



ROBOTICS

Product specification

Robot stopping distances according to
ISO 10218-1



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Product specification
Robot stopping distances according to ISO 10218-1

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Original instructions.

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Overview of this specification

About this specification

This specification contains stopping distances and times for stop category 0 and stop category 1, as required by EN ISO 10218-1 Annex B.

Usage

This specification should be used when calculating the safe distance in applying safeguarding devices.

Who should read this manual?

This specification is intended for:

- Personnel working with planning of robot systems

References

Documentation referred to in the manual, is listed in the table below.

Document name	Document ID
<i>Safety manual for robot - Manipulator and IRC5 or OmniCore controller</i> ⁱ	3HAC031045-001
Product specifications for the respective robots, see ABB Robotics One. https://one.robotics.abb.com/en/knowledge-hub	
Standard: <i>EN ISO 10218-1, Annex B</i>	

ⁱ This manual contains all safety instructions from the product manuals for the manipulators and the controllers.

Revisions

Revision	Description
-	First edition. Release 13.2.
A	Release 14.1. The following robots are added: • IRB 120 • IRB 140 • IRB 6700 • IRB 260 • IRB 460 • IRB 660 • IRB 760
B	Release 15.1. The following robots are added: • IRB 6700 variants • IRB 1200 • IRB 1520 • IRB 1600 Descriptions about the data and measurements are updated.
C	Release 15.2.

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Revision	Description
	The following robots are added: • IRB 2400 • IRB 4400 • IRB 8700  Note Category 0 values are missing for IRB 7600 2.80 m 340 kg.
D	Release 16.1. The following robots are added: • New variants for IRB 1600ID This revision includes the following additions and/or changes: • A description of how to measure the stopping distance and time for your installation is added, see Measuring stopping distance and time on page 17.
E	Release 16.1. • Rename of the new variant IRB 1600ID - 6/1.55 to IRB 1660ID - 6/1.55. • Re-inserted IRB 1600ID-4/1.5 that was missing in the previous revision.
F	Release 16.2. • Improved measurements for 4-axis articulated robots. • Category 0 values are added for IRB 7600 340/2.80.
G	Release 17.2. • Updated data for all previously published robots. • Added information about naming conventions, see Naming of product variants in this document on page 15. • The following robots are added: - IRB 360  Note For stop category 0, the robot may hit the mechanical stops before the speed is reduced to 0. - IRB 6700Inv
H	Release 19A. The following robots are added: • IRB 6790 • IRBP K, IRBP L, IRB R  Note Data for IRBP C will be added in a later release.
J	The following robots are added: • IRB 910SC
K	The following robots are added: • IRBP A, IRBP B, IRBP D • Corrected names in tables for IRBP R.
L	The following robots are added: • IRB 910INV • IRB 1100 • IRBP C

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Revision	Description
M	Added back IRB 2600, that was accidentally removed from revision L.
N	Added correct graphics for IRB 2600. The graphics used in revisions J to M are not correct.
P	Release 20C. The stop category 0 data for all IRBP is updated with graphics. The following robots are added: IRB 1300
Q	Release 20C. The following robots are added: IRB 760, 445 kg variant The description about measurement and calculation is updated.
R	Release 21A. The following robots are added: IRB 390
S	Release 21B. The following robots are added: - CRB 1100 - CRB 15000
T	Release 21C. The following robots are added: IRB 920 The graphs for IRB 1660ID are corrected.
U	Release 22A. The following robots are added: - IRB 1300-12/1.4 - IRB 5710 - IRB 5720 The robot IRB 260 is removed as it is phased out from the official product offer.
V	Release 22B. The following robots are added: IRB 365
W	Release 22C. The following robots are added: - IRB 1010 - IRB 920, new variants
X	Release 22D. The following robots are added: CRB 1300
Y	Release 23A. - IRB 365, new variants - The robot IRB 140 is removed as it is phased out from the official product offer. - The robot IRB 6640 is removed as it is phased out from the official product offer.
Z	Release 23B. The data for the CRB 15000 and IRB 5710/5720 robots is moved to their respective product specification. All documents are available on www.abb.com/robotics.

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Revision	Description
	The data for new robots is included in their respective product specification. Removed duplicated pages for IRB 1010.
AA	Release 23C. The following robots are added: IRB 1510 The data for the CRB 1100, CRB 1300, IRB 1010, IRB 1100, IRB 1300, IRB 910INV, and IRB 920 robots is moved to their respective product specification. All documents are available on www.abb.com/robotics. The data for new robots is included in their respective product specification.
AB	Release 24A. - Corrected the stop category 0 data for IRB 1600. - IRB 120 is phased out from the product offer.
AC	Release 24B. - IRB 1410 is phased out from the product offer. - IRB 910SC is phased out from the product offer. - The stopping data for IRB 1200 OmniCore robots is moved to <i>Product specification - IRB 1200, 3HAC081417-001</i>.
AD	Published in release R25.3. The following updates are made in this revision: - IRB 6700 is phased out from the product offer. - IRB 7600 is phased out from the product offer. - Company name updated to reflect current legal entities.
AE	Company name updated to reflect current legal entities.
AF	Published in release 26B. The following updates are made in this revision: - IRB 2400 is phased out from the product offer. - IRB 6650S is phased out from the product offer.

1 About the data

Robot stopping distances and times

For articulated and SCARA robots, all measurements and calculations of stopping distances and times are done according to ISO 10218-1, with single axis motion on axes 1, 2, and 3. If more than one axis is used for the movement, then the stopping distance and time can be longer or shorter. The movement of the axes does not necessarily represent the actual application. Therefore, the braking distance must be validated for each application.

Normal delays of the hardware and software are taken into account. See more about the delays and their impact on the results, [Reading the data on page 15](#).

For delta robots (parallel arm) the values are based on movement by all axes, as these axes always move together. Only stopping times are presented.

For positioners the values are based on single axis movement.

The stop categories 0 and 1 are according to IEC 60204-1.

Stop category 0

The stopping distance and time for stop category 0 are simulated using maximum speed, maximum payload, and the arm stretched out to the maximum reach.



Note

For SCARA robots without brakes on axis 1 and 2, the stopping distances for stop category 0 in actual applications can be longer than those stated in this document because without brakes, it is the friction that will stop the robot (on axes without brakes).

Stop category 1

The stop category 1 data are based on calculations in simulation of worst case scenarios. The data for stop category 1 are verified by measurements.

The simulations and verifications are done with the default value (100%) for the system parameter *AccSet*. Changing this value will affect the stopping distances and times (only for robots running on versions prior to RobotWare 6.01).



Note

The stop category 1 is a controlled stop and will therefore have less deviation from the programmed path compared with a stop category 0.

Robots

For robots the stopping distance and time for stop category 1 is provided for three arm extensions and three payloads. These variables are 100%, 66%, and 33% of the maximum values for the robot.

The speed and zone data in the simulations are based on TCP0.

Continues on next page

1 About the data

Continued

Positioners

For positioners the stopping distance and time is provided for three payloads. No extension zones are applicable. The payloads are 100%, 66%, and 33% of the maximum values for the positioner.

Positioners with more than one station are presented with only one station data as the stations are identical.

Loads

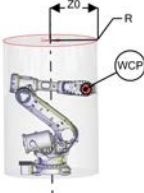
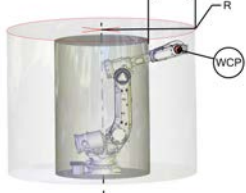
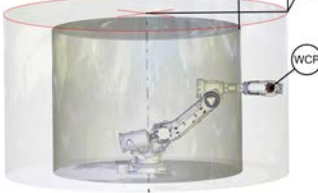
The used loads represent the rated load, with rated inertia in the load diagram, maximum cog z, and zero cog x and cog y. No arm load is used. The load diagrams are available in the respective product specification.

At 66% load and 33% load, the mass and inertia are reduced to 66% and 33% but cog z is the same as for 100% load.

Extension zones for articulated robots

The extension zone for the stop category 1 is based on the wrist center point (WCP).

The extension zone limits describe the size of the respective zones. Radius R is measured from the axis-1 center.

Zone 0 (Z0)	Zone 1 (Z1)	Zone 2 (Z2)
Radius (R) is 0-33% of maximum reach of the wrist center point (WCP).  xx1300002264	Radius (R) is 33-66% of maximum reach of the wrist center point (WCP).  xx1300002265	Radius (R) is 66-100% of maximum reach of the wrist center point (WCP).  xx1300002266

Speed

For robots the TCP0 speed is measured in meters per second when the stop is triggered.

For positioners the speed is the angular speed in radians per second.

Stopping distances

The stopping distance is measured in degrees.



Note

The stopping distances are presented as angles. Large angles with TCP0 close to the rotation center do not necessarily correspond to a long stopping distance. Therefore a large stop angle can represent a short TCP stop distance.



Note

The stopping distance for delta robots is measured in meters.

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Stopping times

The stopping time is measured in seconds.

Limitations

The stopping distance can vary depending on additional loads on the robot.

The stopping distance for stop category 0 can vary depending on the individual brakes and their friction.

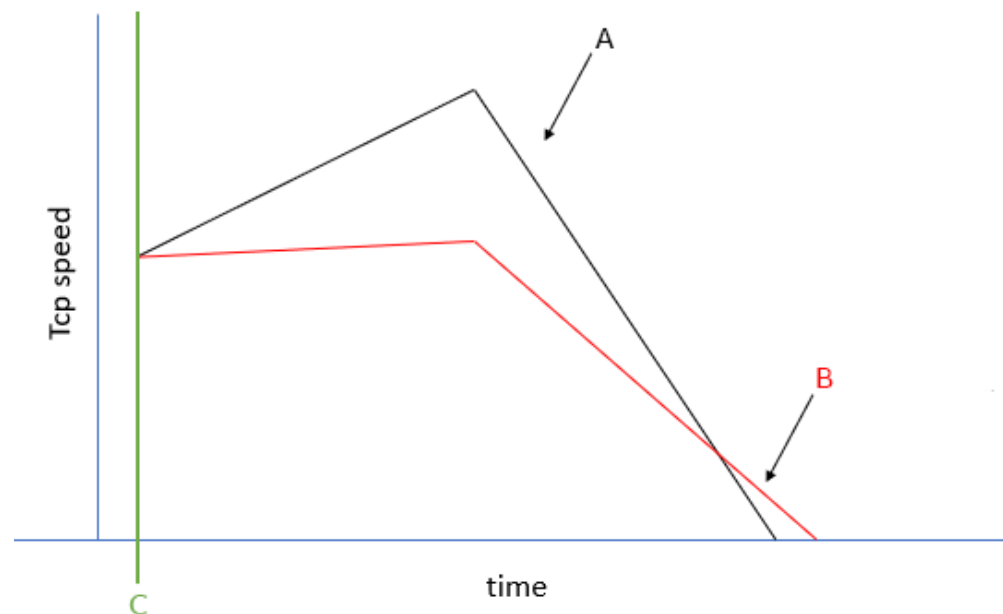
This document includes the robot variants that are part of the official product offer at the time of the release of this revision.

Reading the data

The data for stop category 0 is presented in tables, with distance and time for each axis.

The data for stop category 1 is presented as graphs with curves representing the different loads.

There is a short delay in the stop, which means that if the axis is accelerating when the stop is initiated (C), it will continue to accelerate during this delay time. This can result in graphs where a higher load (A) gives shorter stopping distance than a smaller load (B).



xx2300001041

The tcp speed is the actual speed when the stop is initiated, which is not necessarily the programmed speed.

Naming of product variants in this document

The product variants presented in this document are named according to their reach and capacity. This corresponds to their official variant name but there are a

Continues on next page

few exceptions where the the names do not match due to different data sources.
For example, IRB 6650S 125/3.5 is listed as IRB 6650S 3.45 m 125 kg.

2 Measuring stopping distance and time

Preparations before measuring

For measurement and calculation of overall system stopping performance, see ISO 13855:2010.

The measurement shall be done for the selected stop category. The emergency stop button on the robot controller is configured for stop category 0 on delivery. A risk assessment can conclude the need for another stop category. The stop category can be changed through the system parameter *Function* (topic *Controller*, type *Safety Run Chain*). In case of deviations of the default configuration of stop category 0, then this is detailed in the product specification for the respective manipulator.



CAUTION

The measurement and calculation of overall stopping performance for a robot must be tested with its correct load, speed, and tools, in its actual environment, before the robot is taken into production. Validating the actual data can be part of a yearly maintenance routine.

All load and tool data must be correctly defined (weight, CoG, moment of inertia). The load identification service routine can be used to identify the data.



CAUTION

Follow the safety instructions in the respective product manual for the robot.

Measuring with TuneMaster

The software TuneMaster can be used to measure stopping distances and times for ABB robots. The TuneMaster software contains documentation on how to use it.

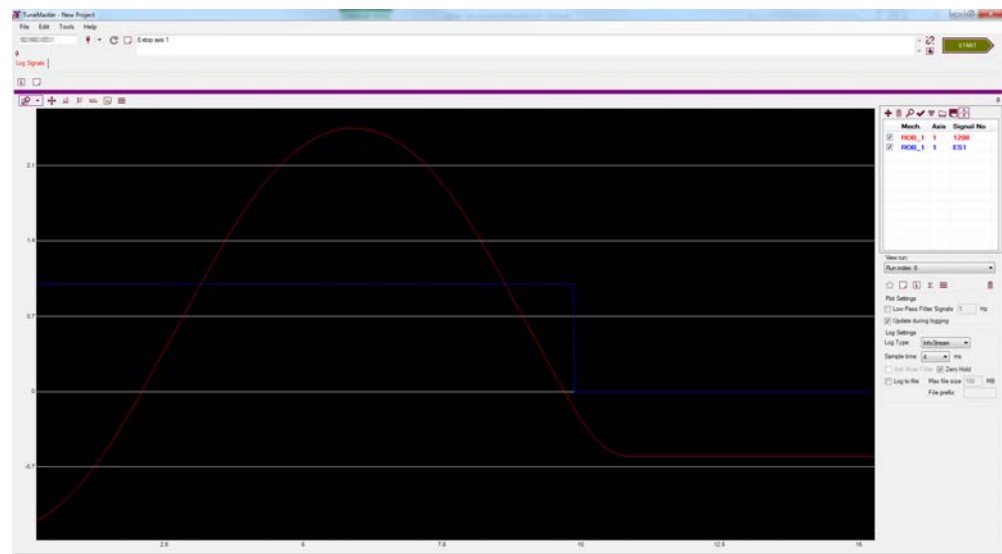
- 1 Download TuneMaster from www.abb.com/robotics, section **RobotStudio - Downloads - RobotWare Tools and Utilities**.
- 2 Install TuneMaster on a computer. Start the TuneMaster app and select **Log Signals**.
- 3 Connect to the robot controller.
- 4 Define the I/O stop signal to use for measurement, for example, ES1 for emergency stop.
- 5 Define the signal number to use for measurement, 1298 for axis position. The value is given in radians.
- 6 Start the logging in TuneMaster.
- 7 Start the test program on the controller.
- 8 When the axis has reached maximum speed, press the emergency stop button.
- 9 In TuneMaster, measure the stopping distance and time.
- 10 Repeat for all installed emergency stop buttons until the identified hazards due to stopping distance and time for axes have been verified.

Continues on next page

2 Measuring stopping distance and time

Continued

Example from TuneMaster



xx1600000386

3 IRB 1200

3.1 IRB 1200 0.7 m 7 kg



Note

This data is applicable for the IRC5 robot. For OmniCore robots, see *Product specification - IRB 1200, 3HAC081417-001*.

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	32.7	0.14
2	37.2	0.22
3	37.6	0.16

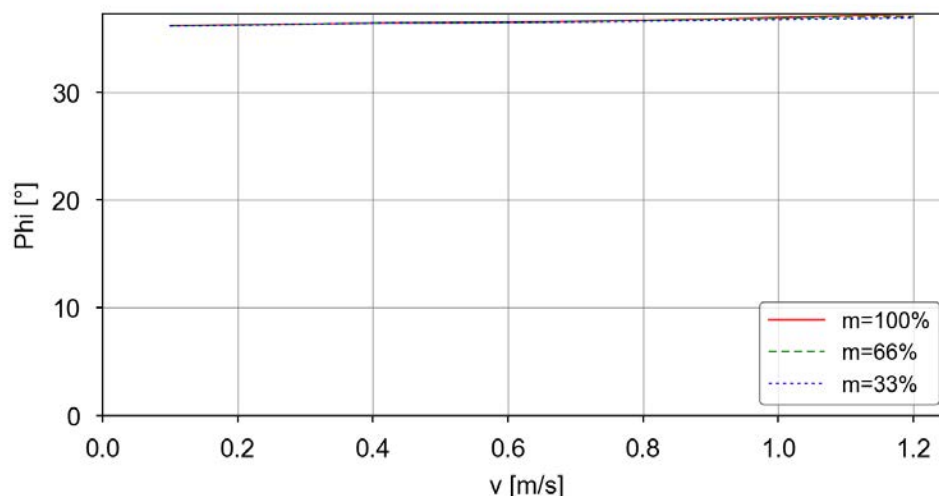
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.235
1	0.235	0.469
2	0.469	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

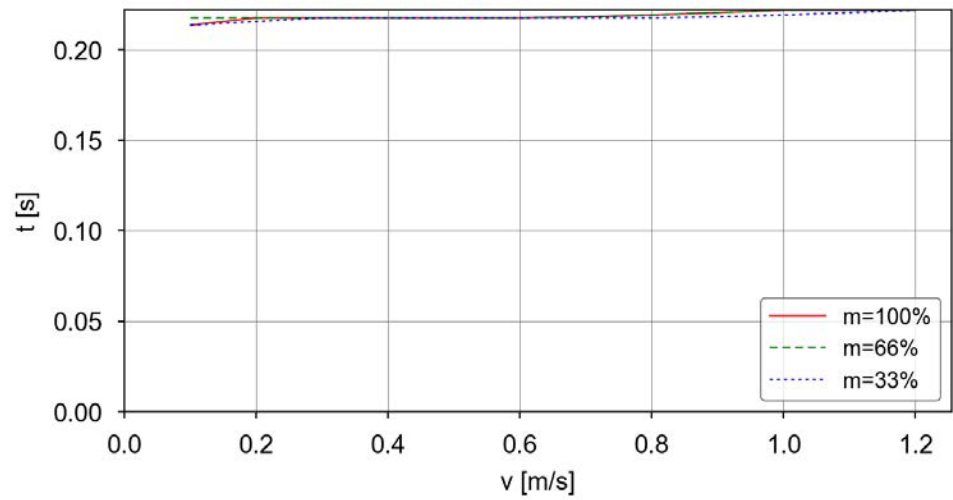


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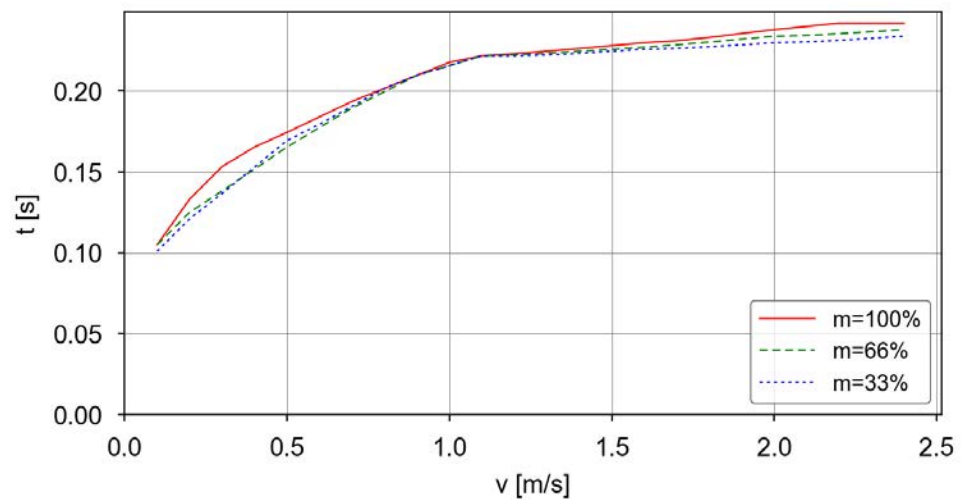
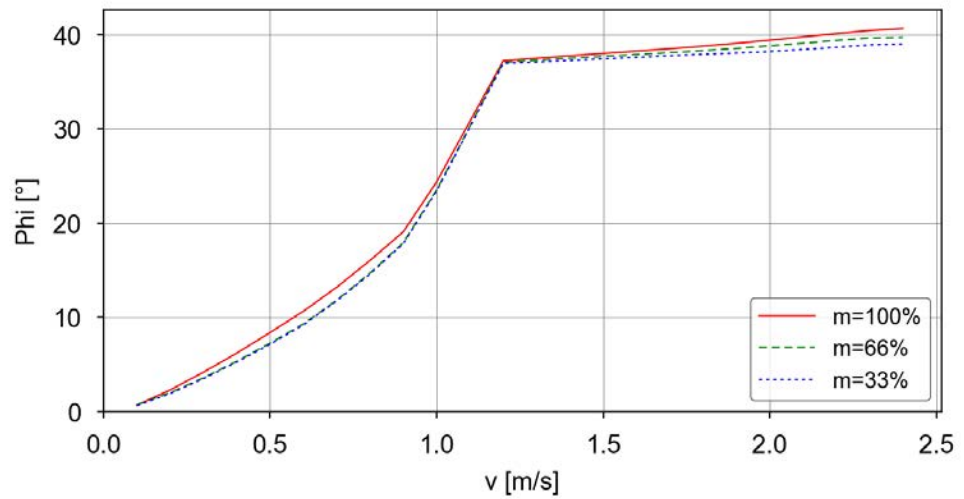
3 IRB 1200

3.1 IRB 1200 0.7 m 7 kg

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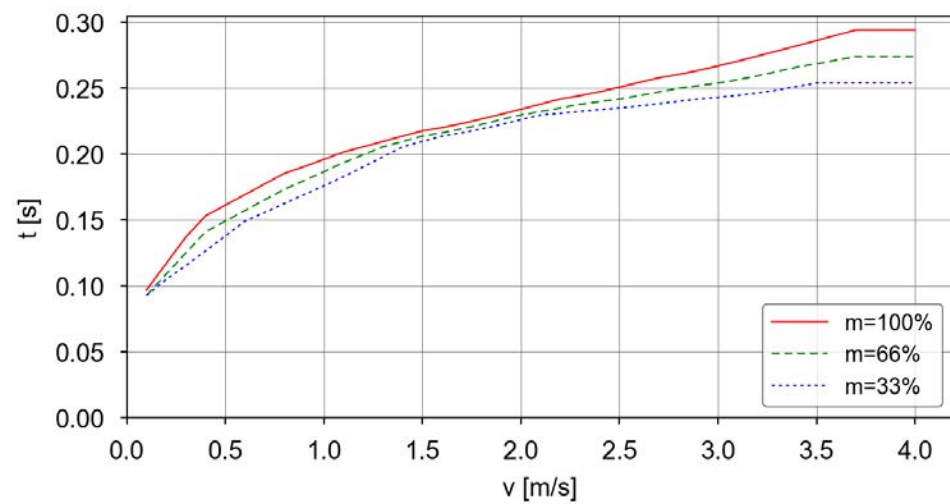
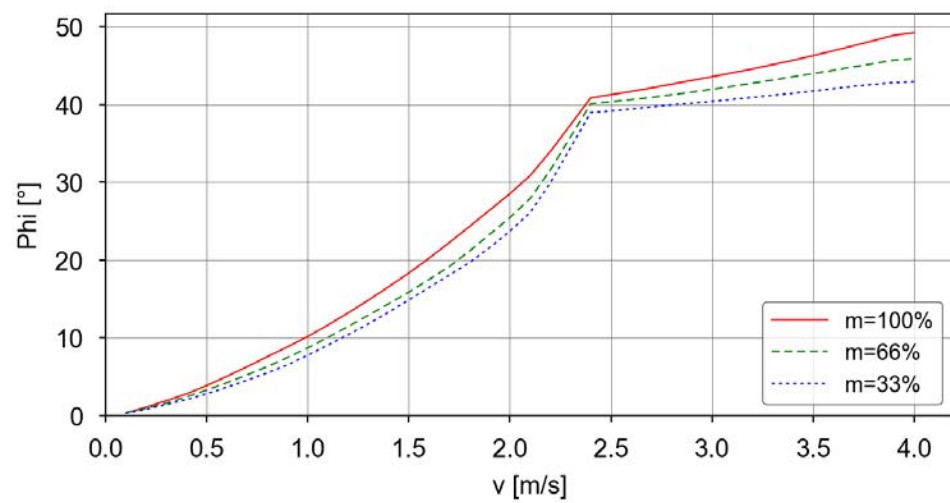


Extension zone 1, stopping distance and stopping time



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Extension zone 2, stopping distance and stopping time



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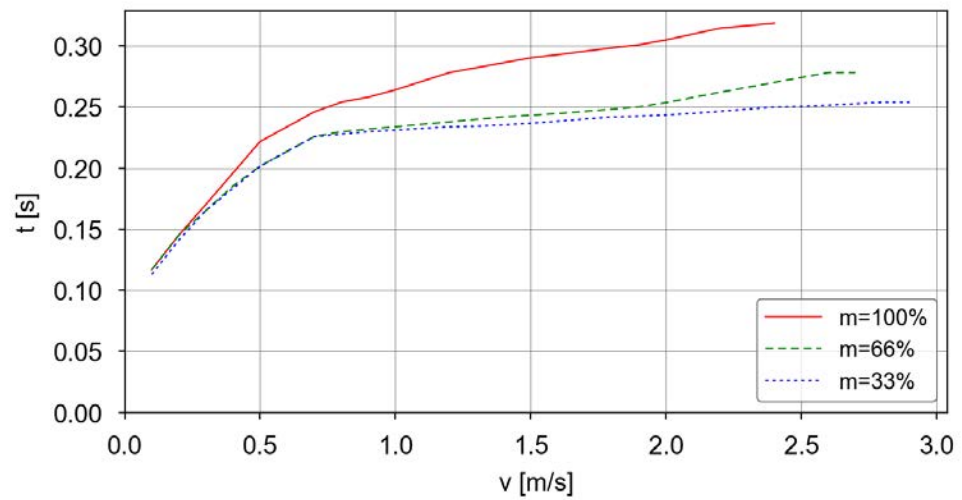
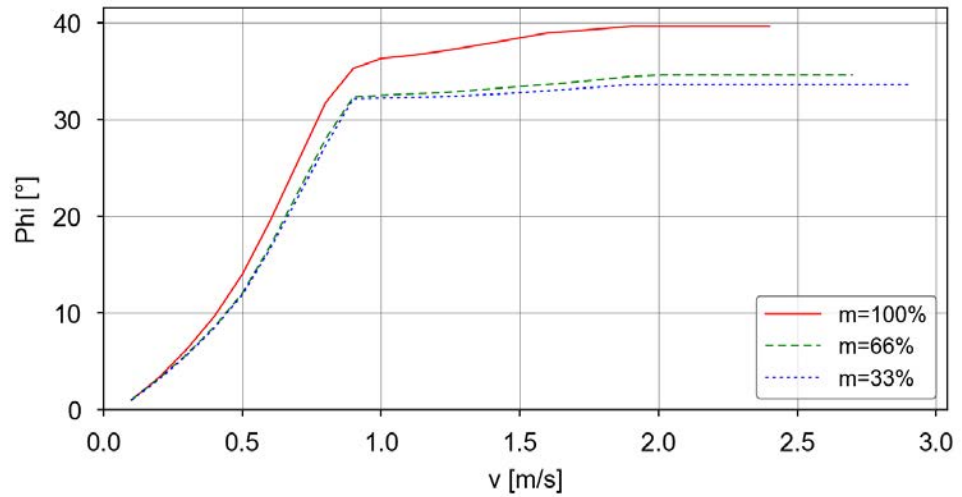
3 IRB 1200

3.1 IRB 1200 0.7 m 7 kg

Continued

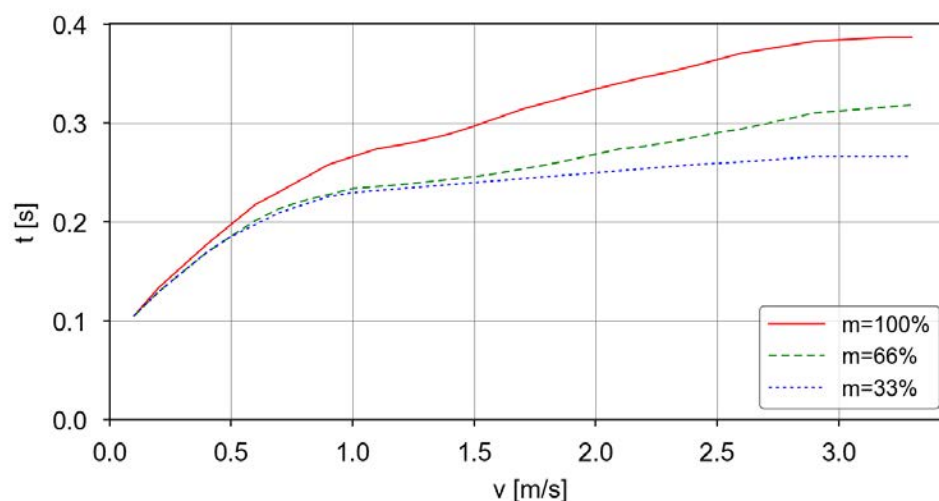
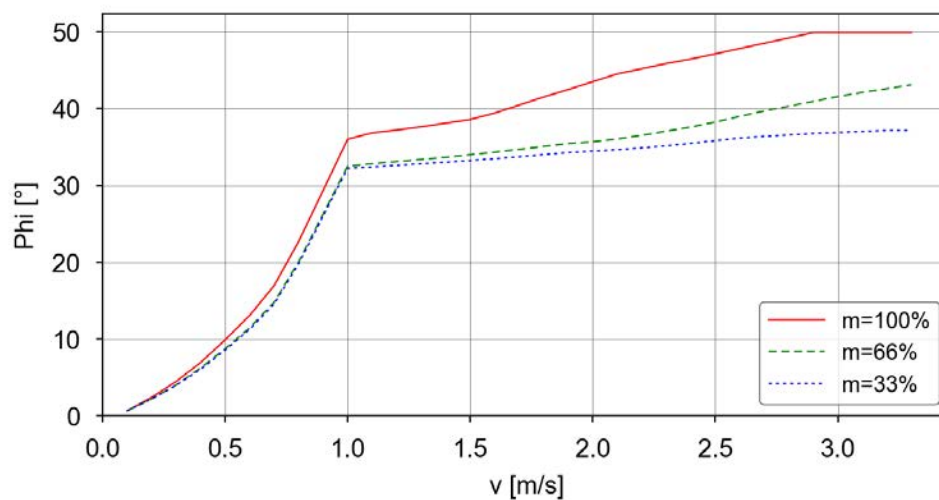
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

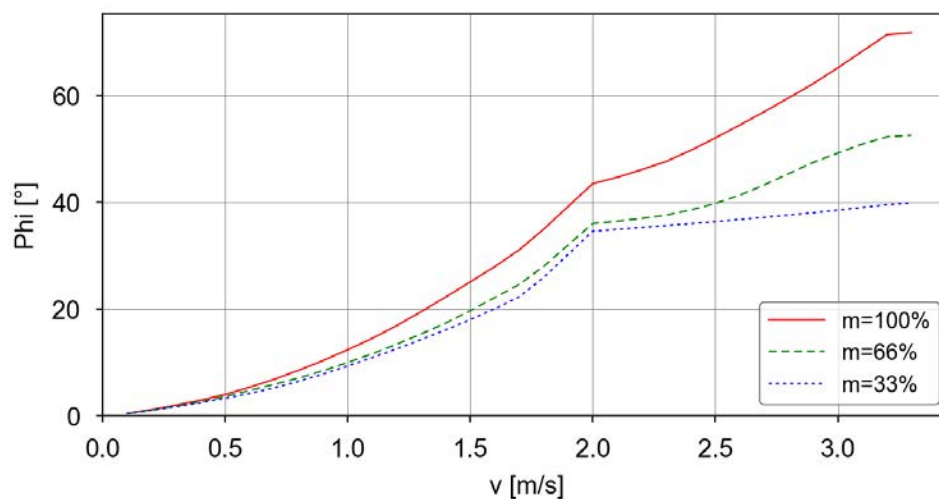


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

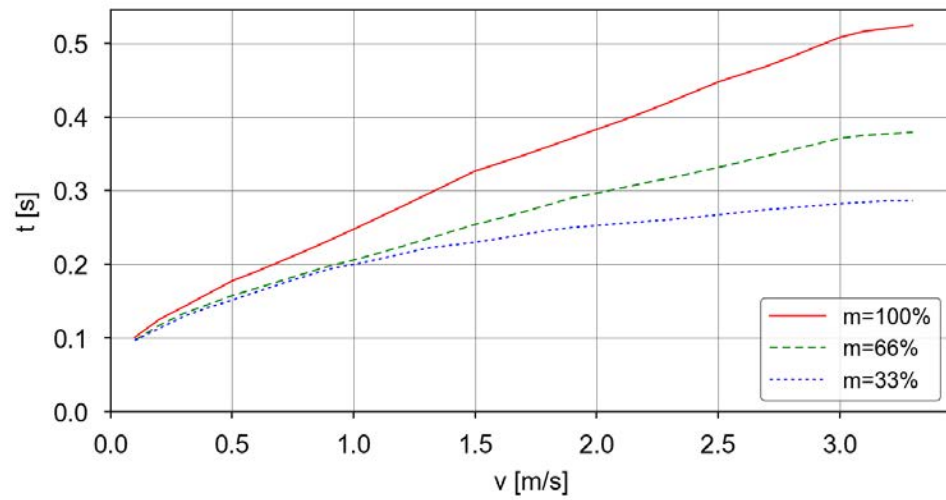


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3 IRB 1200

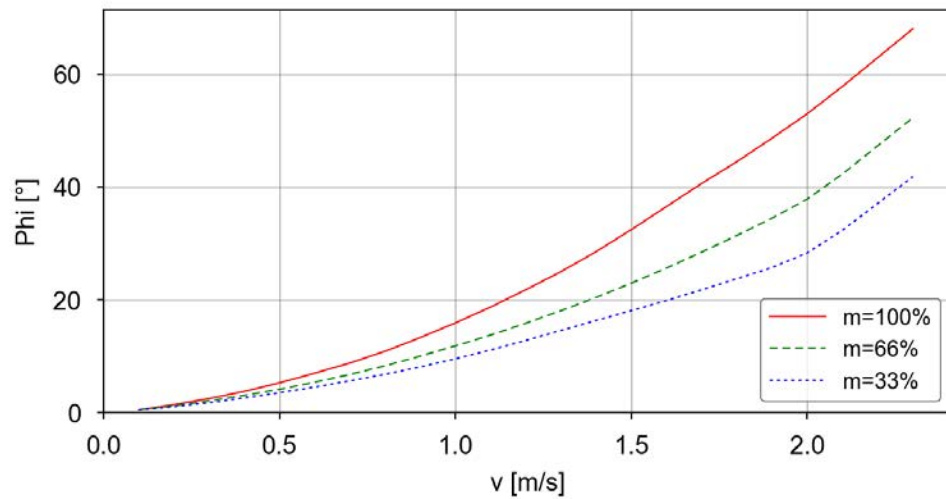
3.1 IRB 1200 0.7 m 7 kg

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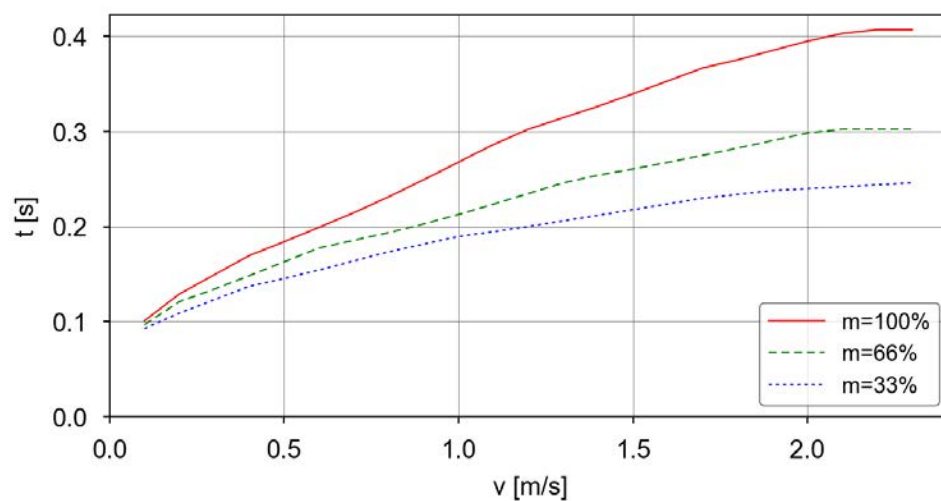


Category 1, Axis 3

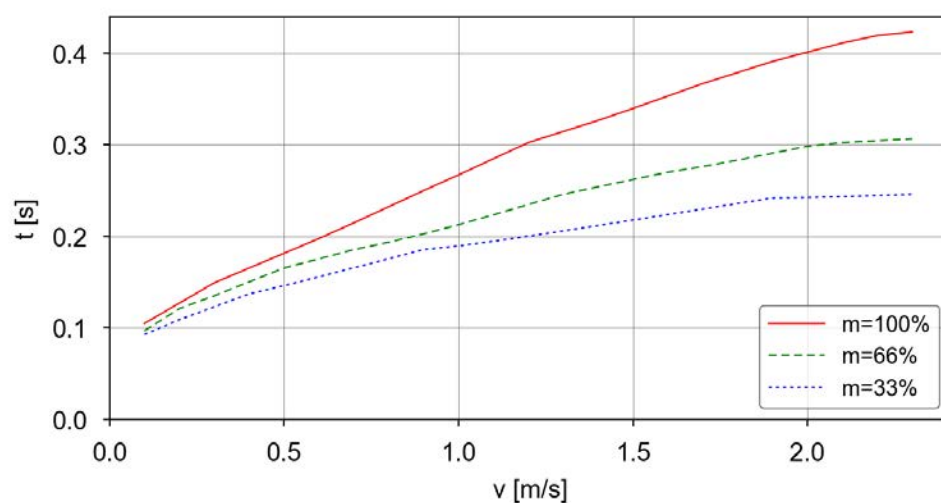
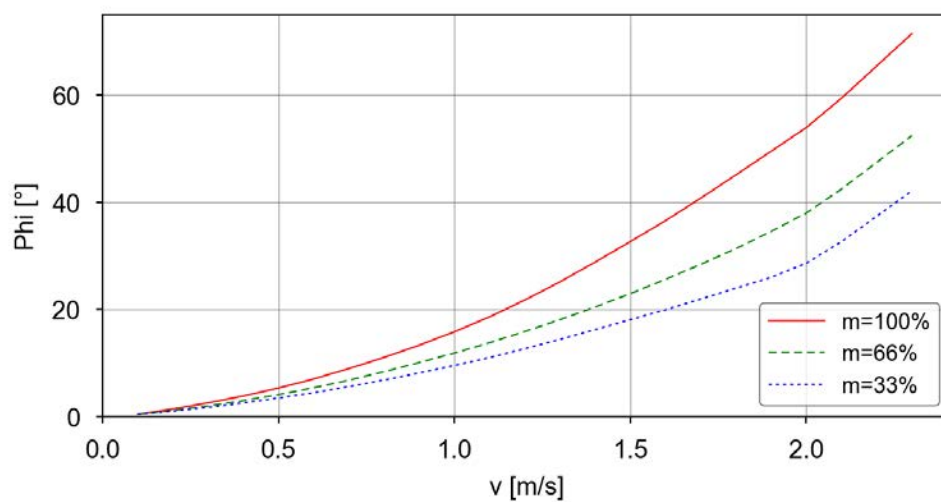
Extension zone 0, stopping distance and stopping time



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Extension zone 1, stopping distance and stopping time



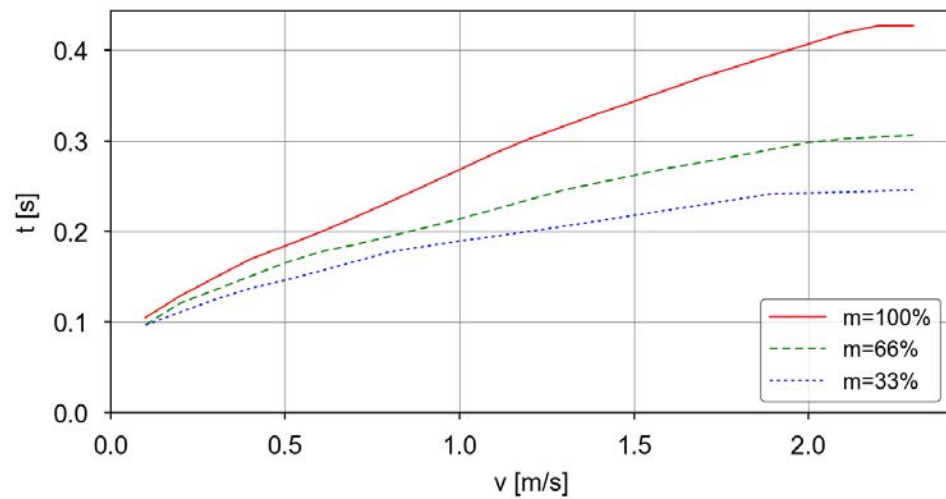
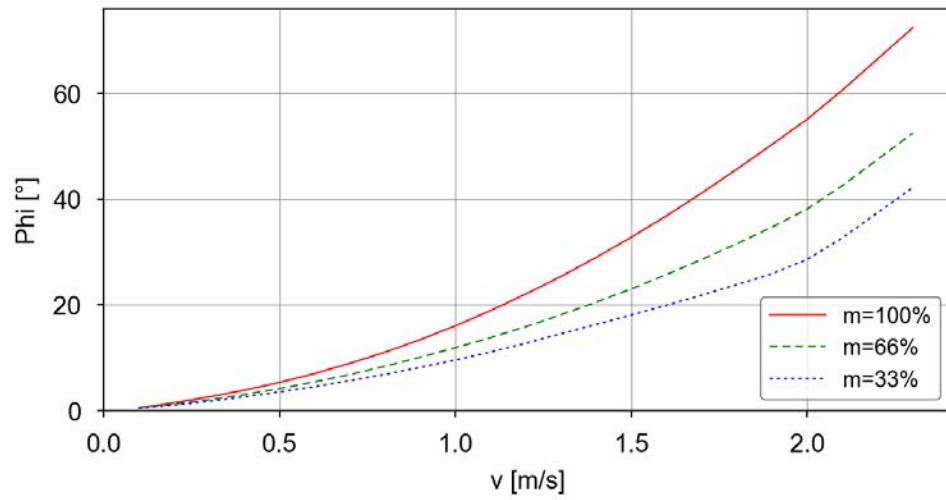
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3 IRB 1200

3.1 IRB 1200 0.7 m 7 kg

Continued

Extension zone 2, stopping distance and stopping time



3.2 IRB 1200 0.9 m 5 kg

**Note**

This data is applicable for the IRC5 robot. For OmniCore robots, see *Product specification - IRB 1200, 3HAC081417-001*.

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	39.1	0.19
2	45.8	0.29
3	42.1	0.2

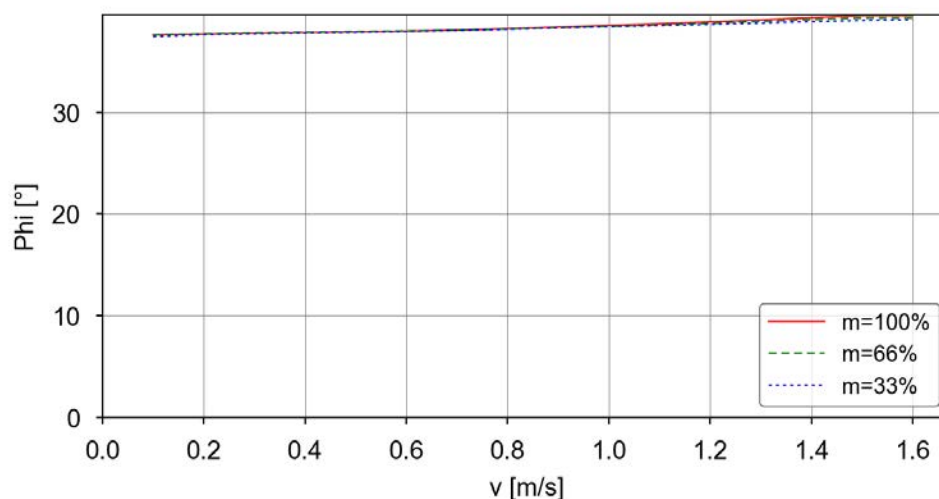
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.3
1	0.3	0.601
2	0.601	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

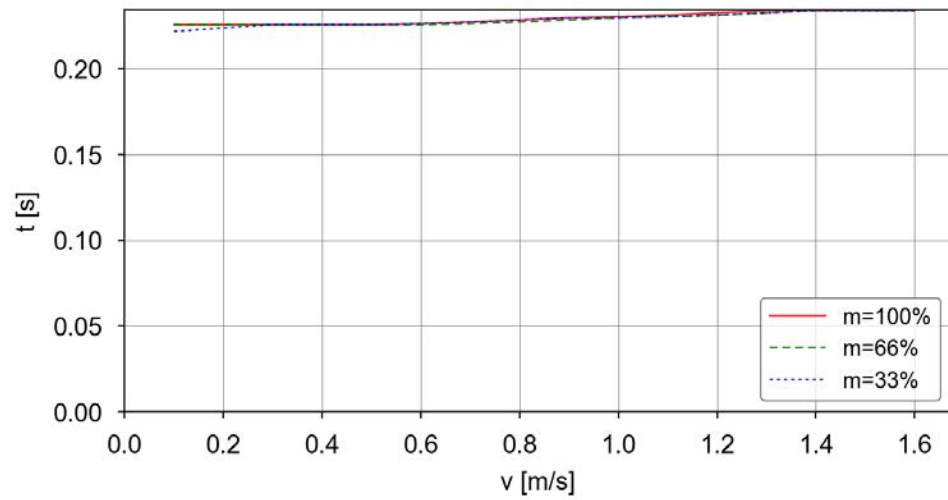


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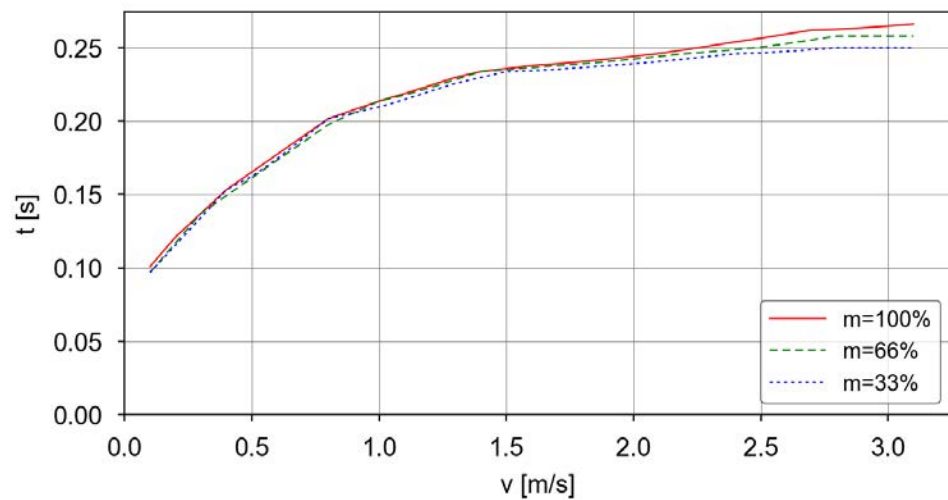
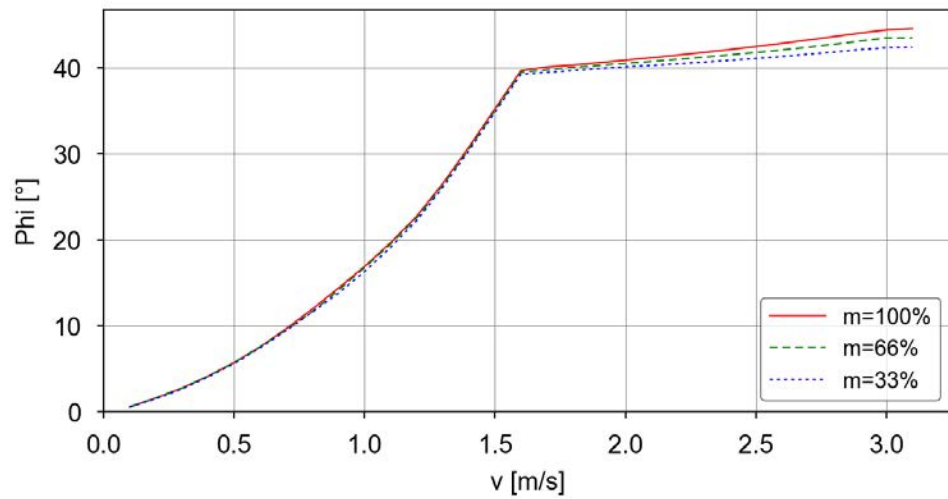
3 IRB 1200

3.2 IRB 1200 0.9 m 5 kg

Continued

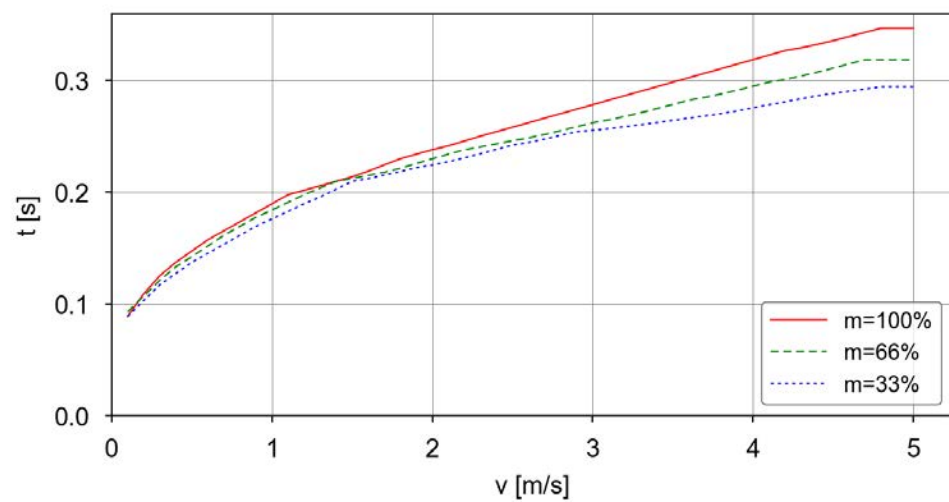
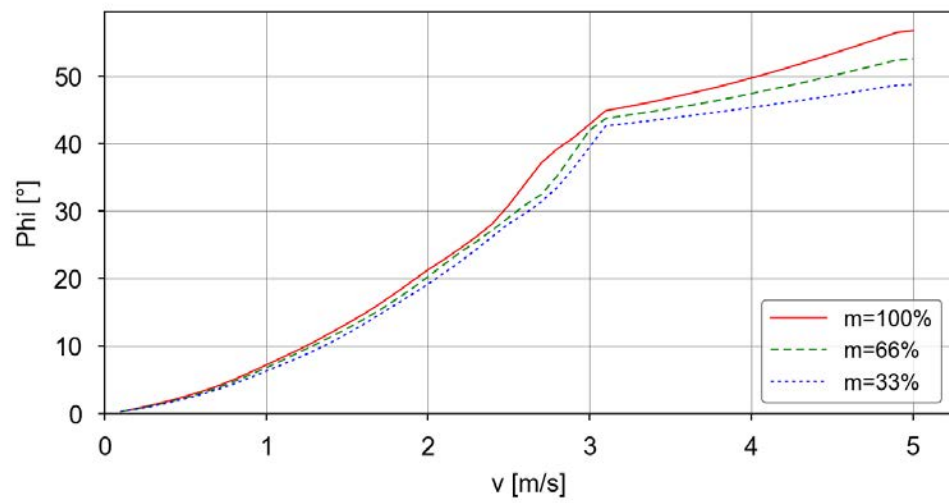


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

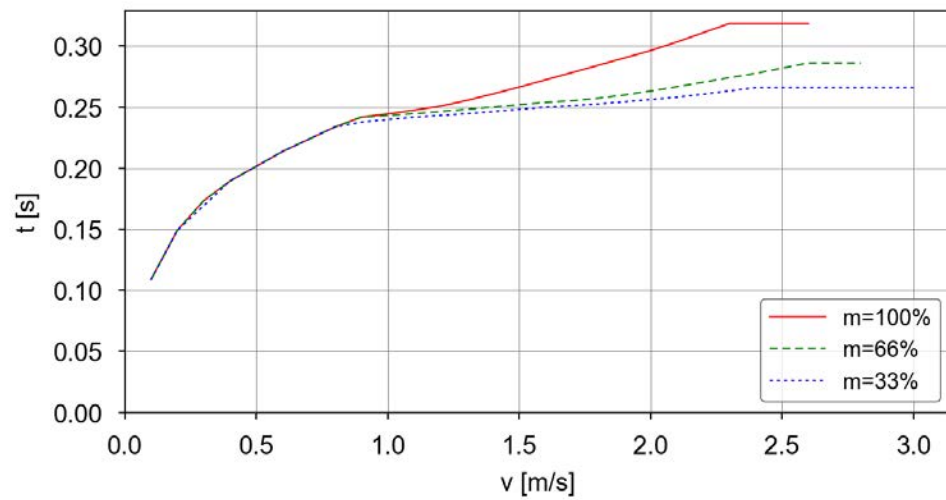
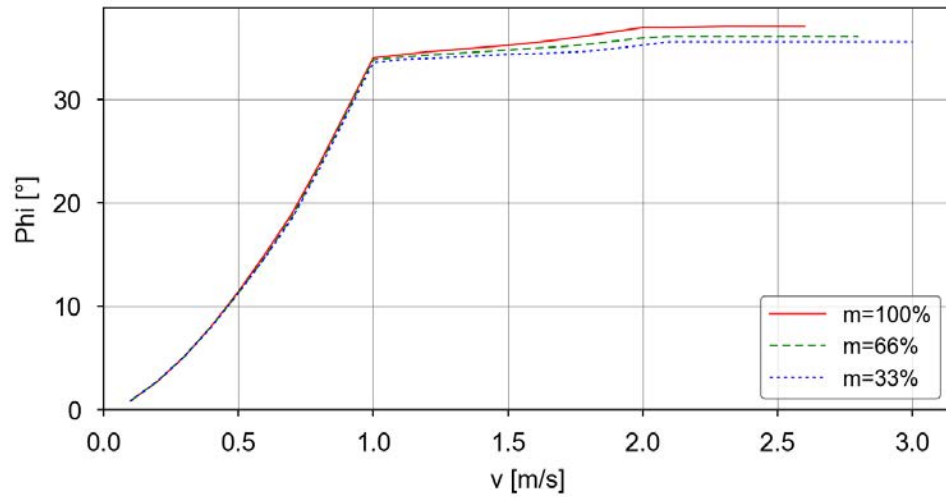
3 IRB 1200

3.2 IRB 1200 0.9 m 5 kg

Continued

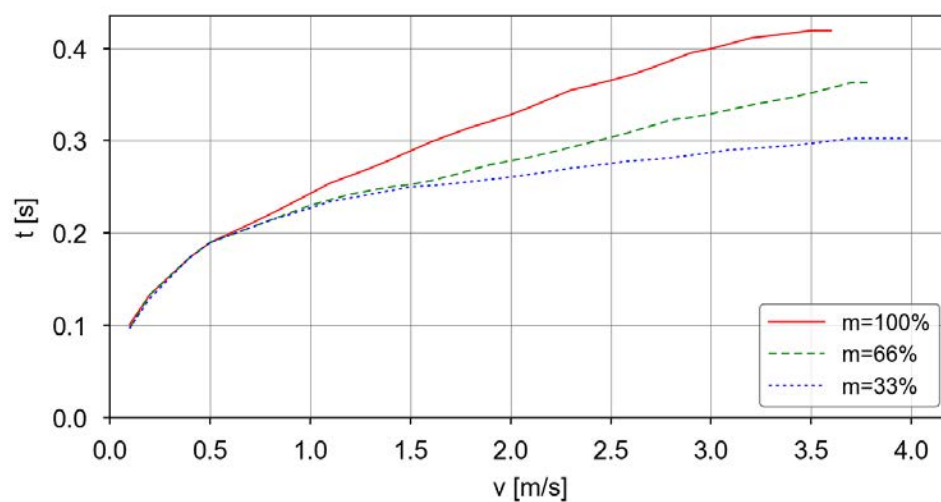
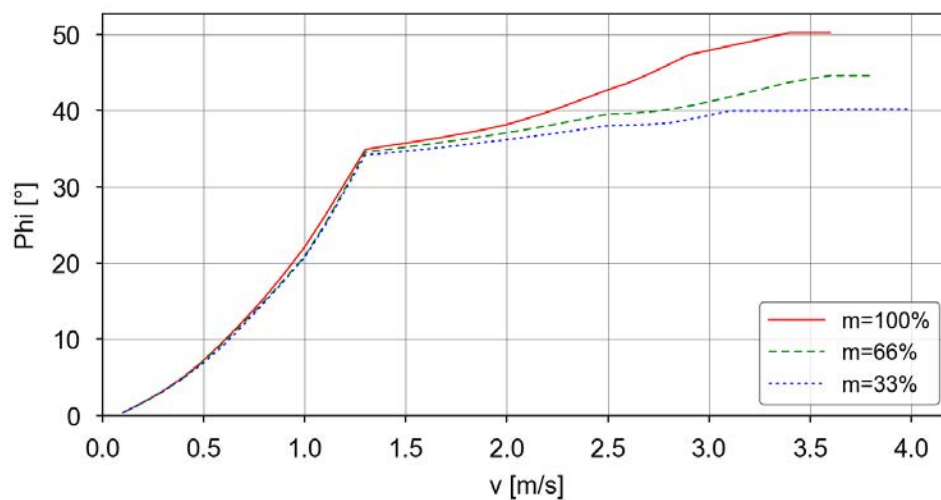
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

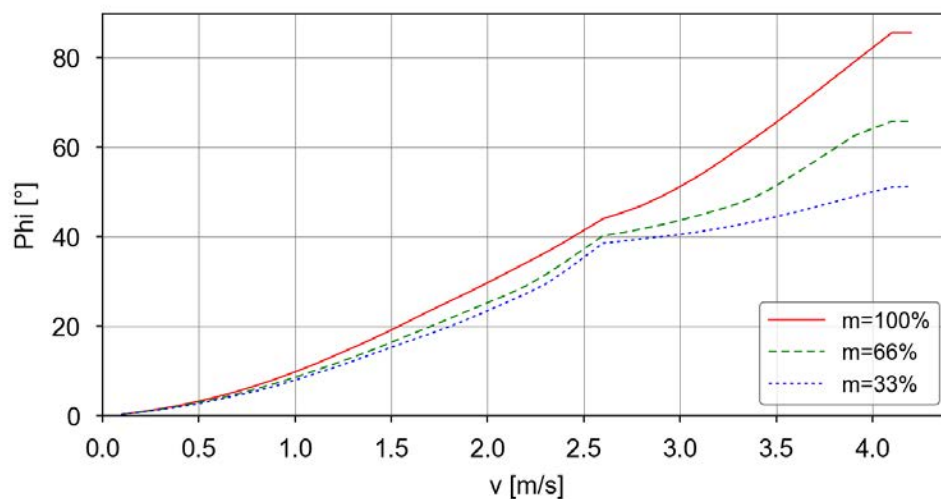


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

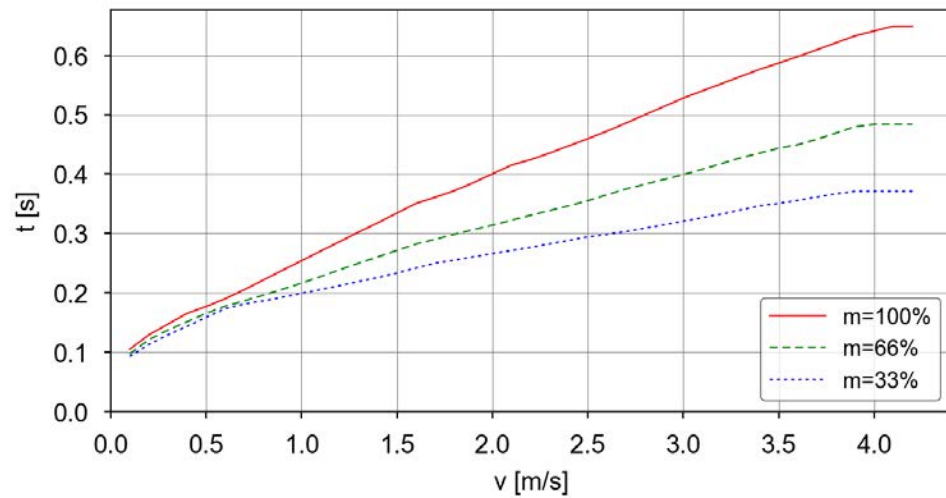


Continues on next page

3 IRB 1200

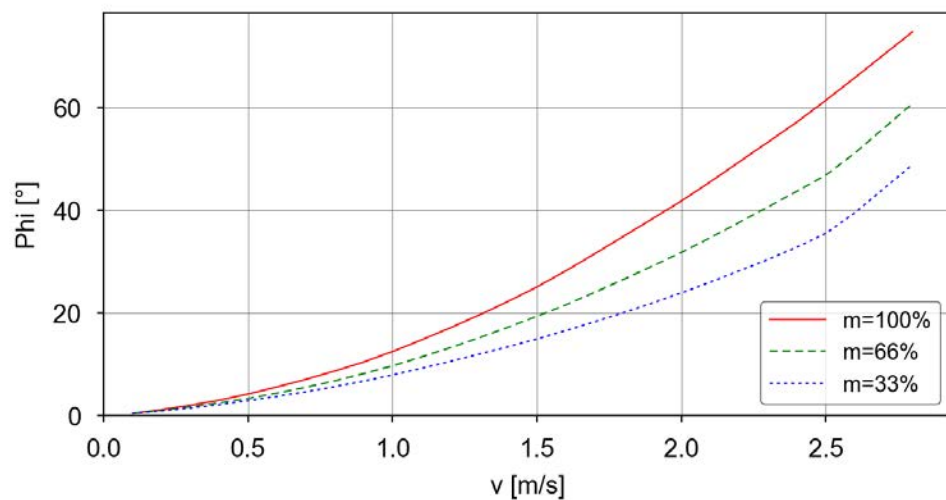
3.2 IRB 1200 0.9 m 5 kg

Continued

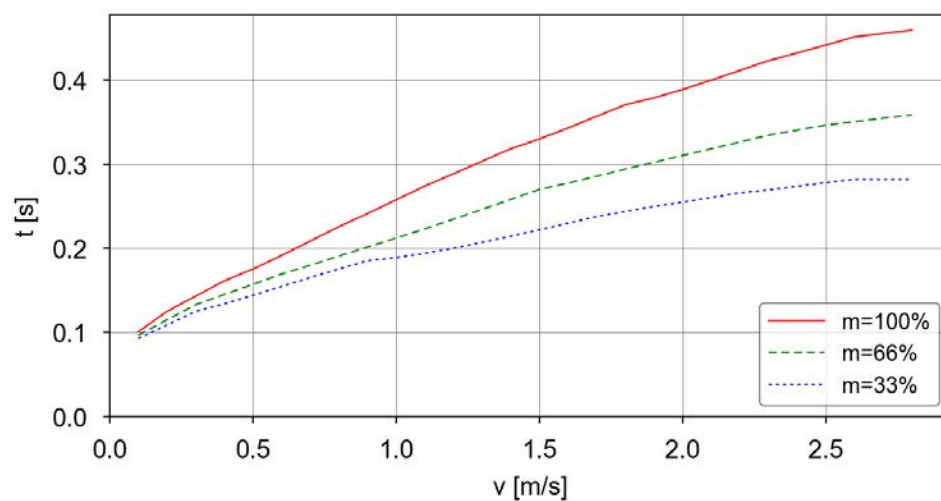


Category 1, Axis 3

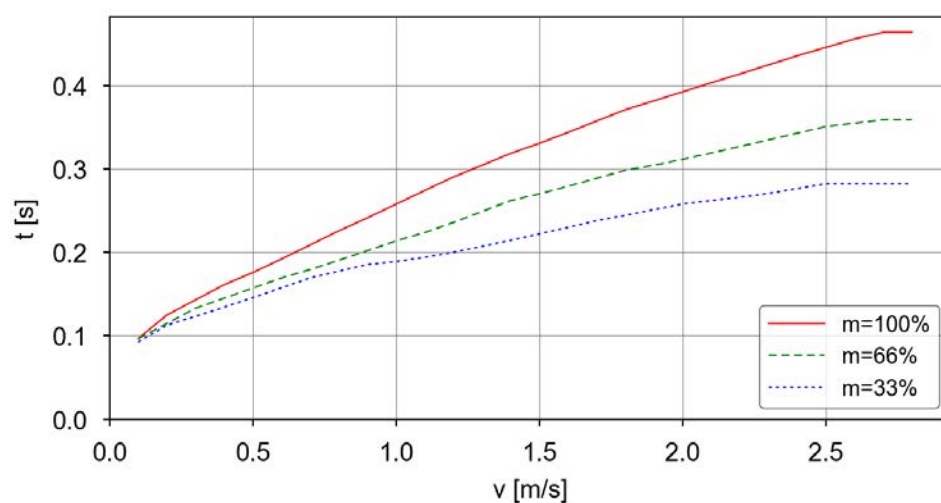
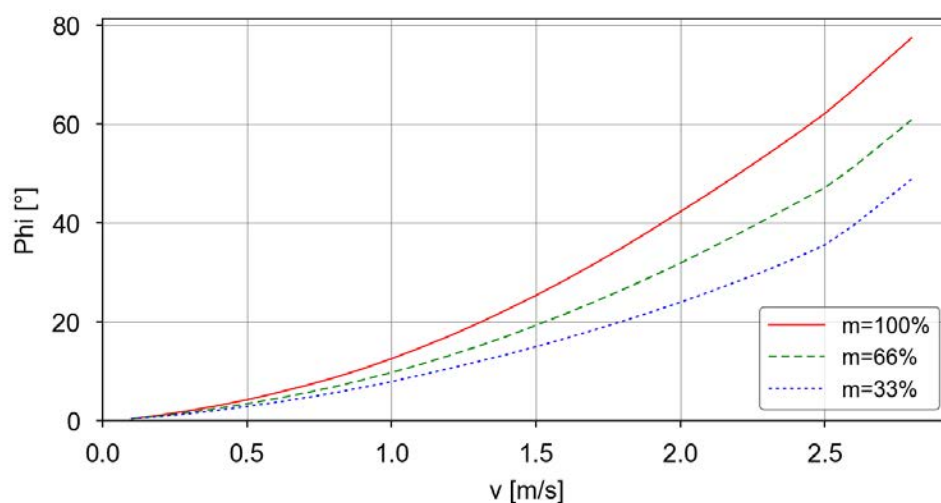
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



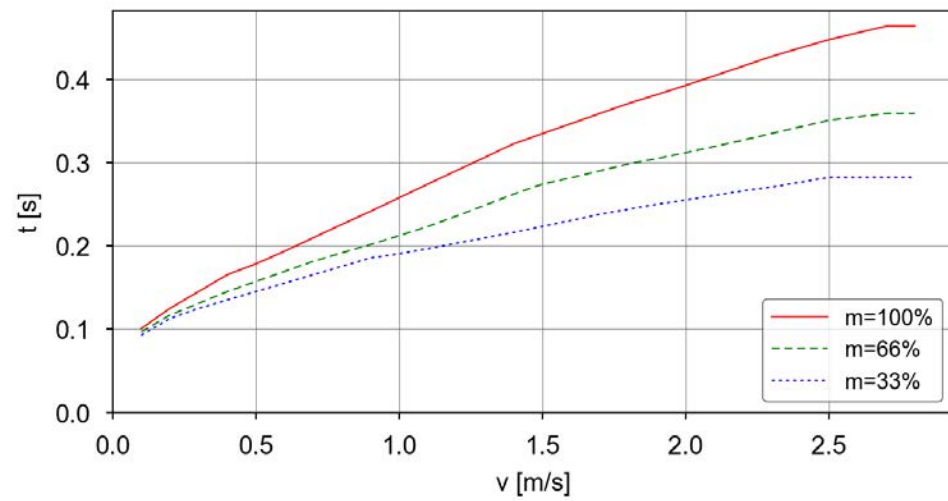
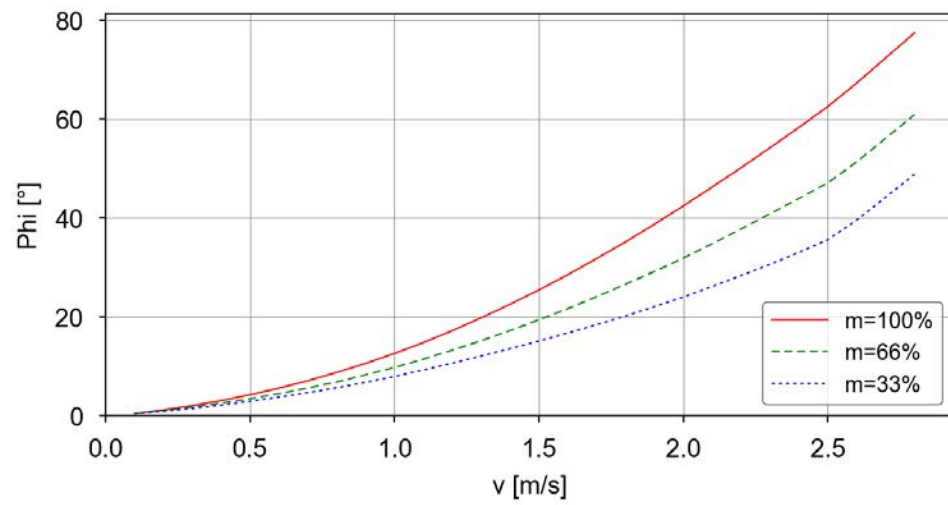
Continues on next page

3 IRB 1200

3.2 IRB 1200 0.9 m 5 kg

Continued

Extension zone 2, stopping distance and stopping time



4 IRB 1510

4.1 IRB 1510ID 1.5 m 4 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	20.2	0.22
2	18.5	0.17
3	15.0	0.12

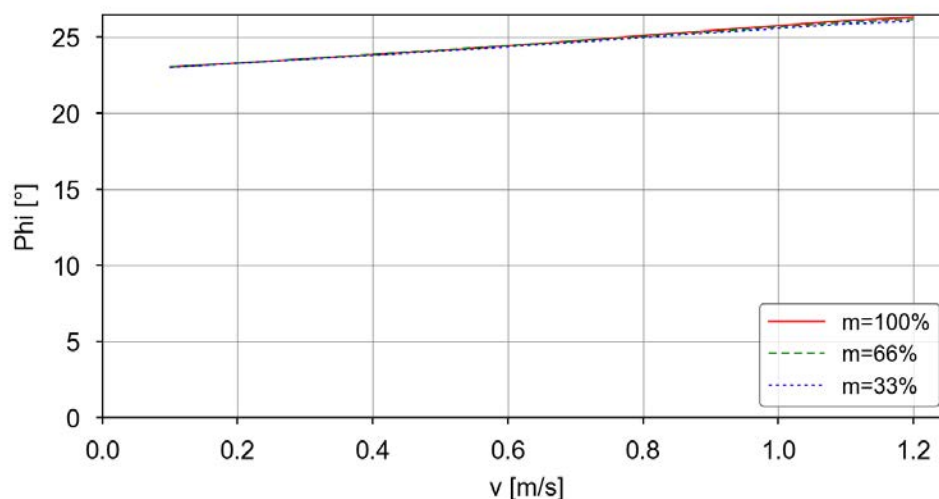
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.5
1	0.5	1.0
2	1.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

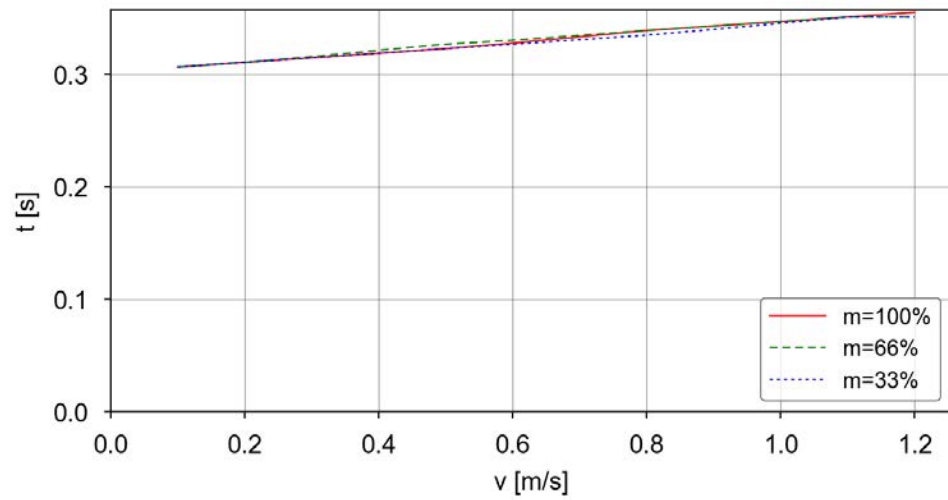


Continues on next page

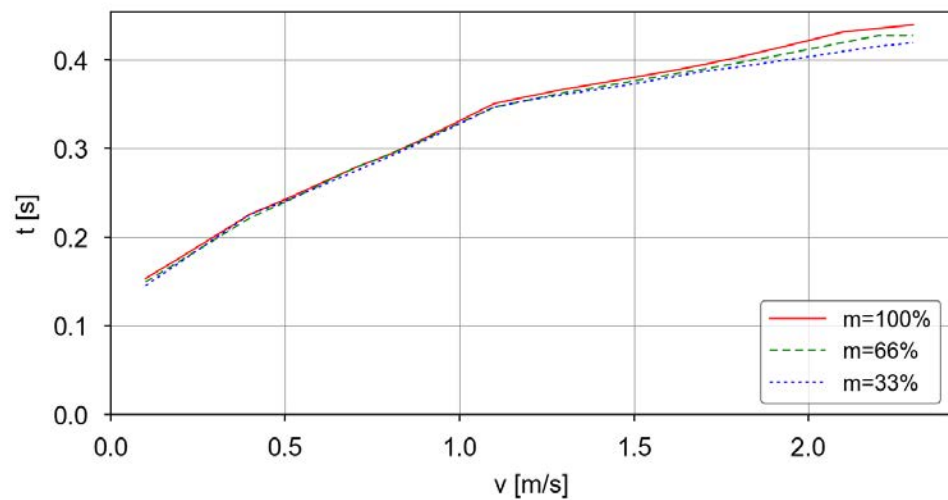
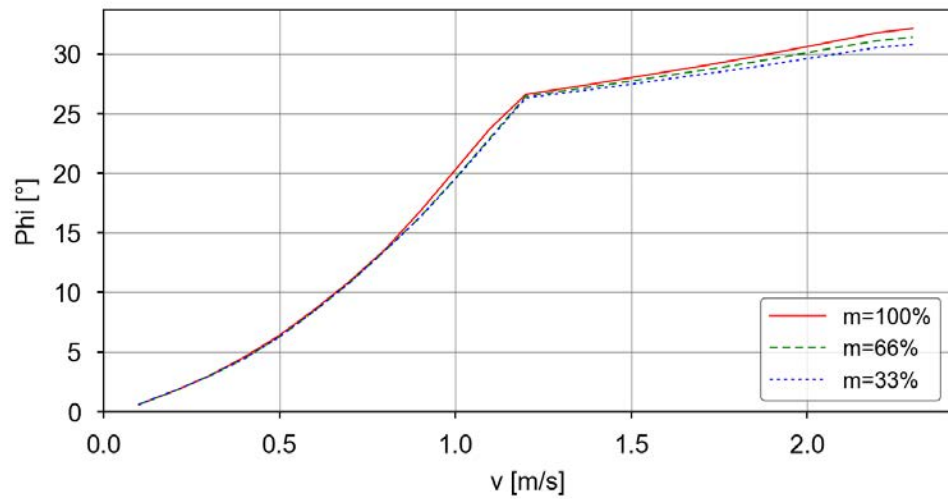
4 IRB 1510

4.1 IRB 1510ID 1.5 m 4 kg

Continued

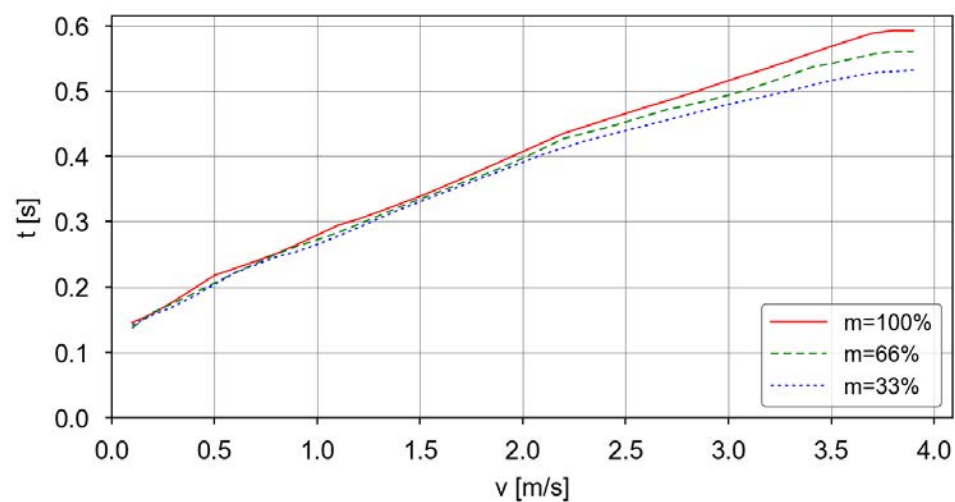
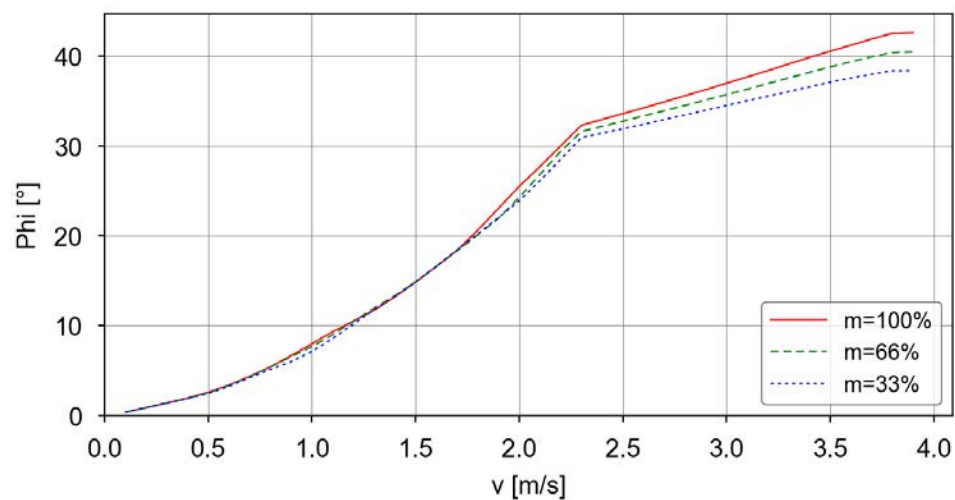


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

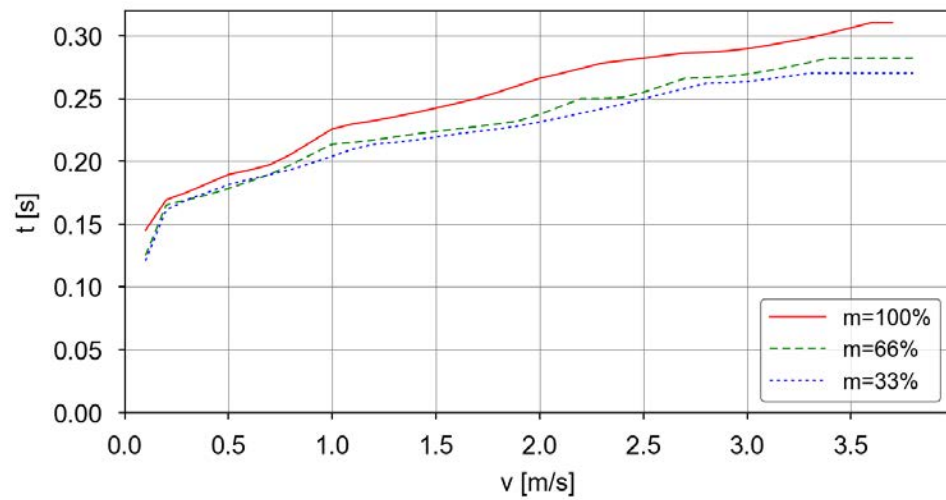
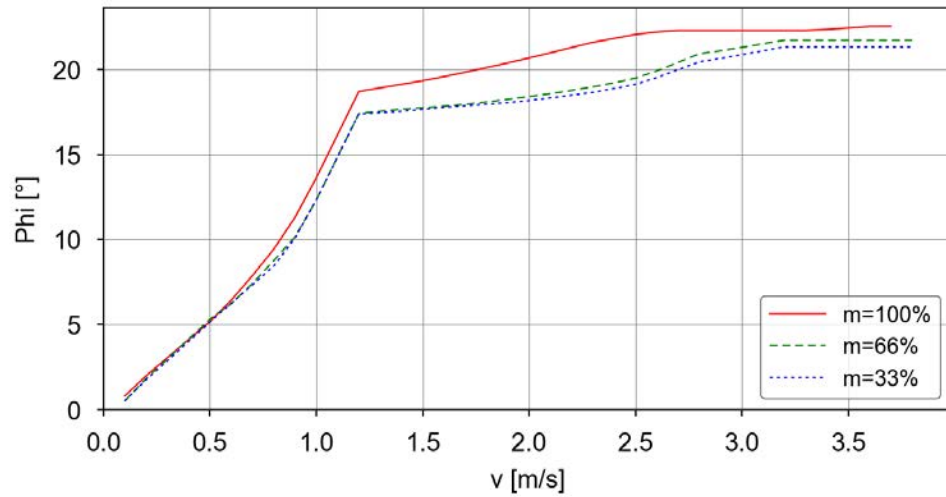
4 IRB 1510

4.1 IRB 1510ID 1.5 m 4 kg

Continued

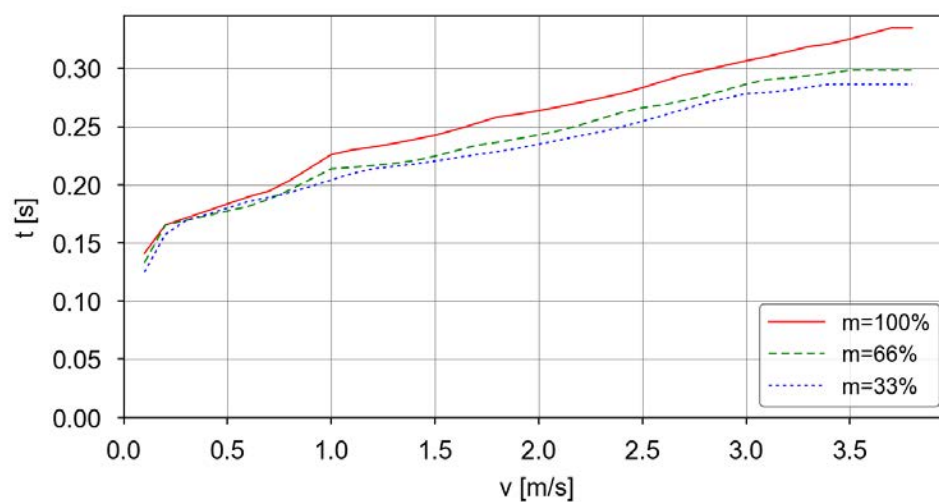
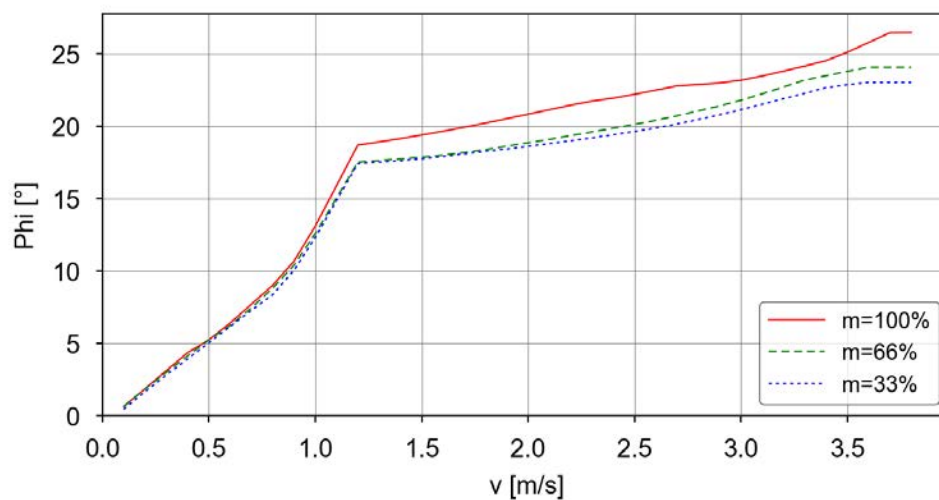
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

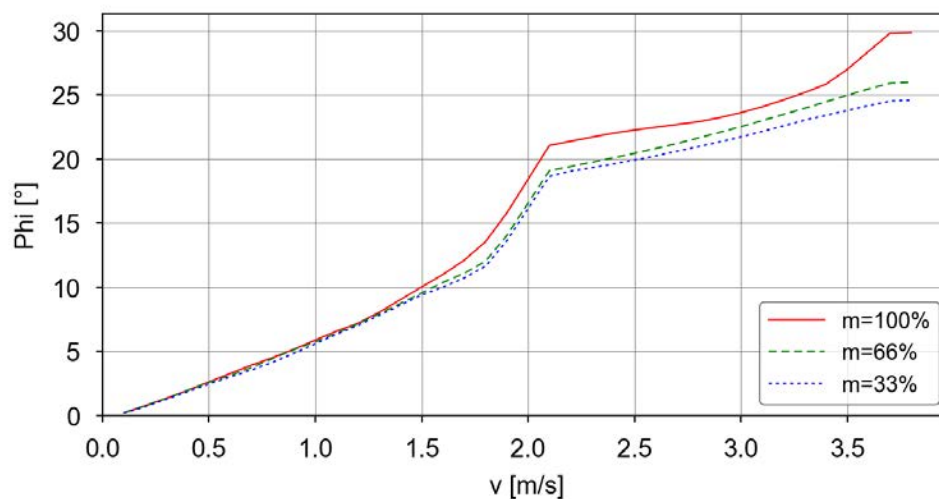


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

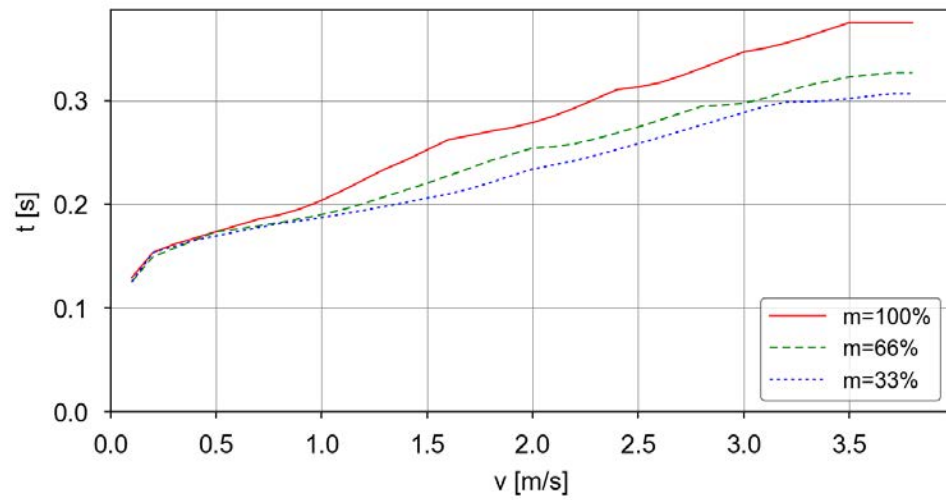


Continues on next page

4 IRB 1510

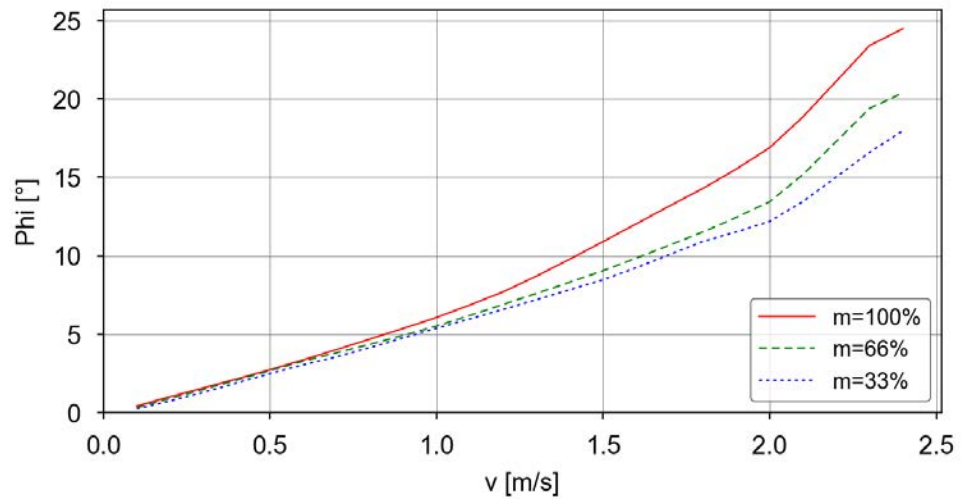
4.1 IRB 1510ID 1.5 m 4 kg

Continued

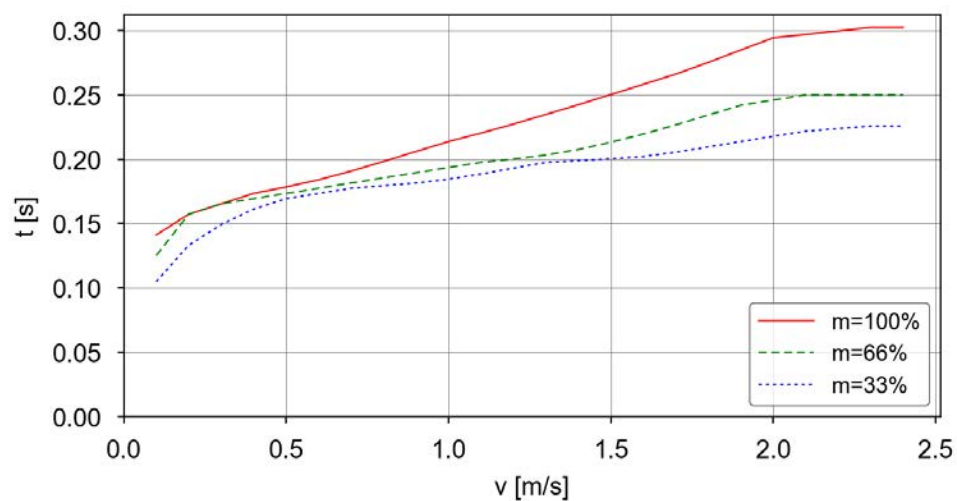


Category 1, Axis 3

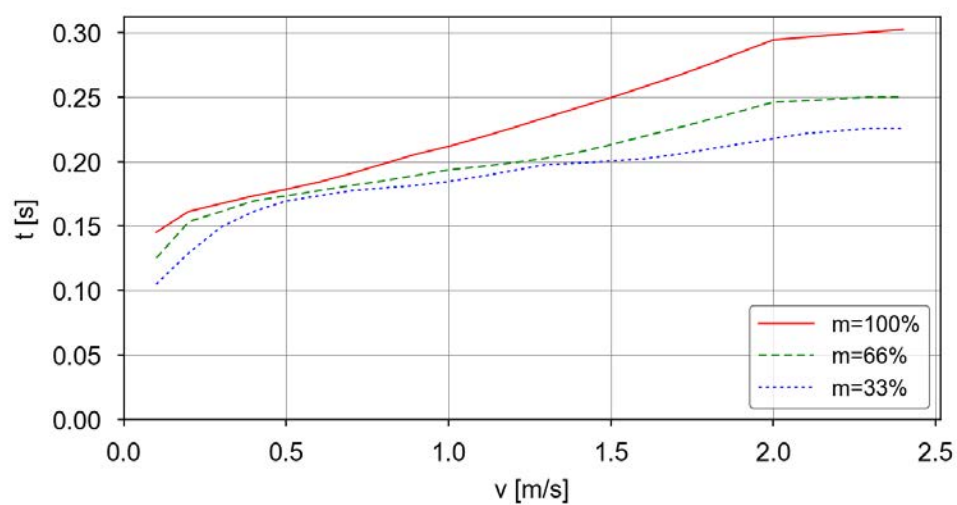
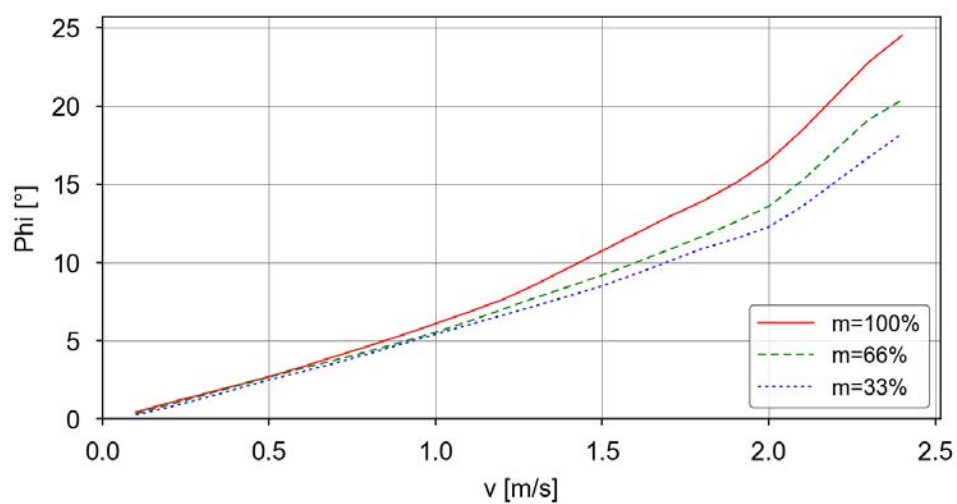
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



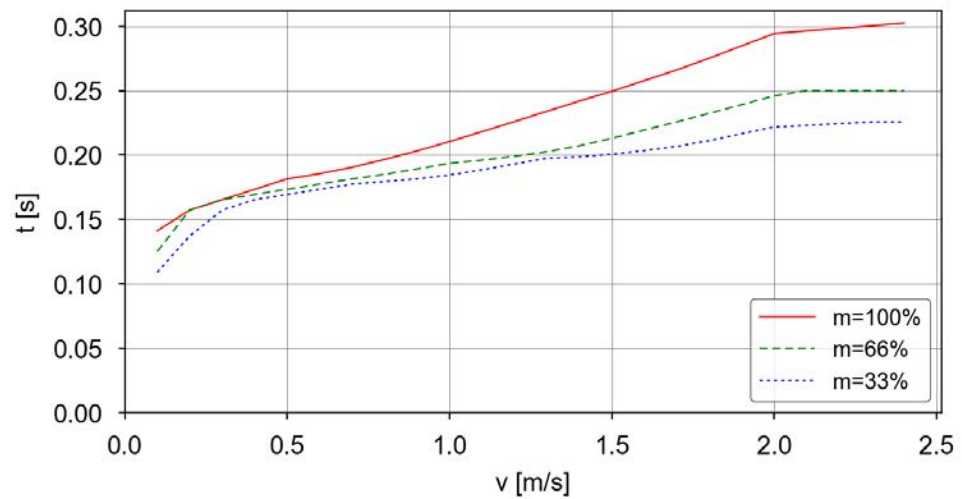
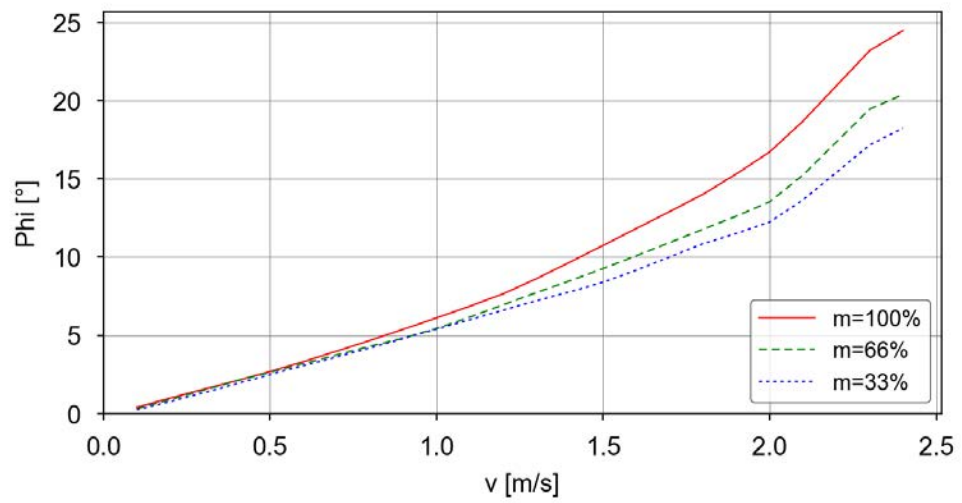
Continues on next page

4 IRB 1510

4.1 IRB 1510ID 1.5 m 4 kg

Continued

Extension zone 2, stopping distance and stopping time



5 IRB 1520

5.1 IRB 1520ID 1.5 m 4 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	20.2	0.22
2	18.5	0.17
3	15.0	0.12

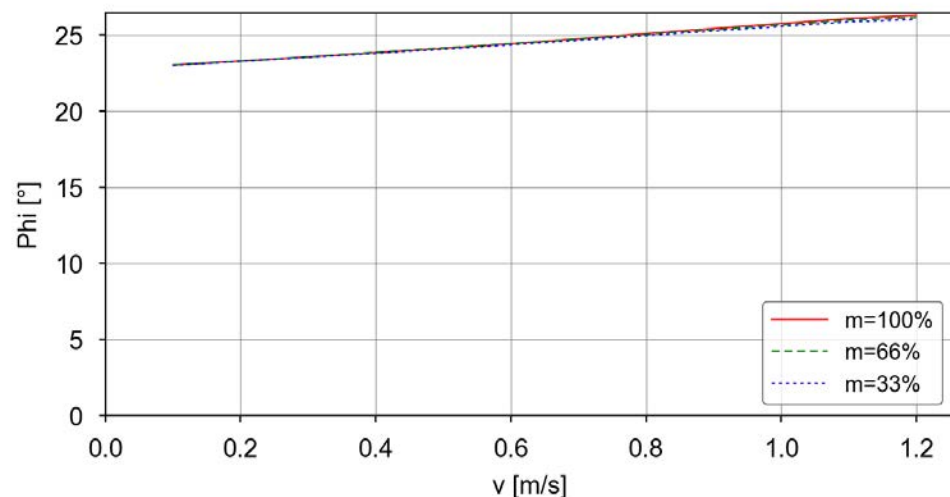
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.5
1	0.5	1.0
2	1.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

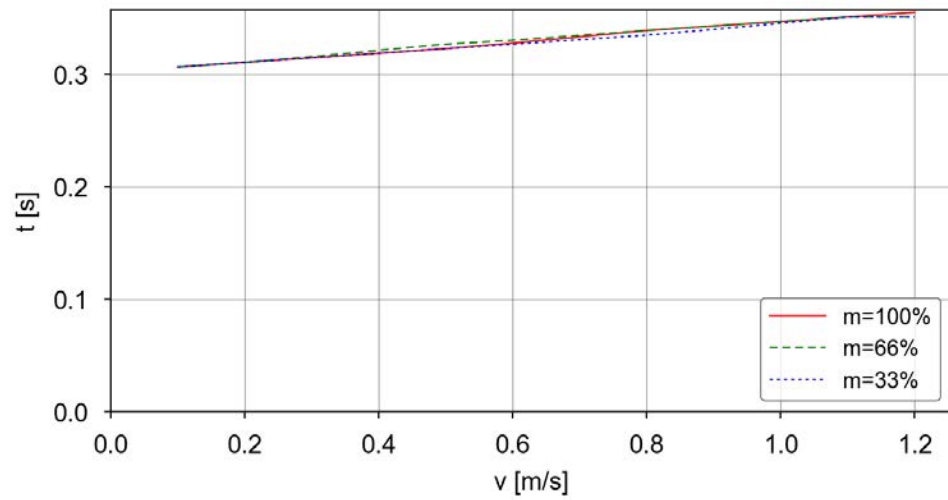


Continues on next page

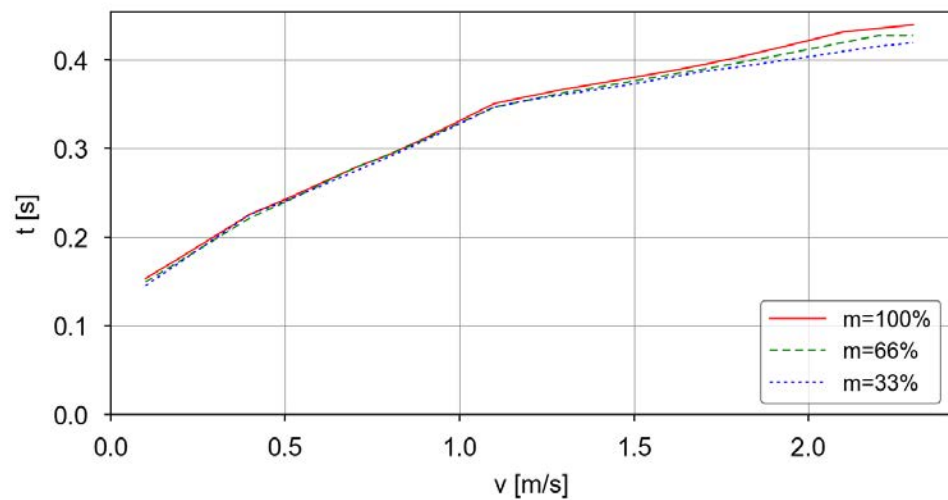
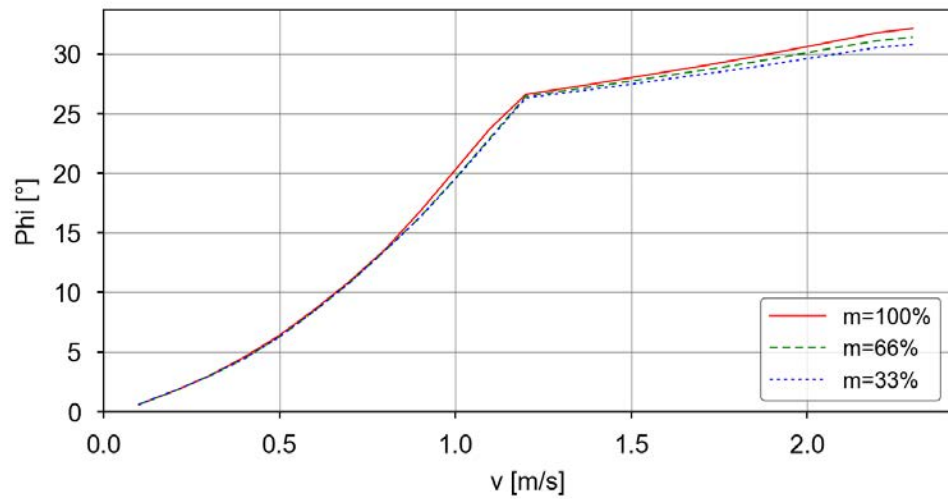
5 IRB 1520

5.1 IRB 1520ID 1.5 m 4 kg

Continued

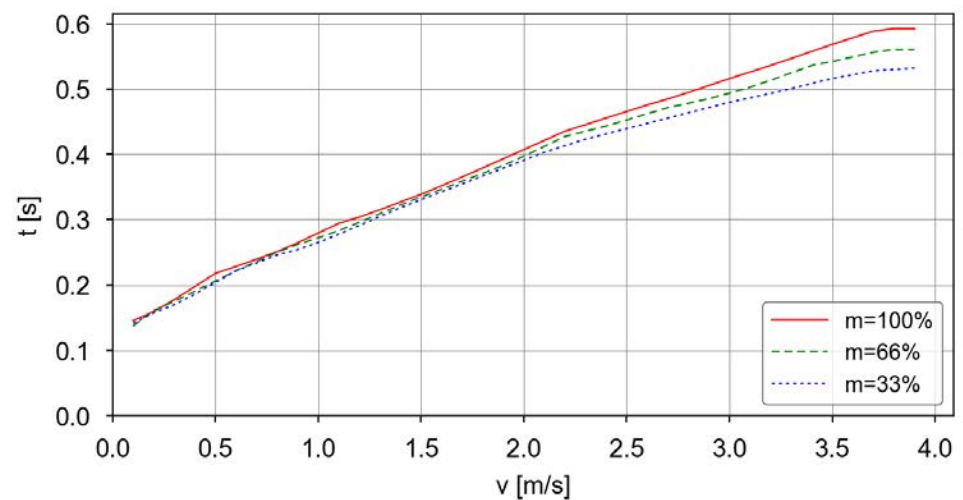
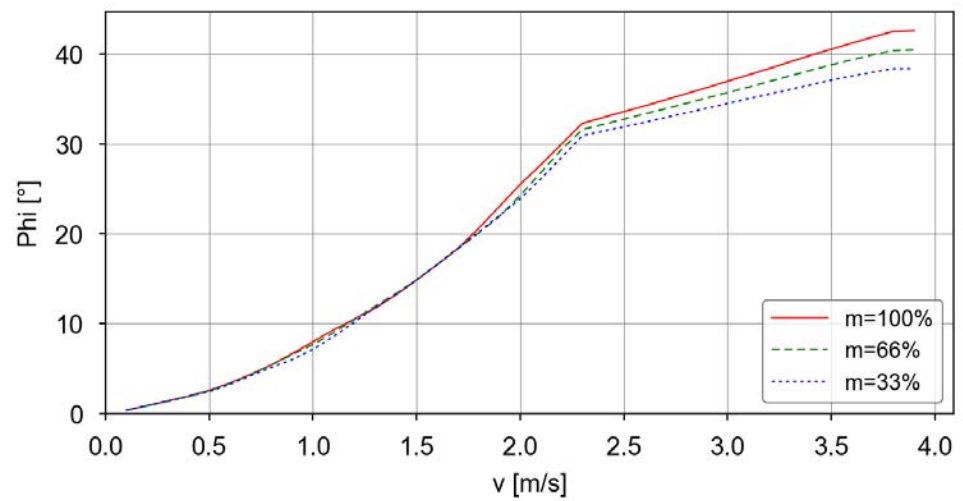


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

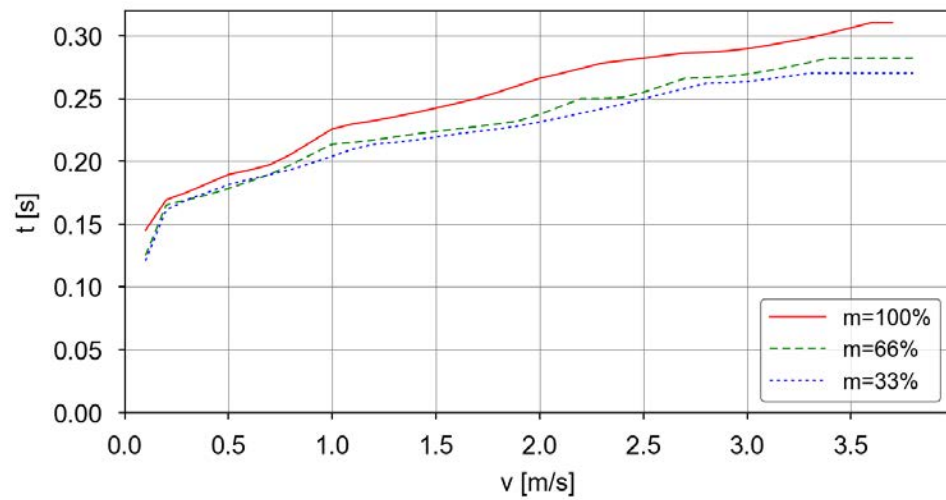
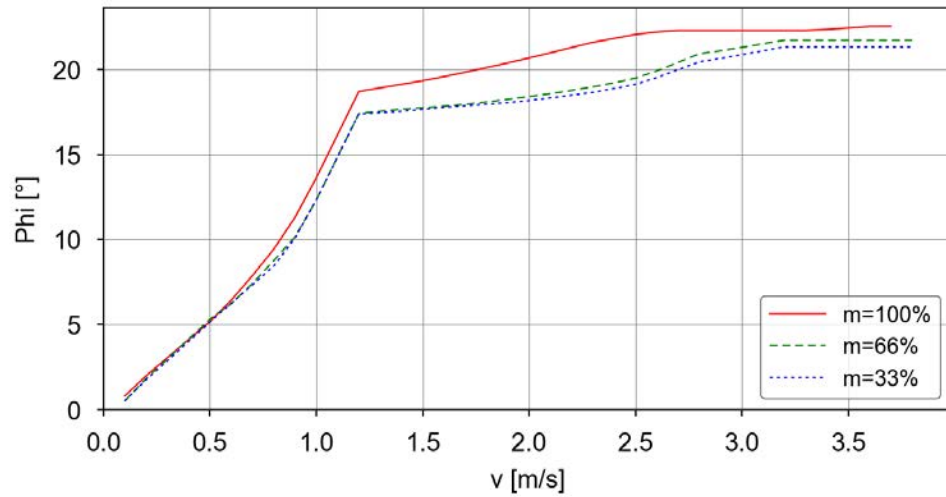
5 IRB 1520

5.1 IRB 1520ID 1.5 m 4 kg

Continued

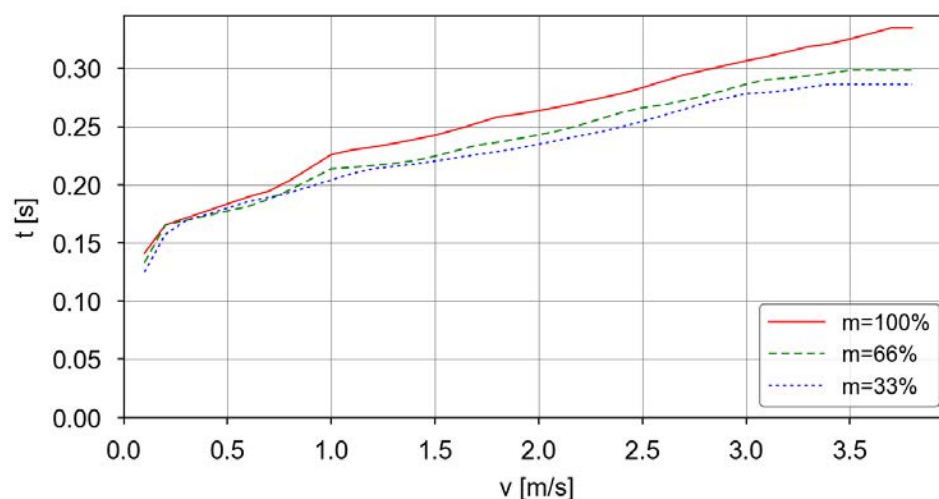
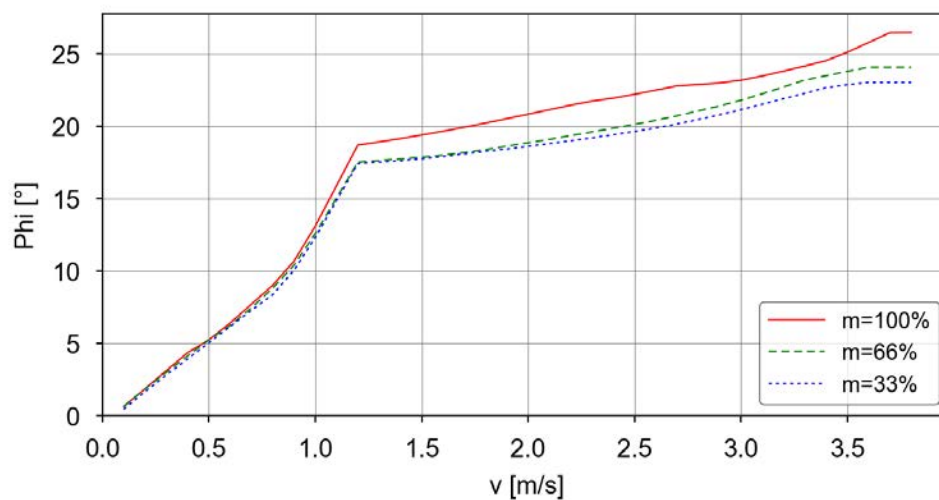
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

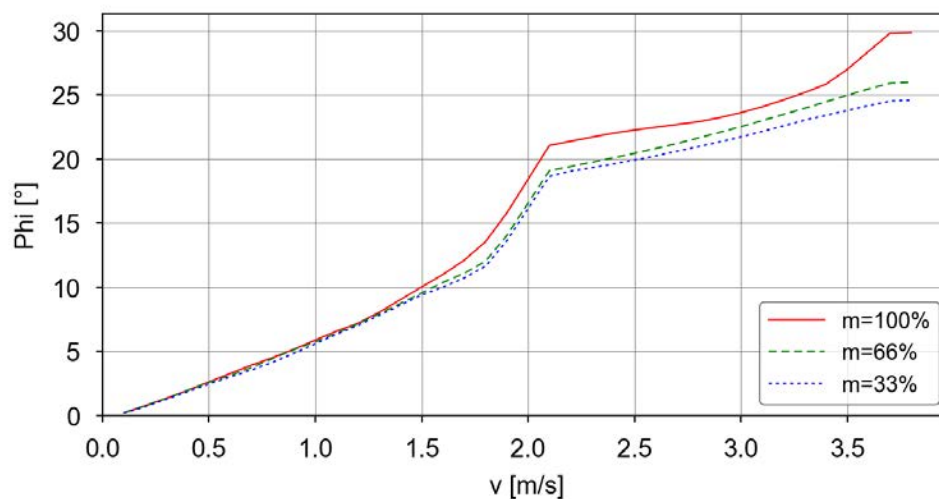


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

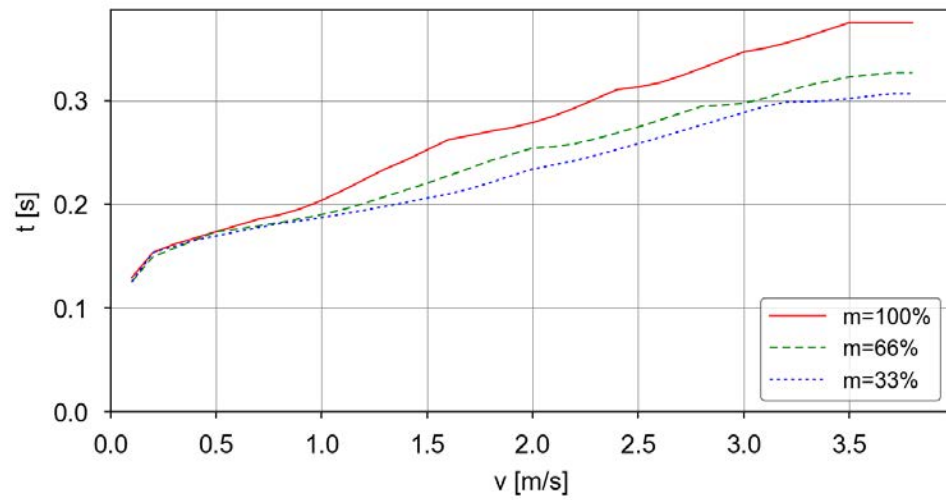


Continues on next page

5 IRB 1520

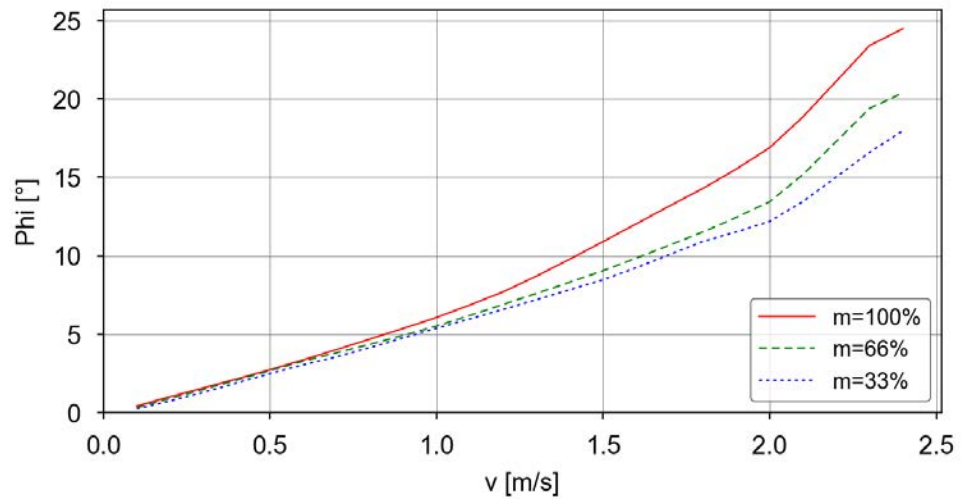
5.1 IRB 1520ID 1.5 m 4 kg

Continued

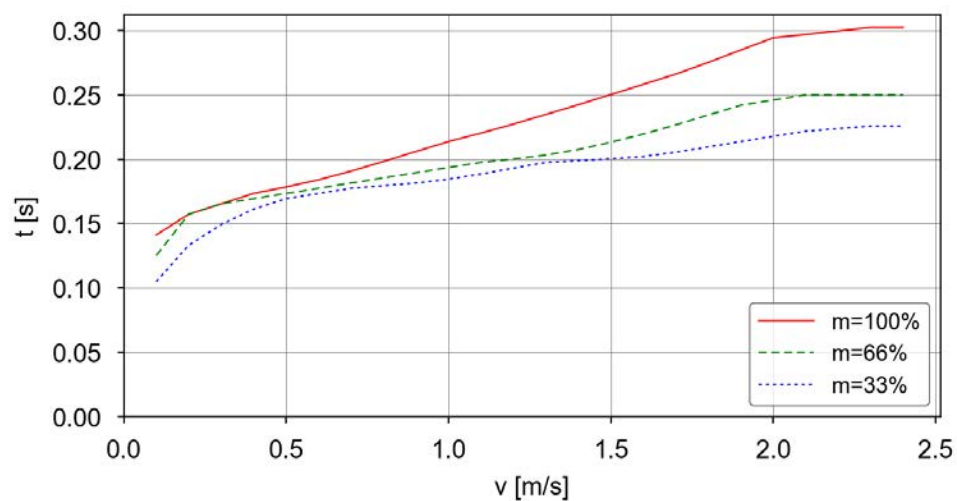


Category 1, Axis 3

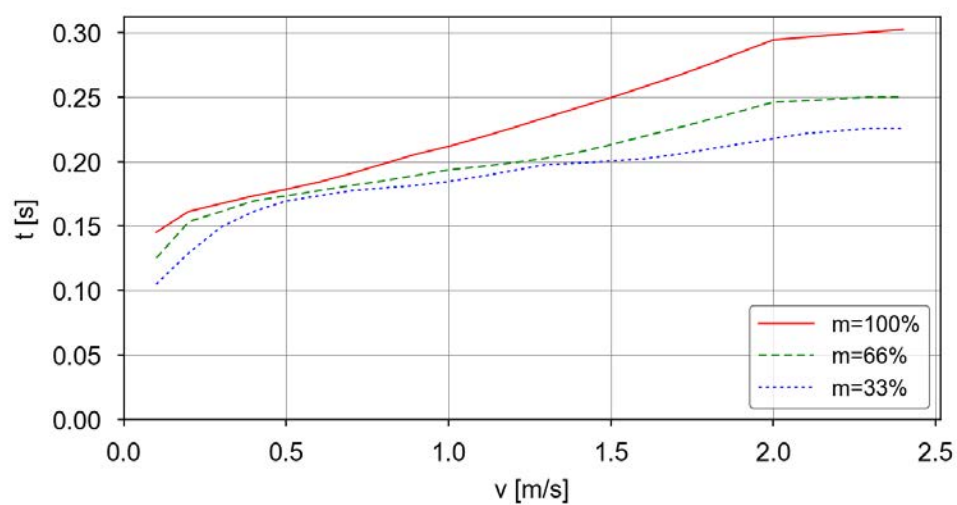
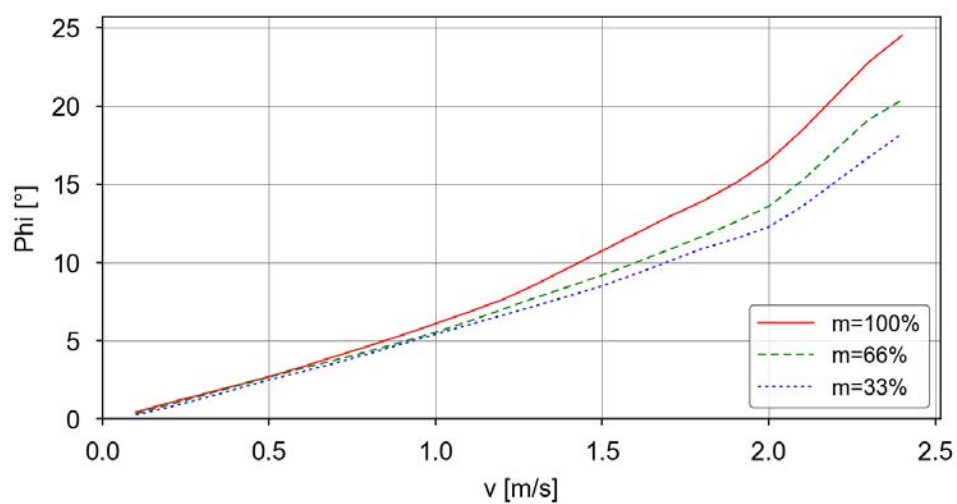
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



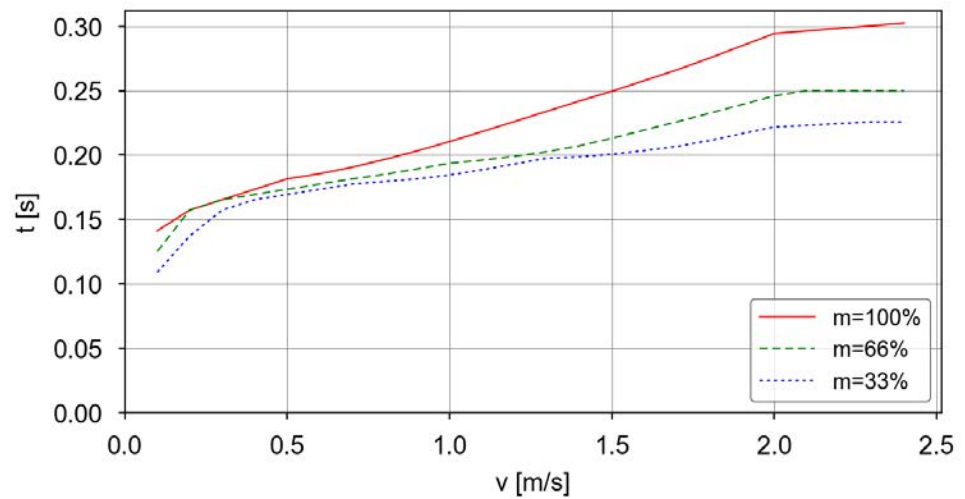
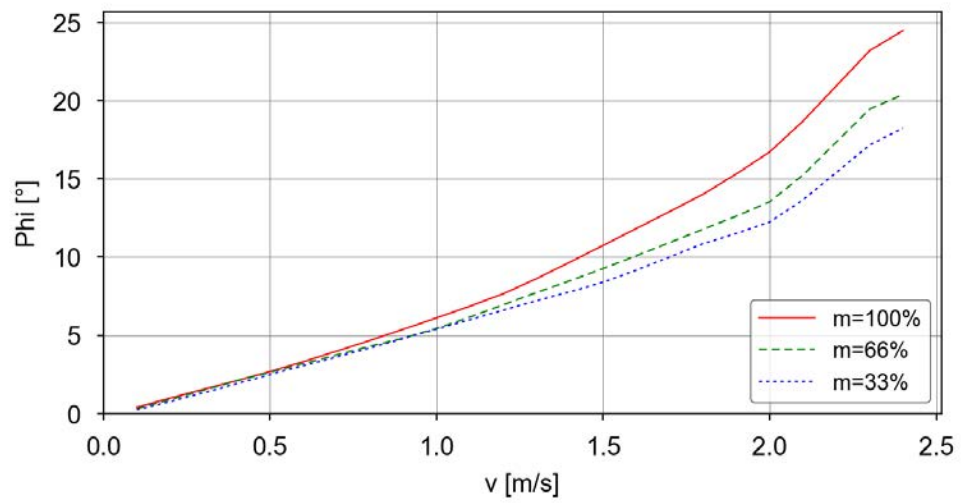
Continues on next page

5 IRB 1520

5.1 IRB 1520ID 1.5 m 4 kg

Continued

Extension zone 2, stopping distance and stopping time



6 IRB 1600

6.1 IRB 1600 1.2 m 6 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	19.7	0.17
2	16.8	0.12
3	16.1	0.1

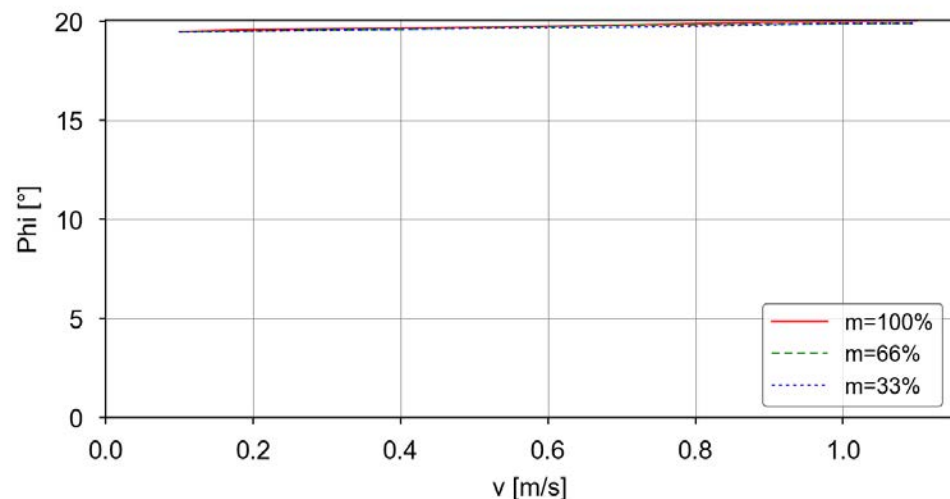
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.408
1	0.408	0.817
2	0.817	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

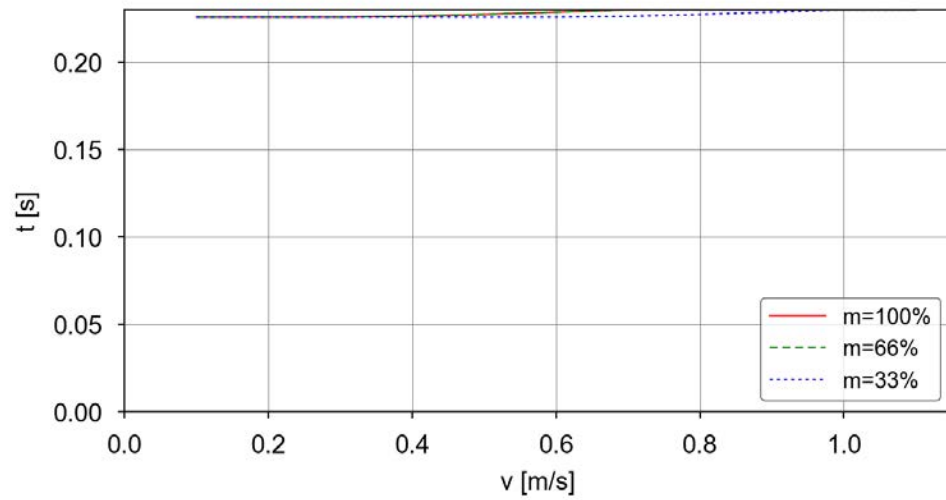


Continues on next page

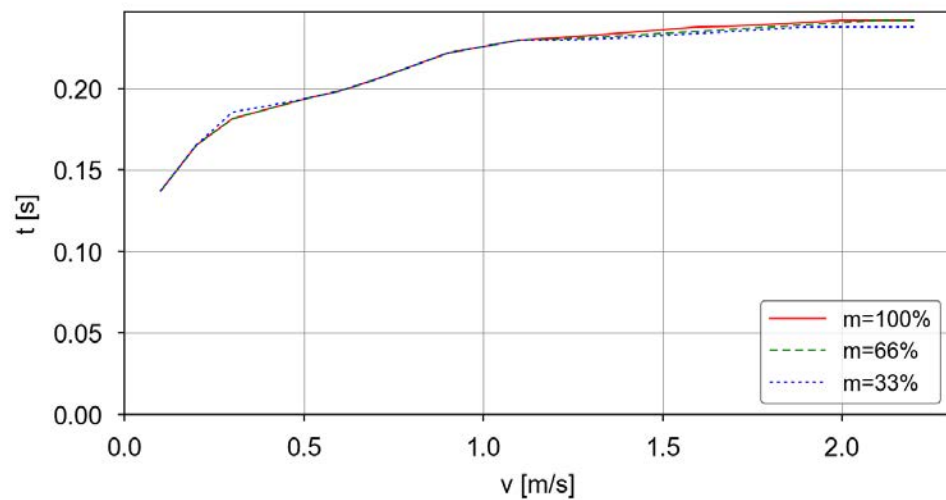
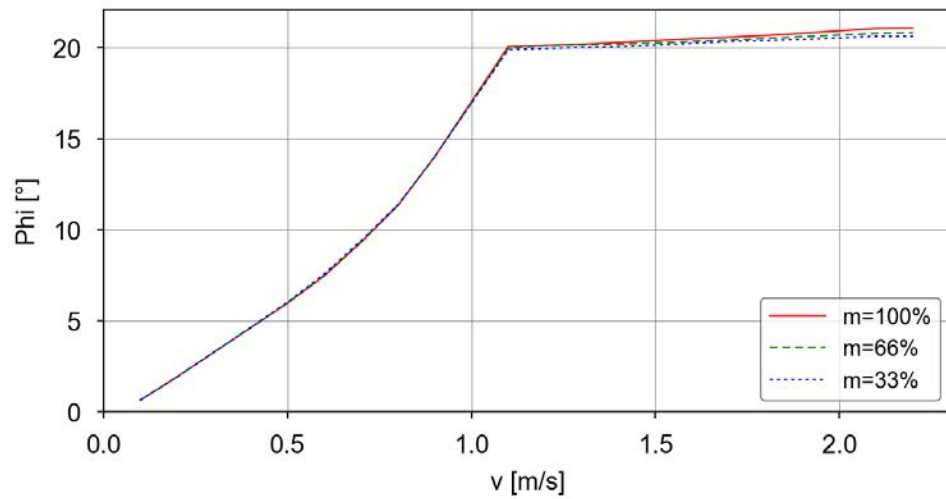
6 IRB 1600

6.1 IRB 1600 1.2 m 6 kg

Continued

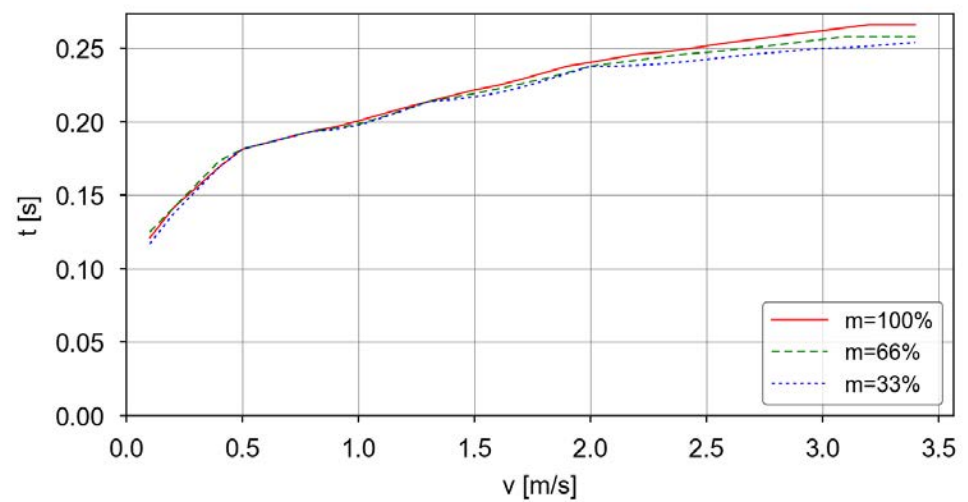
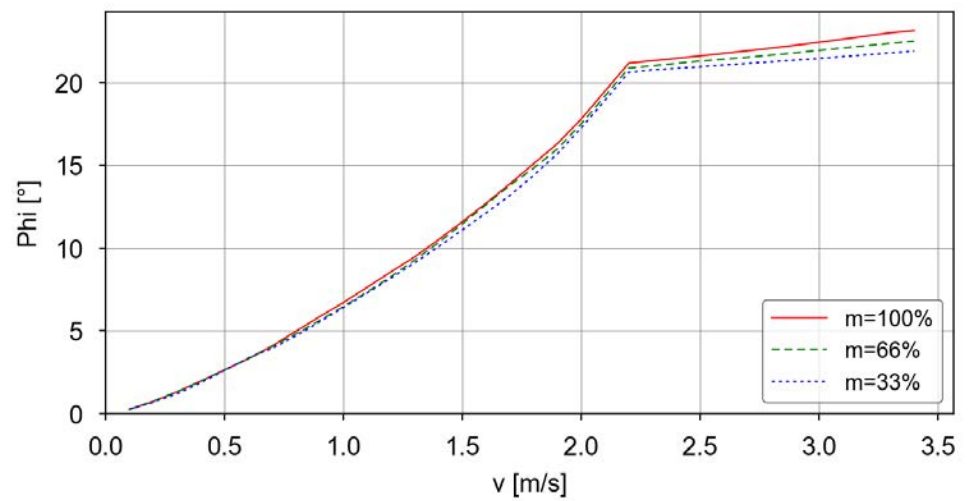


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

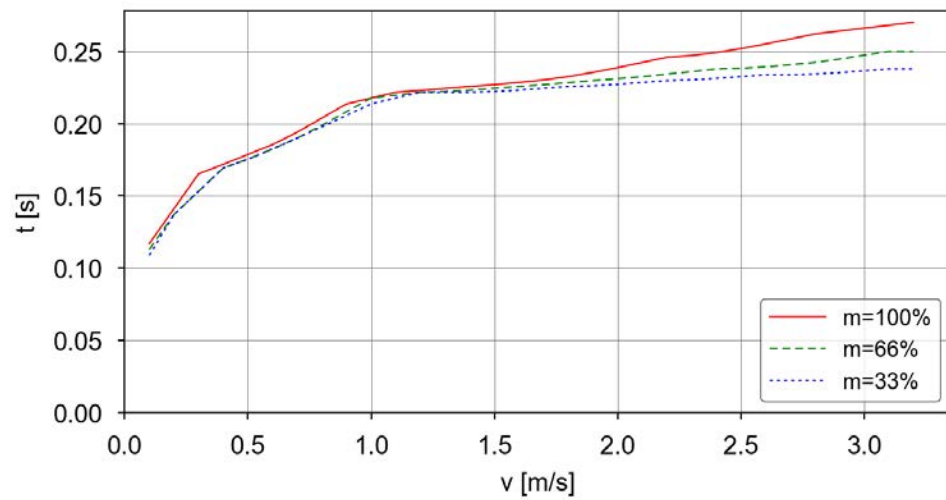
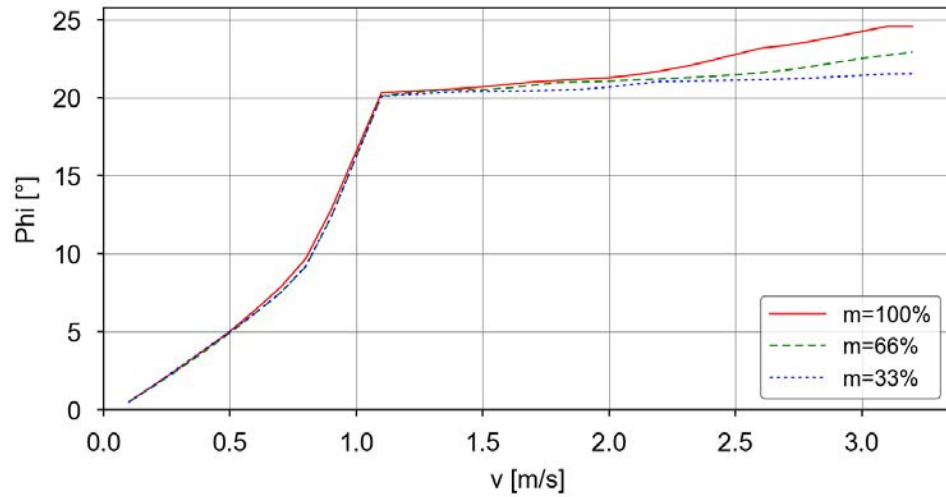
6 IRB 1600

6.1 IRB 1600 1.2 m 6 kg

Continued

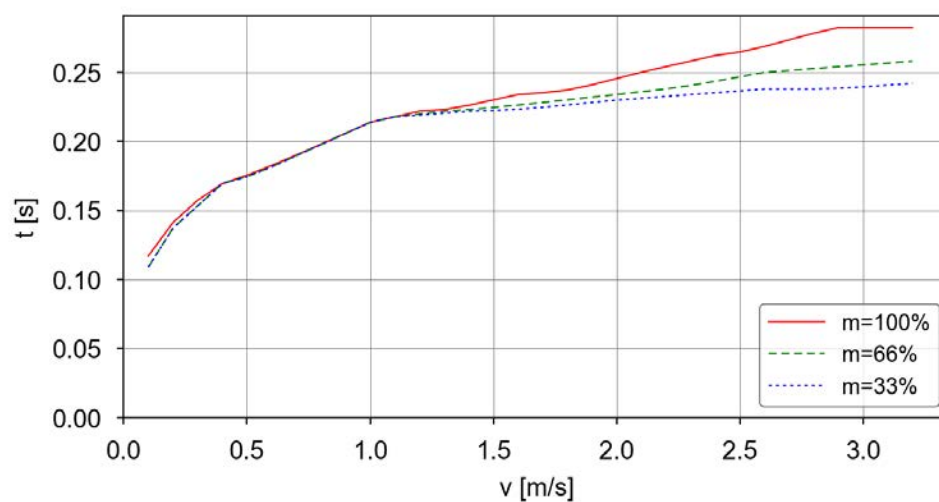
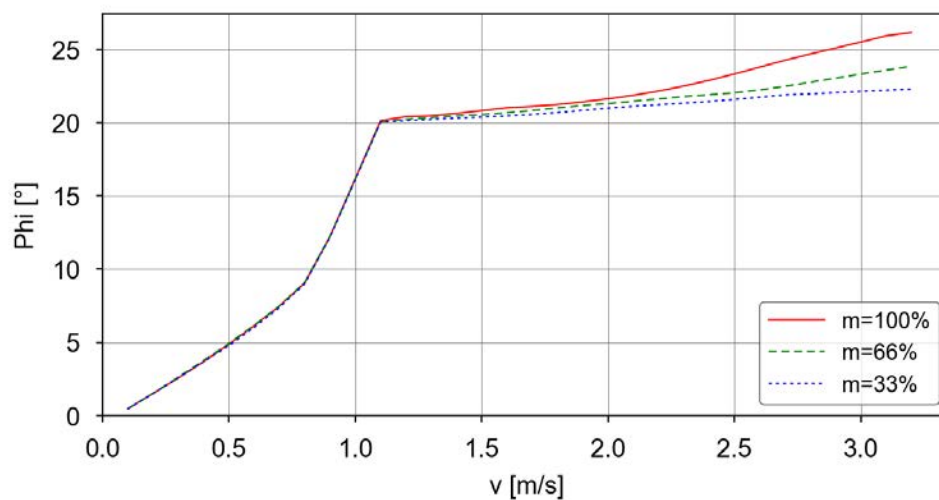
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

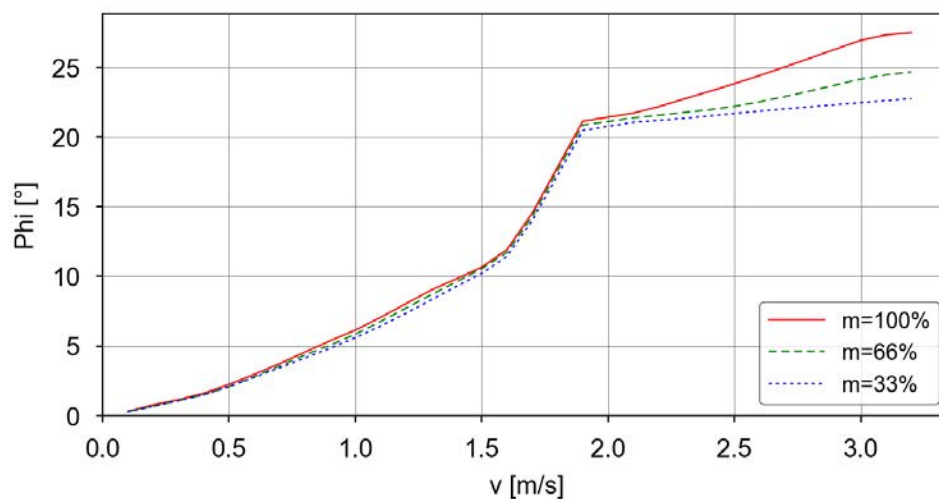


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

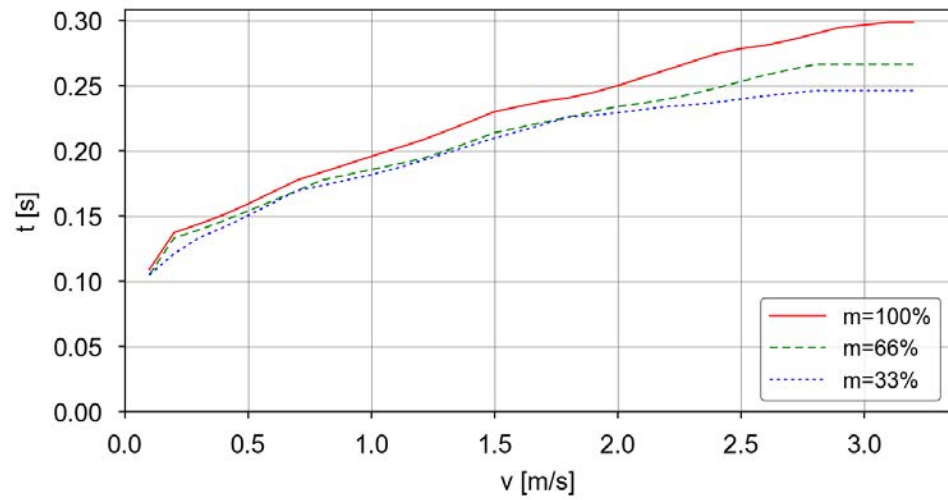


Continues on next page

6 IRB 1600

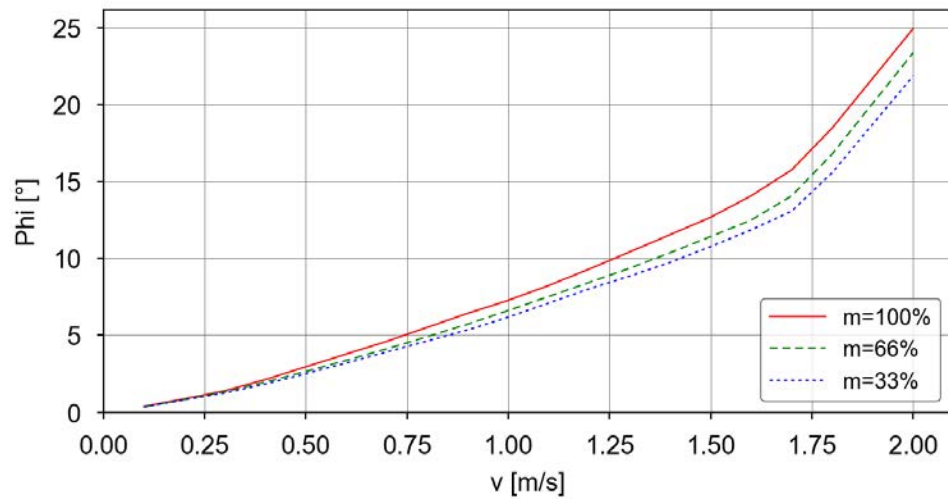
6.1 IRB 1600 1.2 m 6 kg

Continued

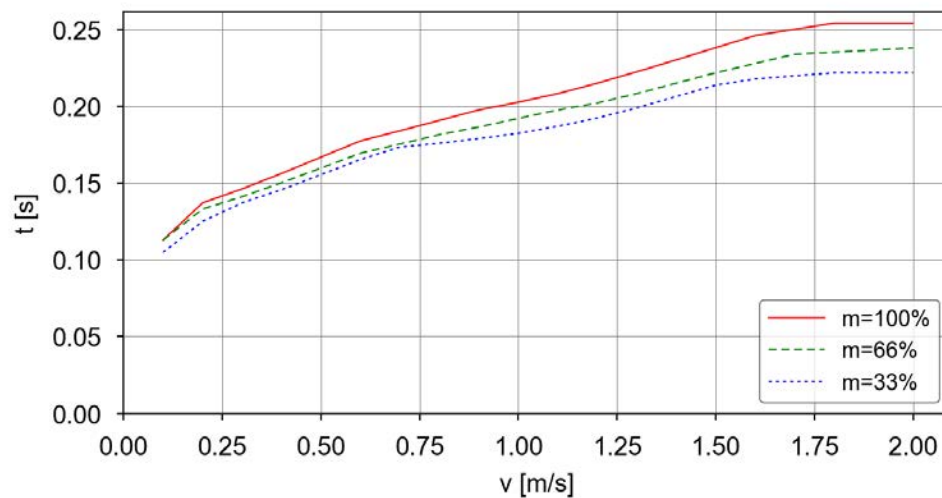


Category 1, Axis 3

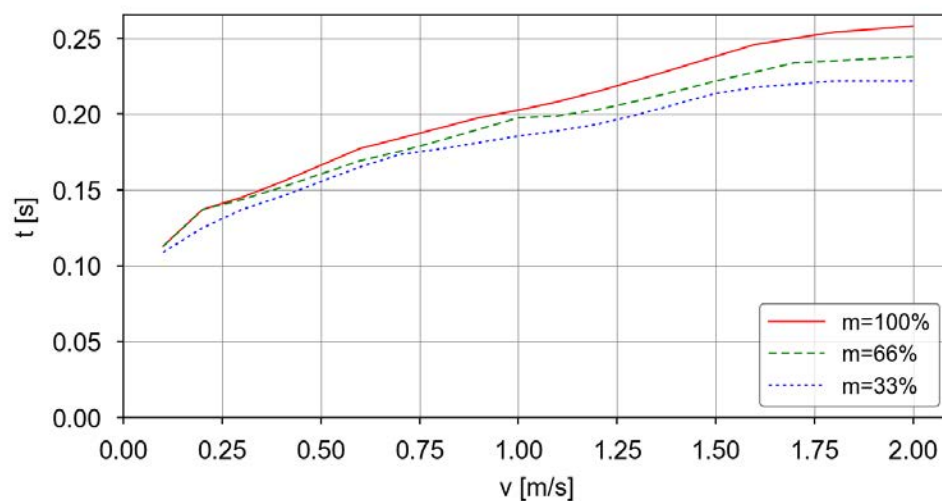
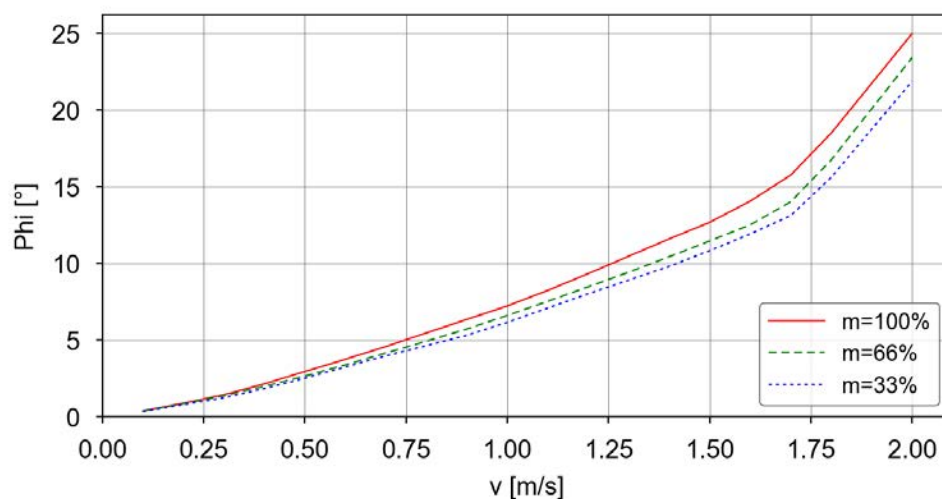
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



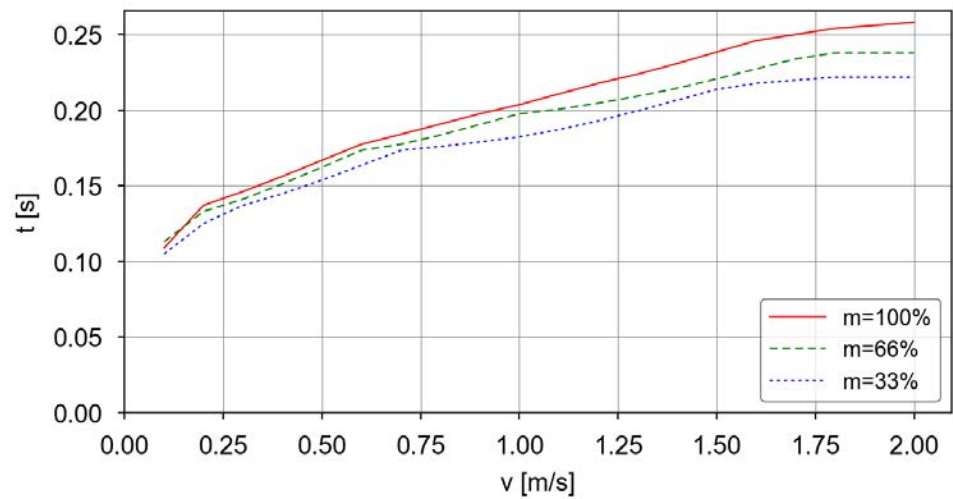
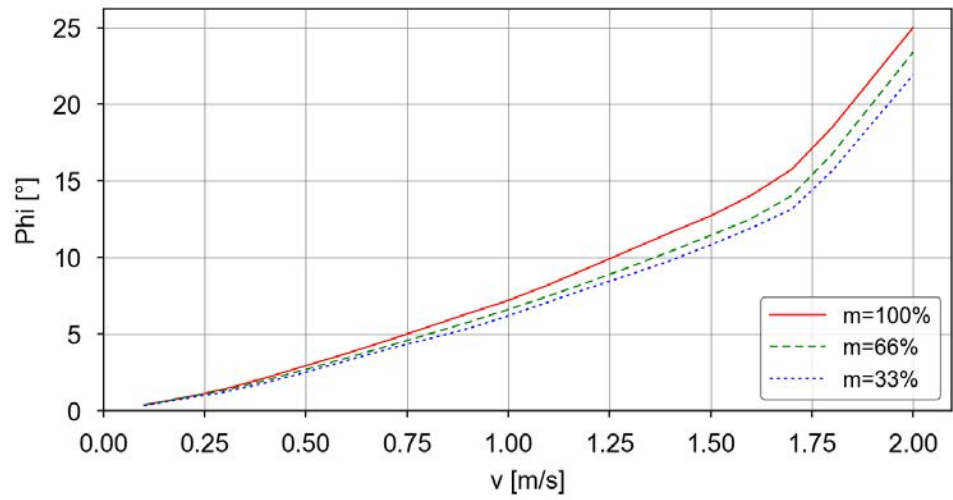
Continues on next page

6 IRB 1600

6.1 IRB 1600 1.2 m 6 kg

Continued

Extension zone 2, stopping distance and stopping time



6.2 IRB 1600 1.2 m 10 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	22.7	0.17
2	26.1	0.2
3	22.3	0.15

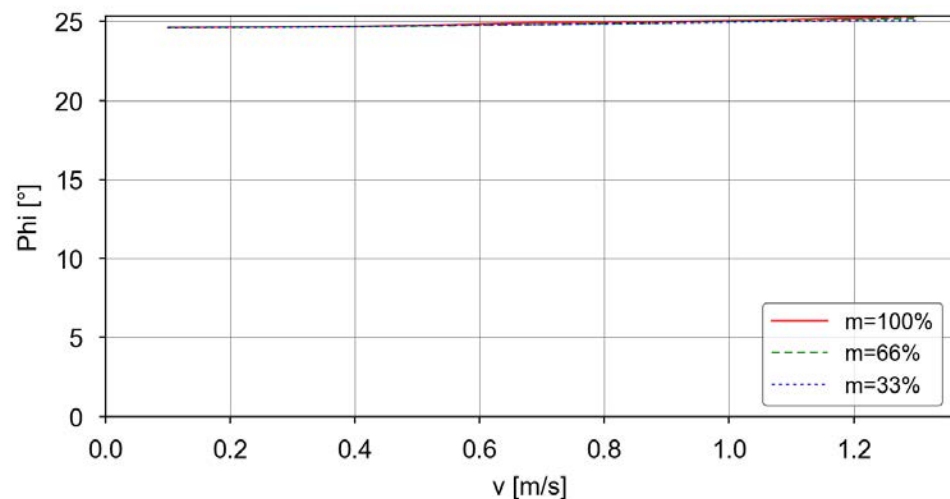
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.408
1	0.408	0.817
2	0.817	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

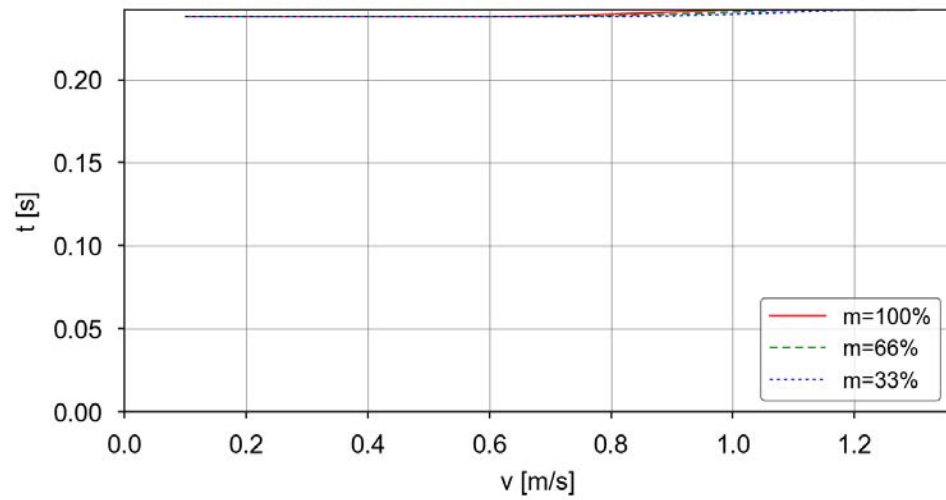


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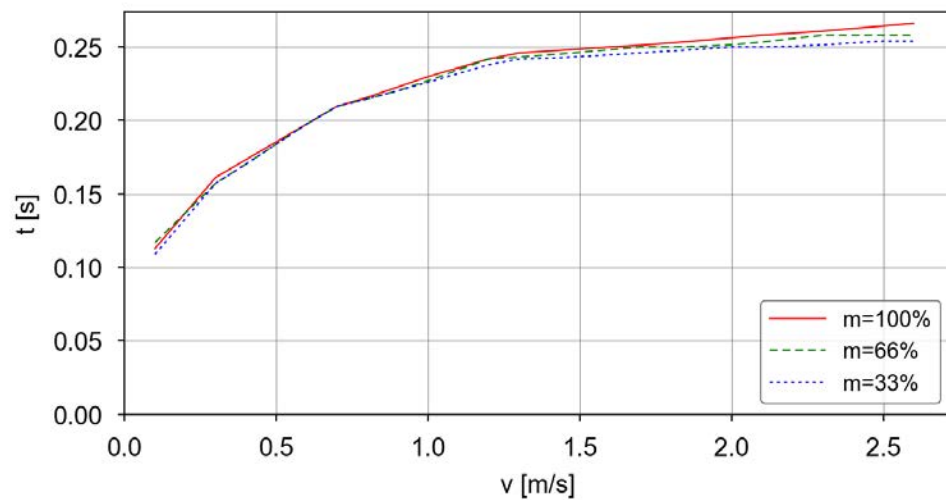
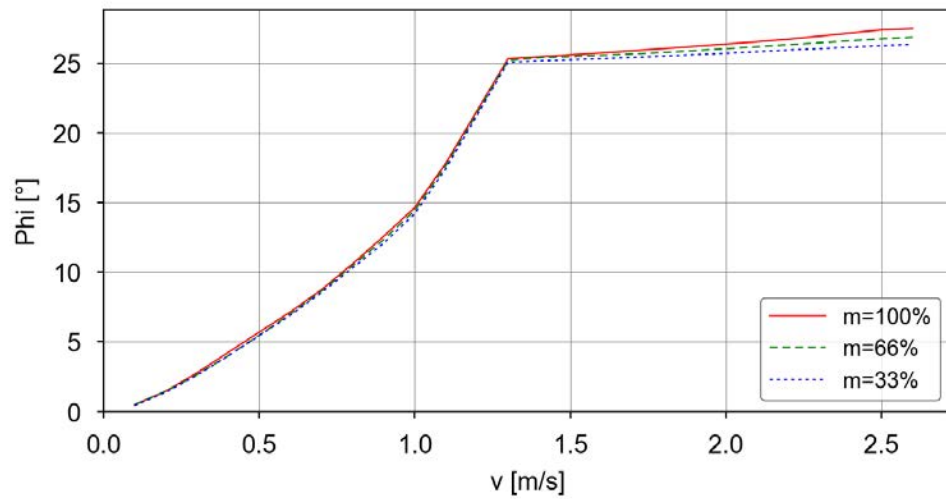
6 IRB 1600

6.2 IRB 1600 1.2 m 10 kg

Continued

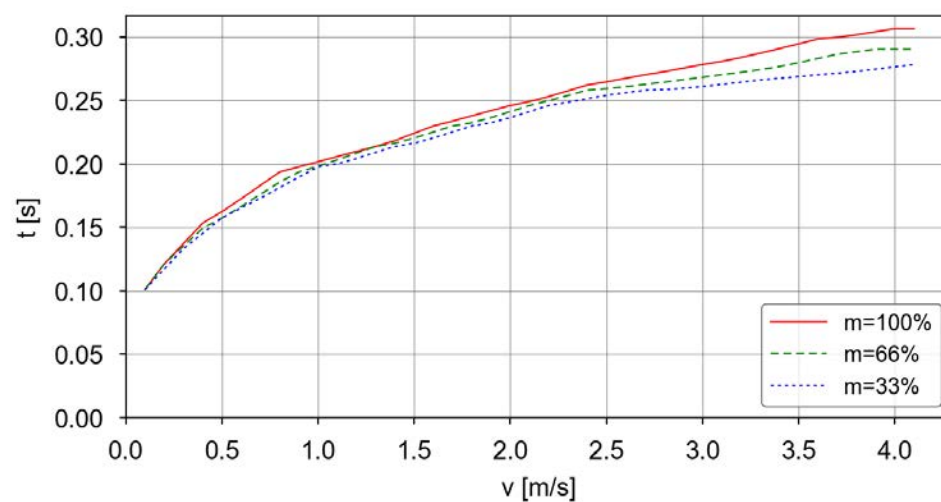
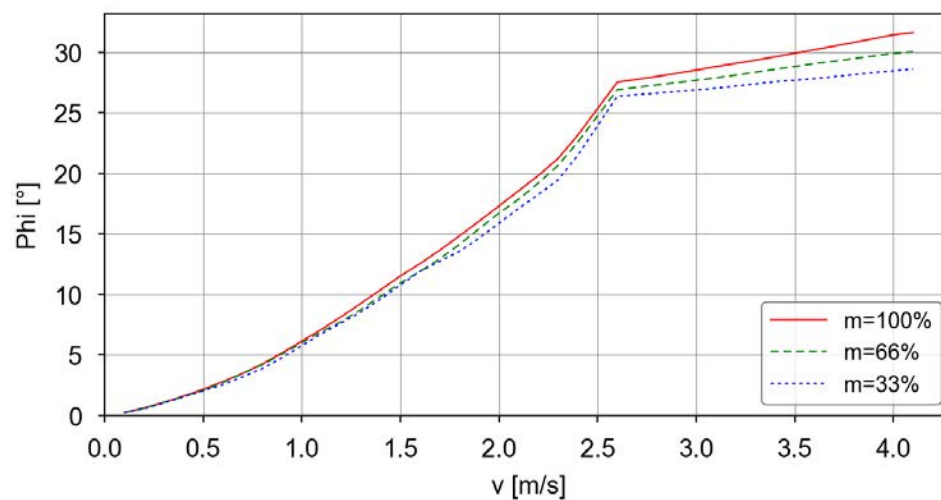


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

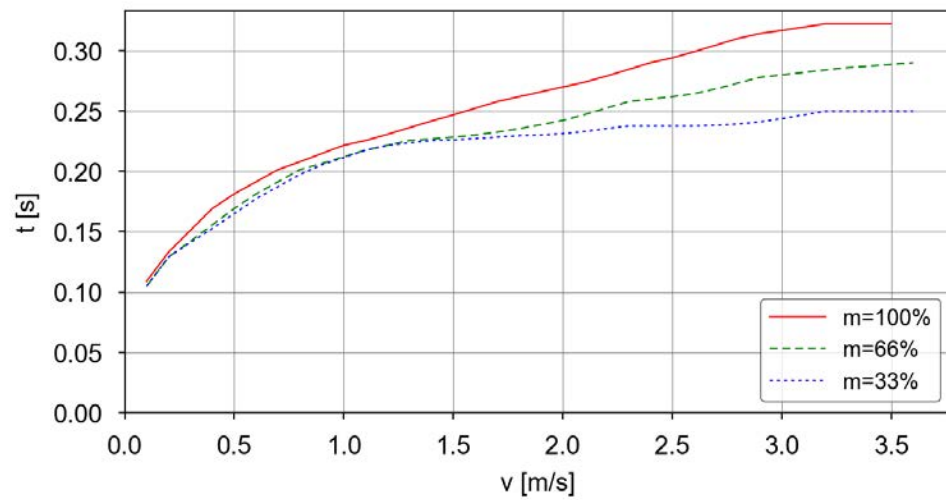
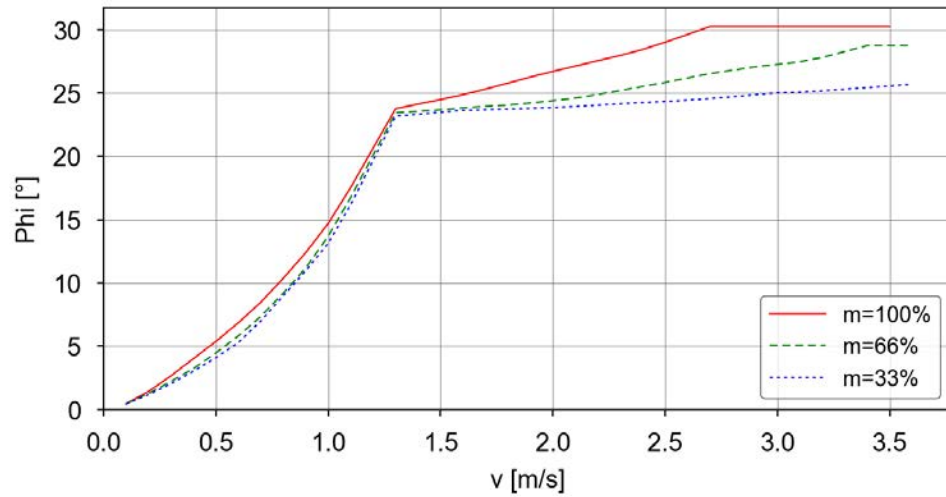
6 IRB 1600

6.2 IRB 1600 1.2 m 10 kg

Continued

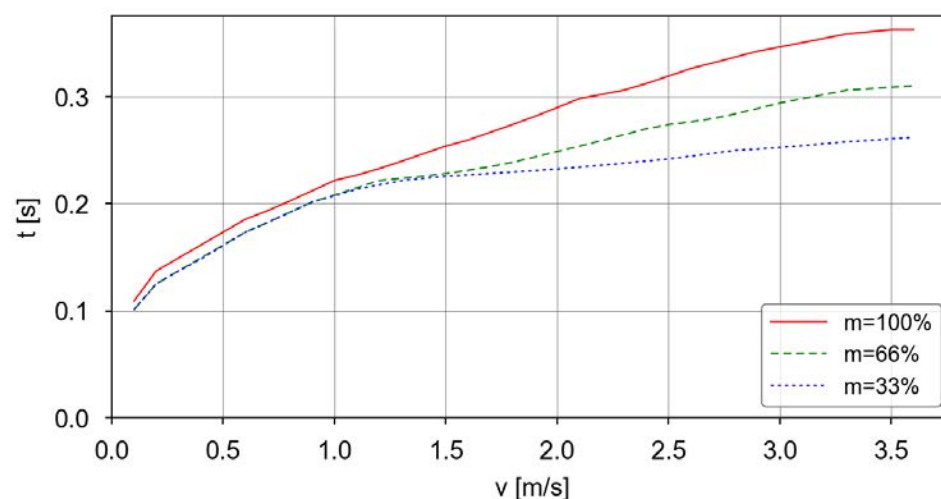
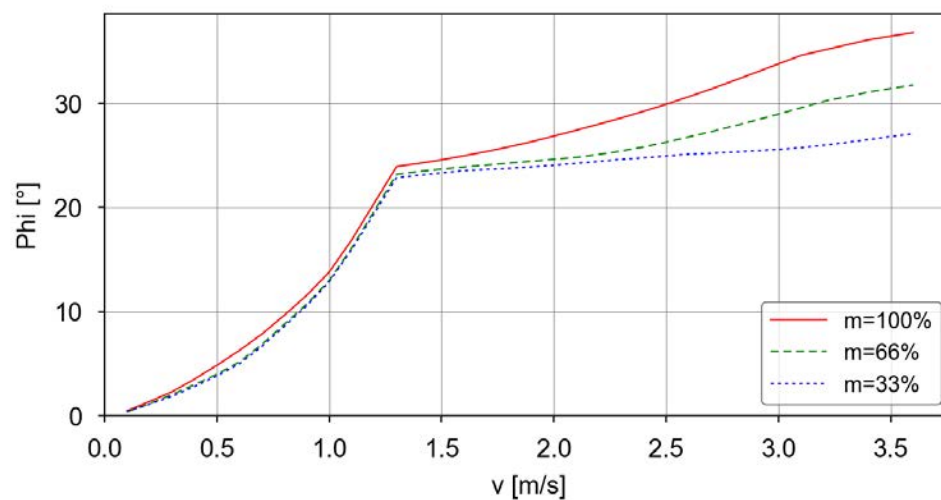
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

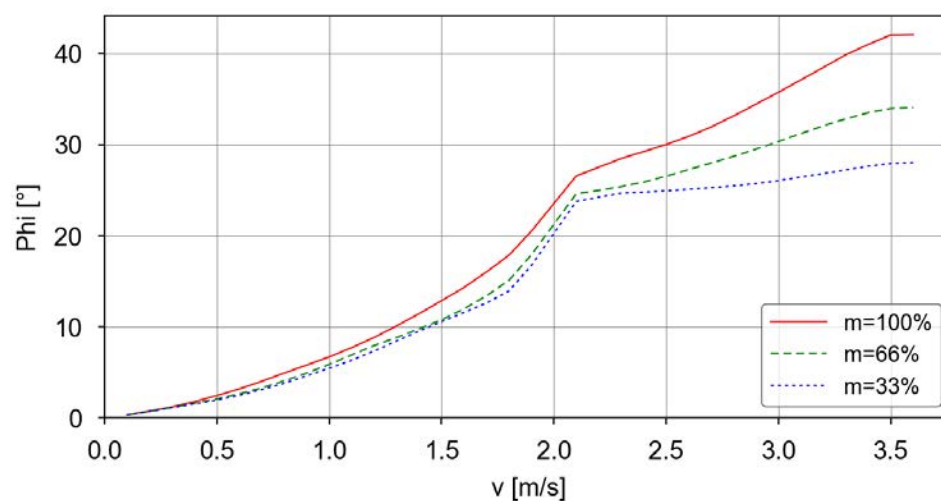


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

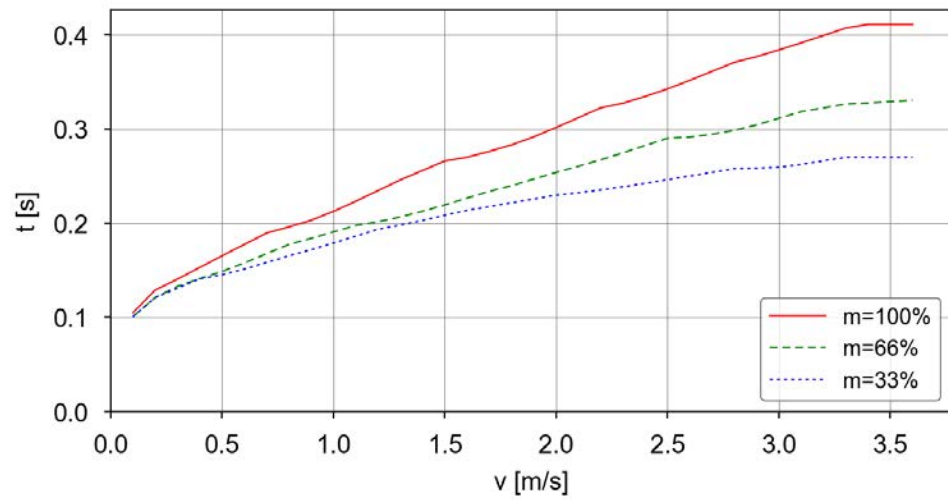


Continues on next page

6 IRB 1600

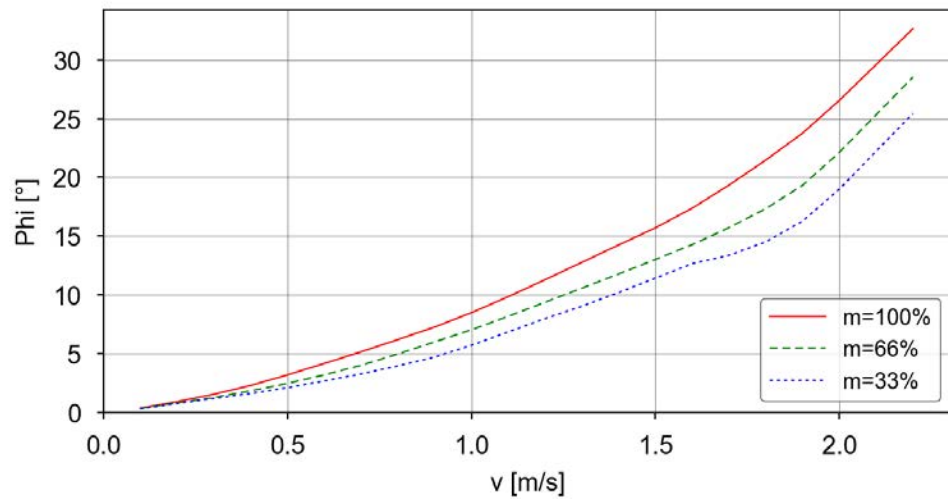
6.2 IRB 1600 1.2 m 10 kg

Continued

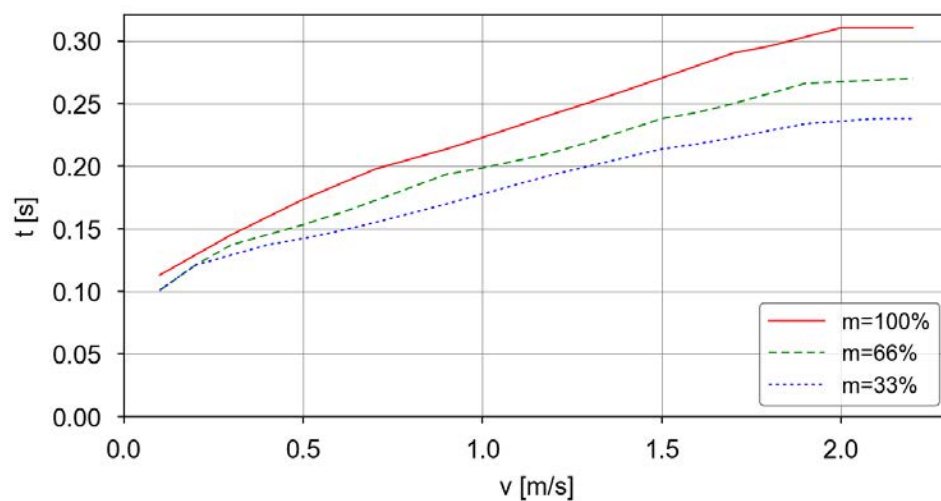


Category 1, Axis 3

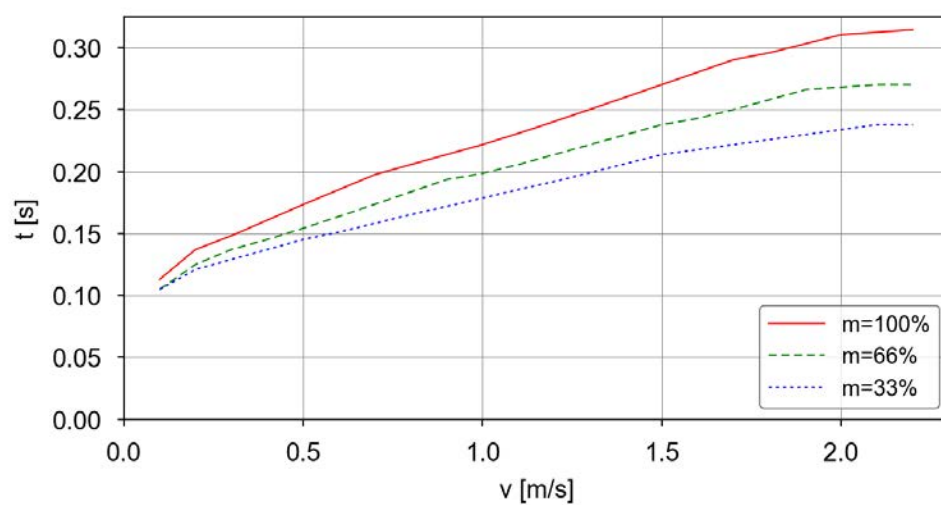
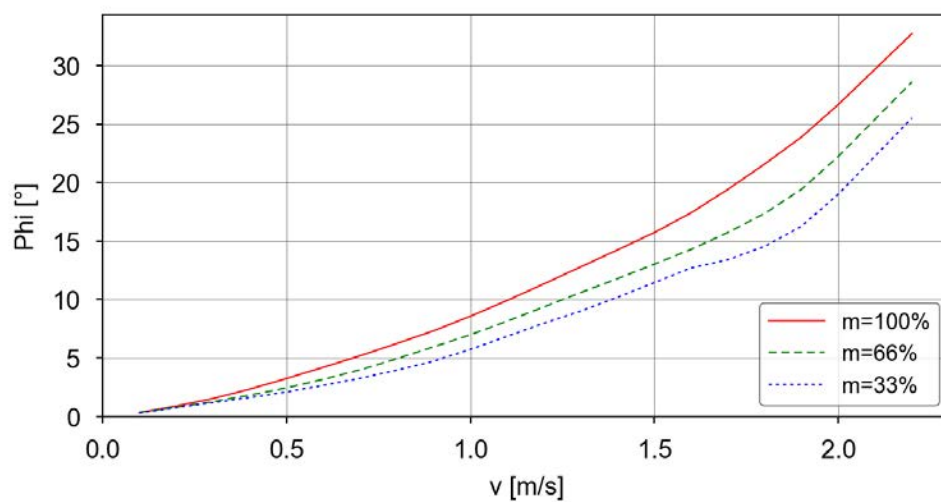
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



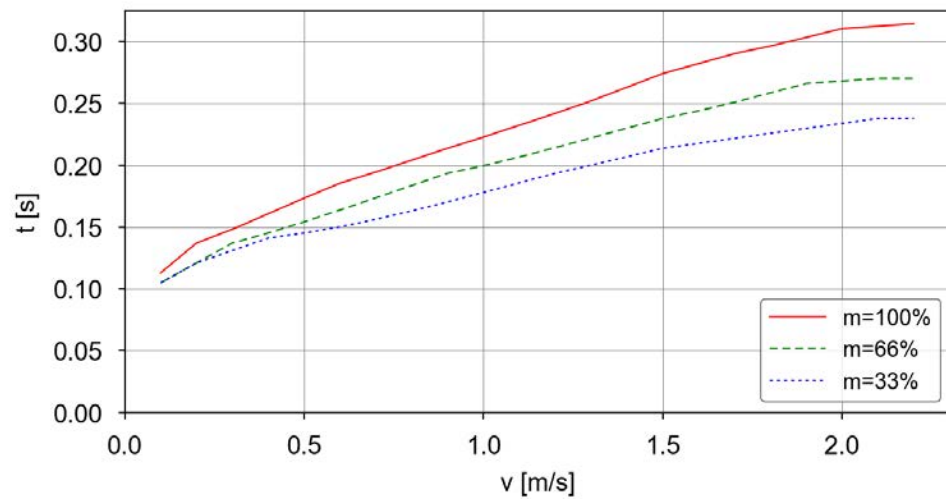
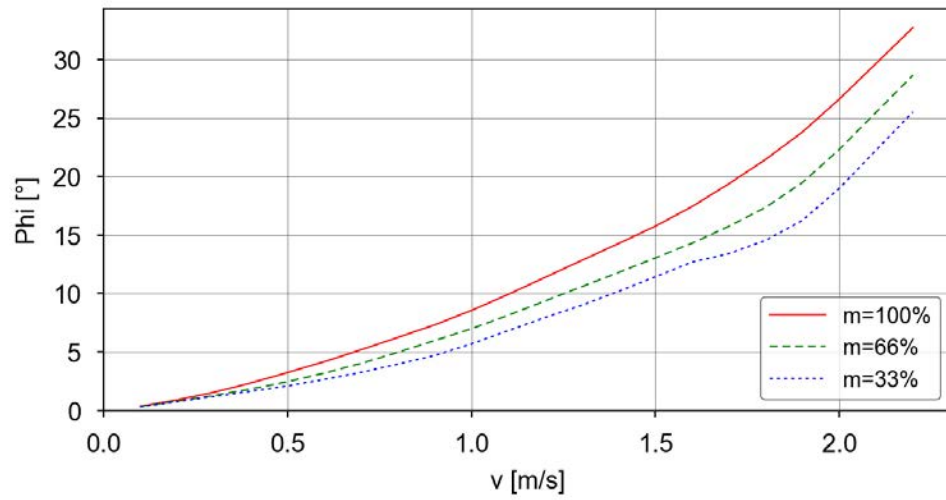
Continues on next page

6 IRB 1600

6.2 IRB 1600 1.2 m 10 kg

Continued

Extension zone 2, stopping distance and stopping time



6.3 IRB 1600 1.45 m 6 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	23.4	0.2
2	22.0	0.17
3	15.8	0.1

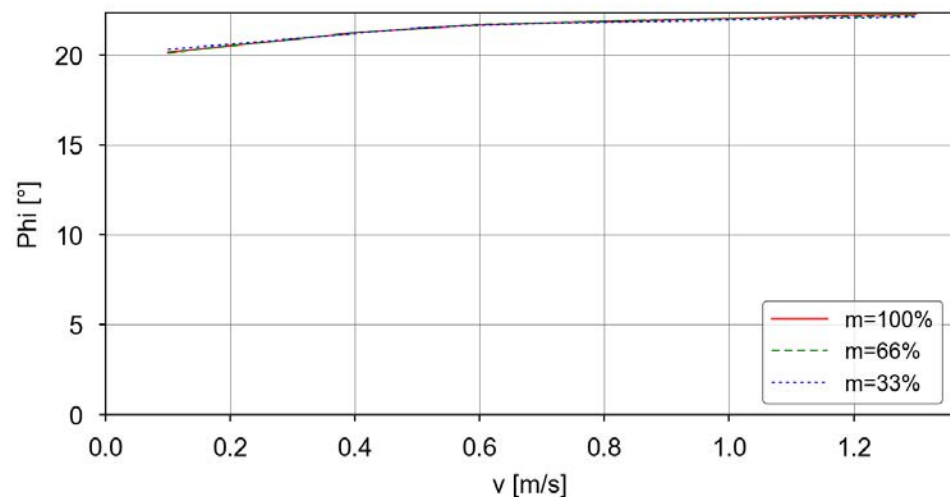
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.483
1	0.483	0.967
2	0.967	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

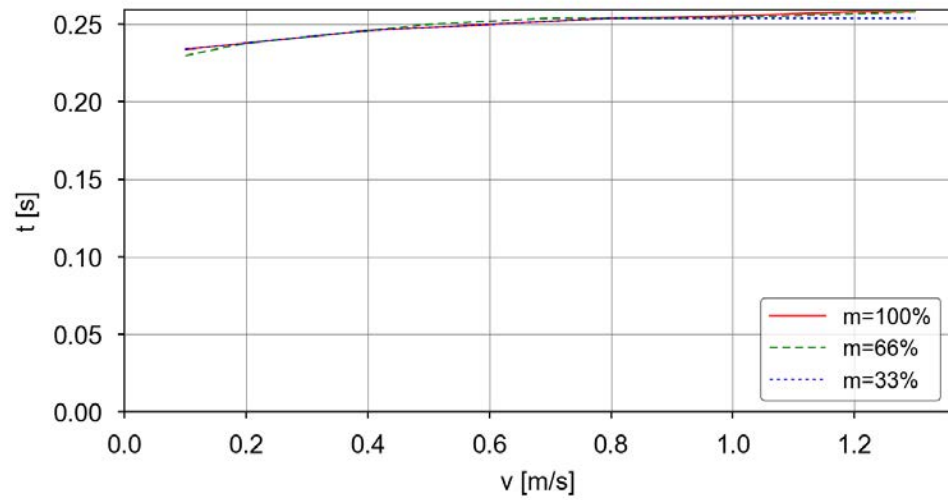


Continues on next page

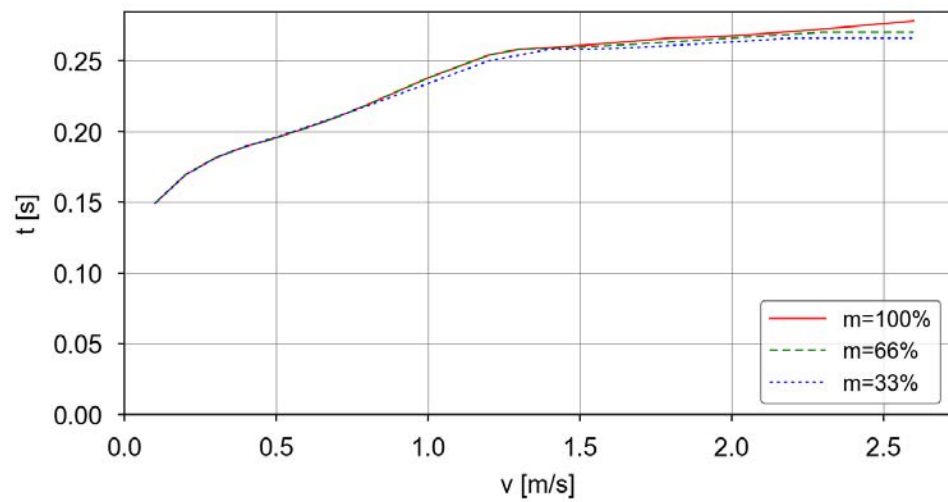
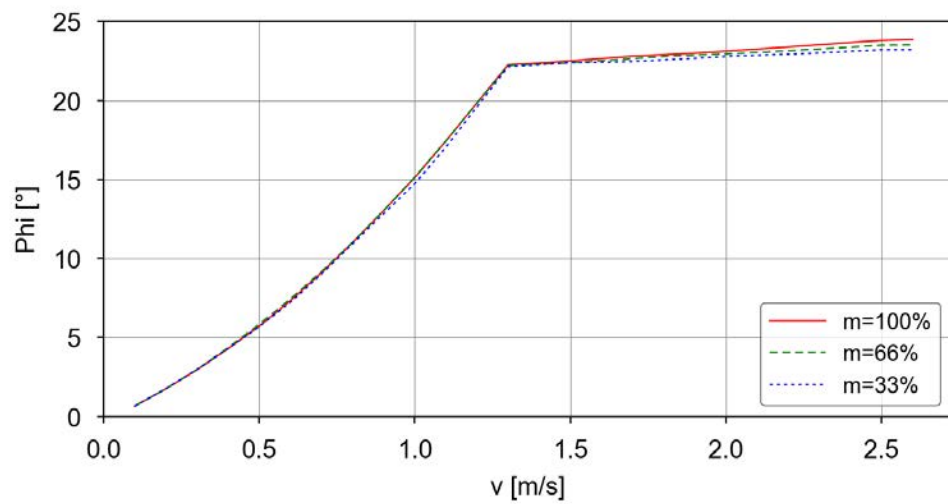
6 IRB 1600

6.3 IRB 1600 1.45 m 6 kg

Continued

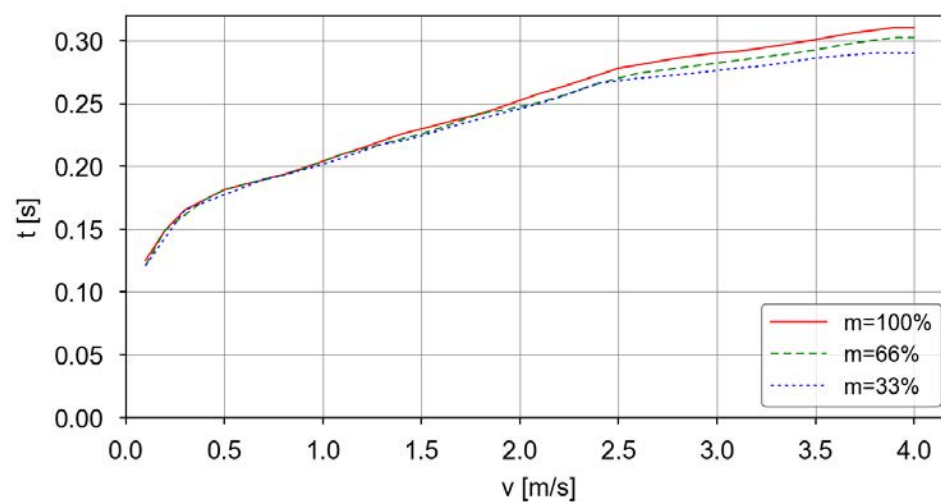
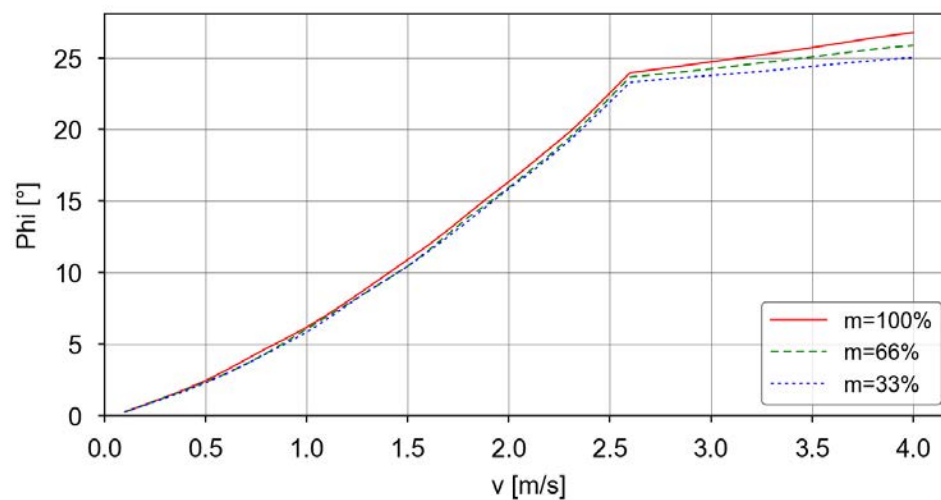


Extension zone 1, stopping distance and stopping time



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Extension zone 2, stopping distance and stopping time



Continues on next page

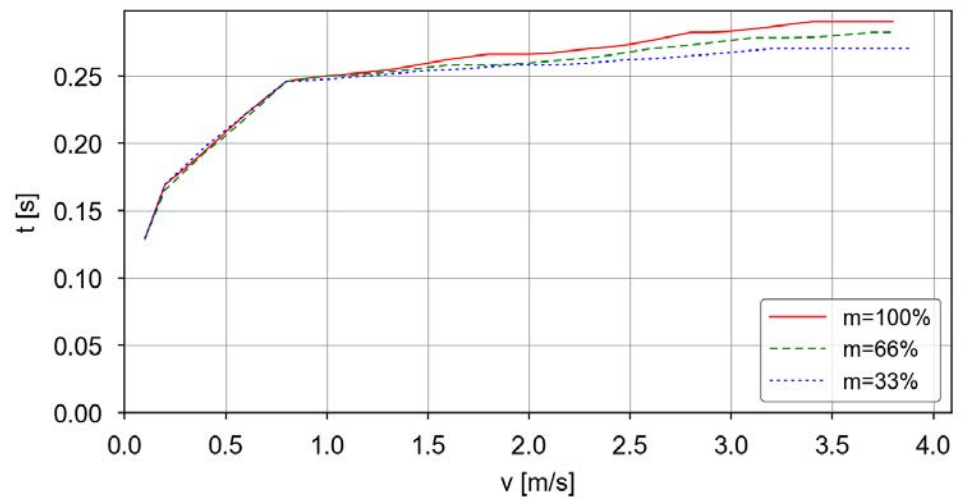
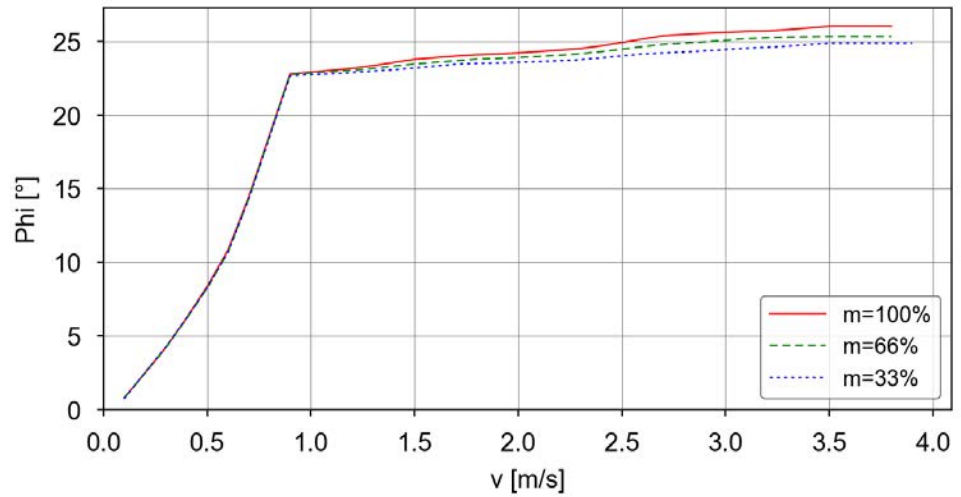
6 IRB 1600

6.3 IRB 1600 1.45 m 6 kg

Continued

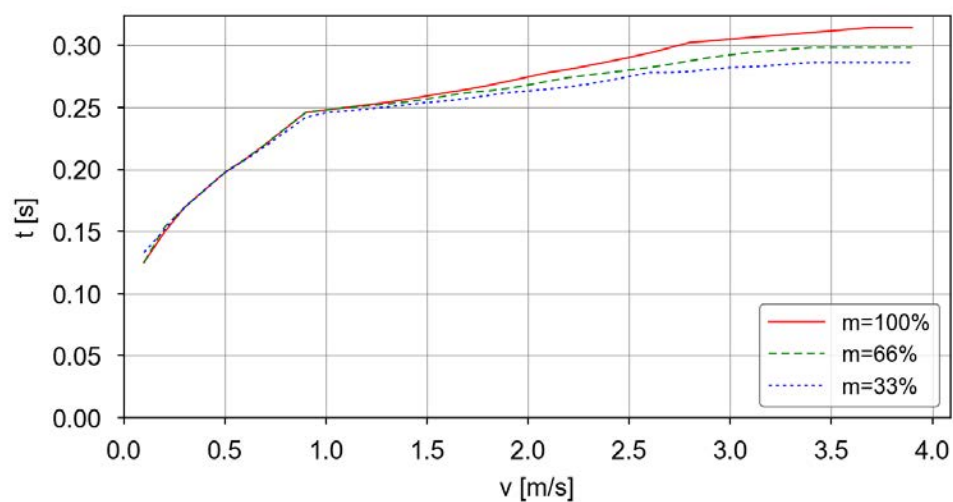
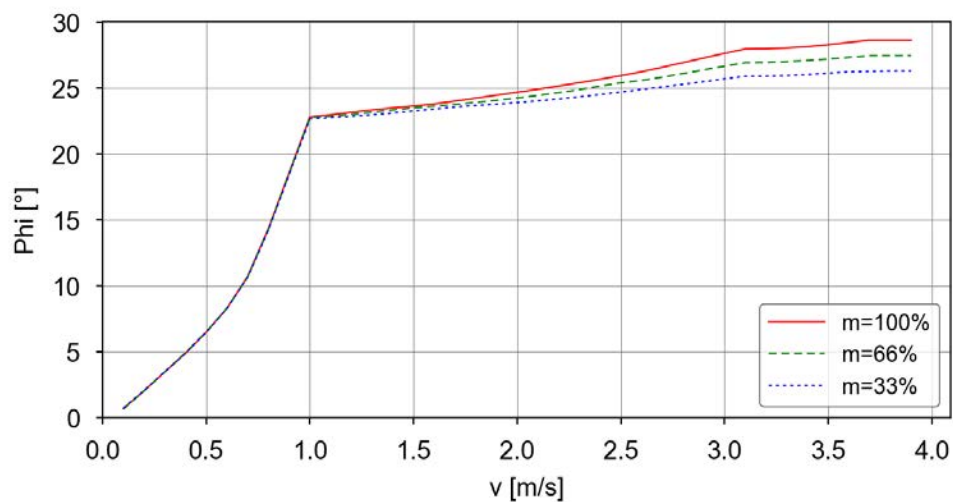
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

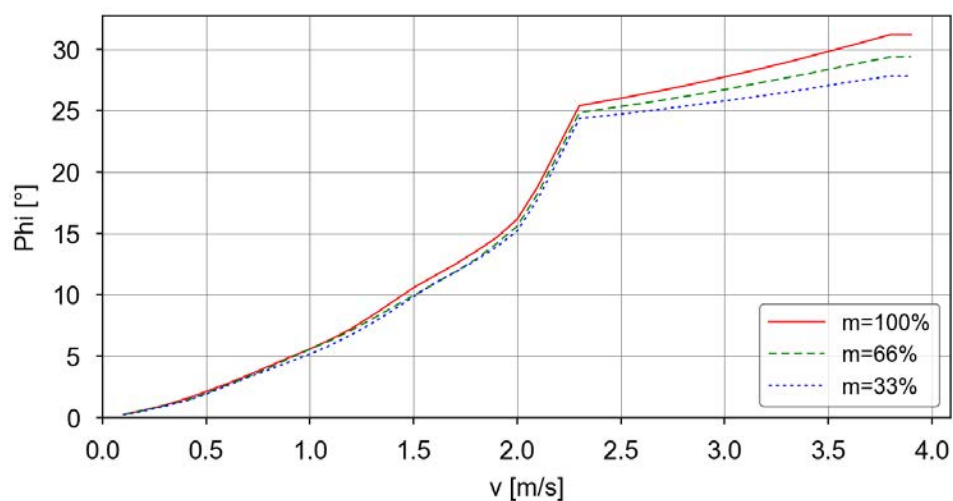


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

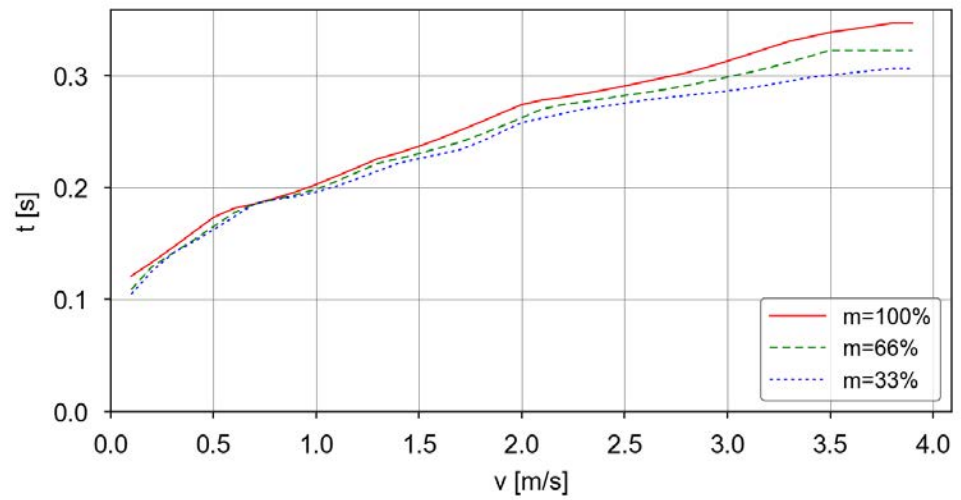


Continues on next page

6 IRB 1600

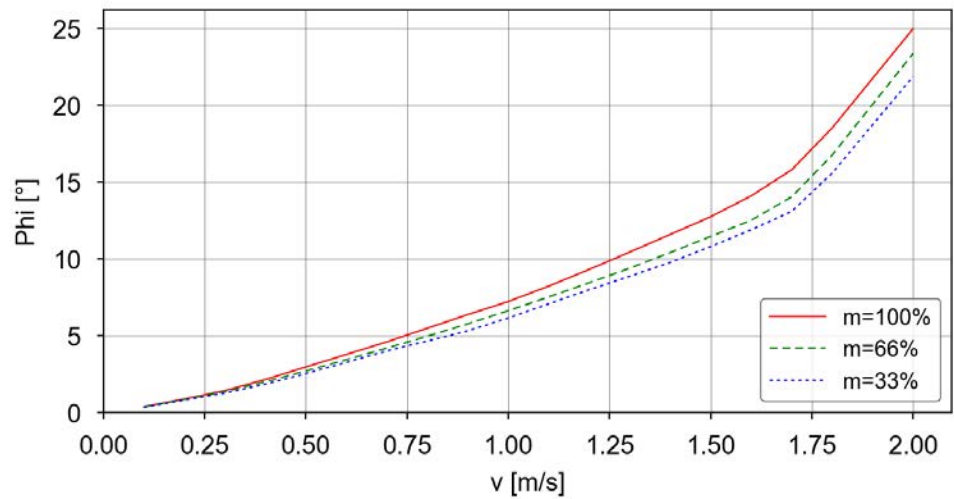
6.3 IRB 1600 1.45 m 6 kg

Continued

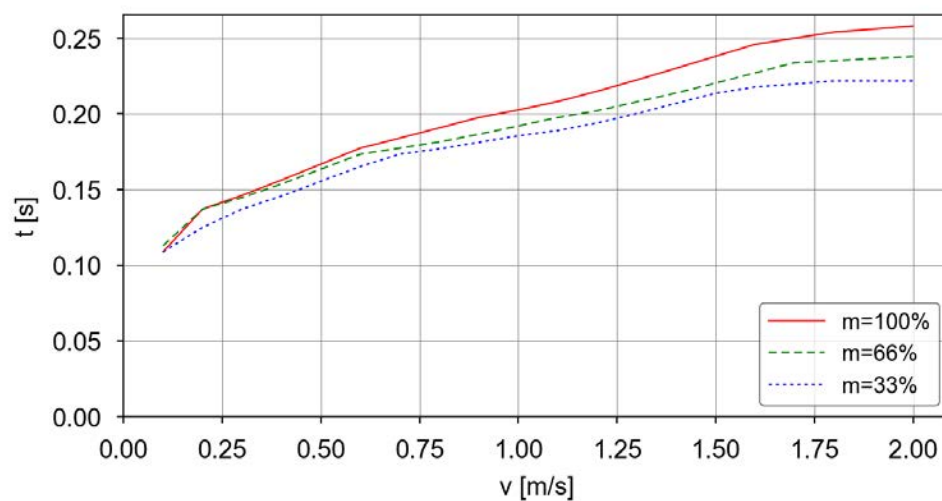


Category 1, Axis 3

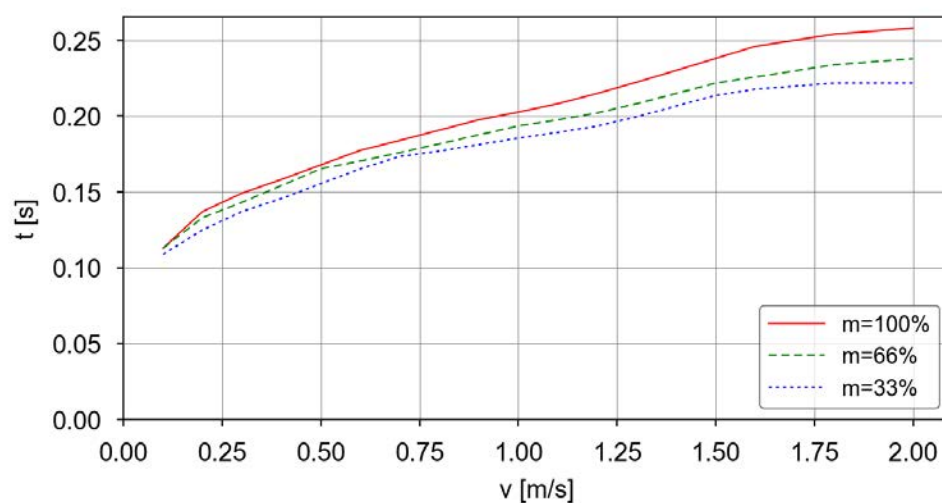
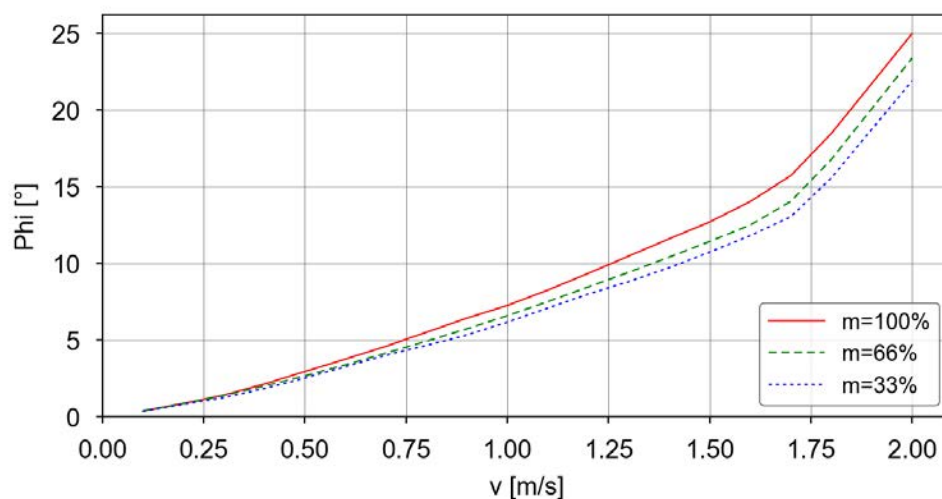
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



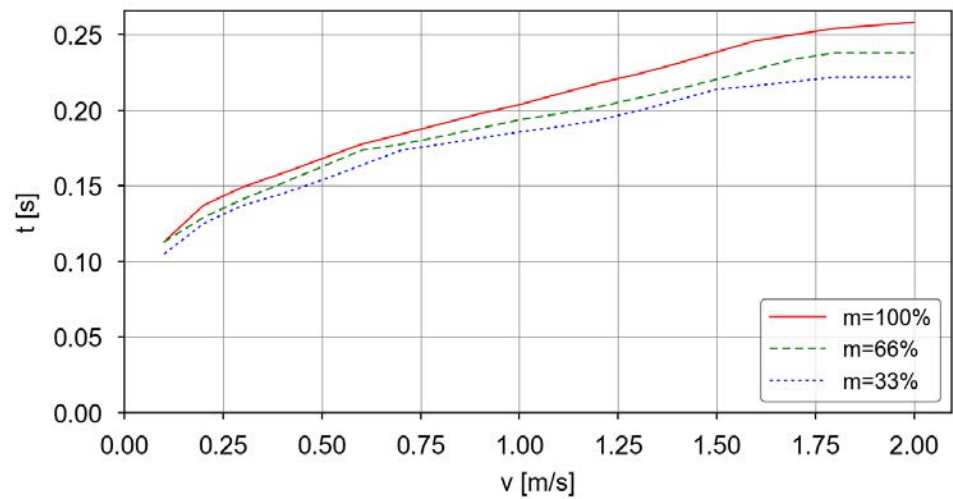
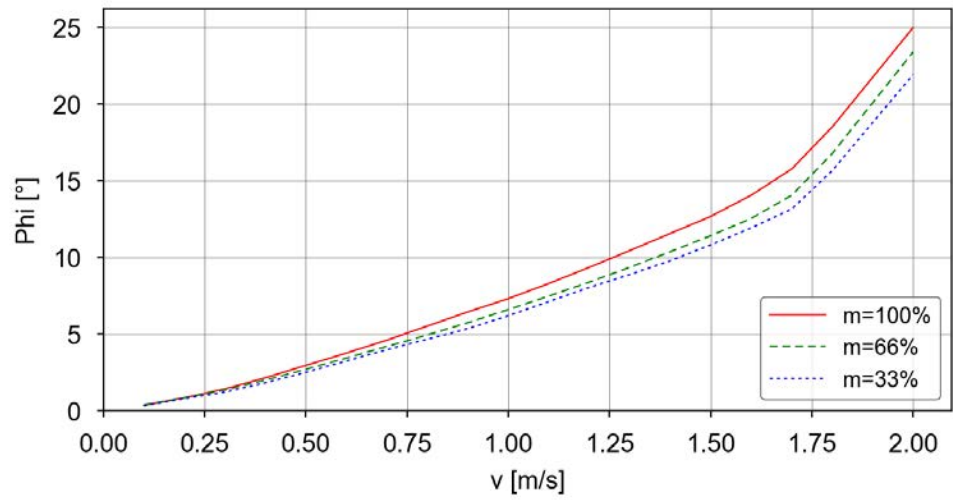
Continues on next page

6 IRB 1600

6.3 IRB 1600 1.45 m 6 kg

Continued

Extension zone 2, stopping distance and stopping time



6.4 IRB 1600 1.45 m 10 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	33.1	0.28
2	38.5	0.34
3	29.4	0.22

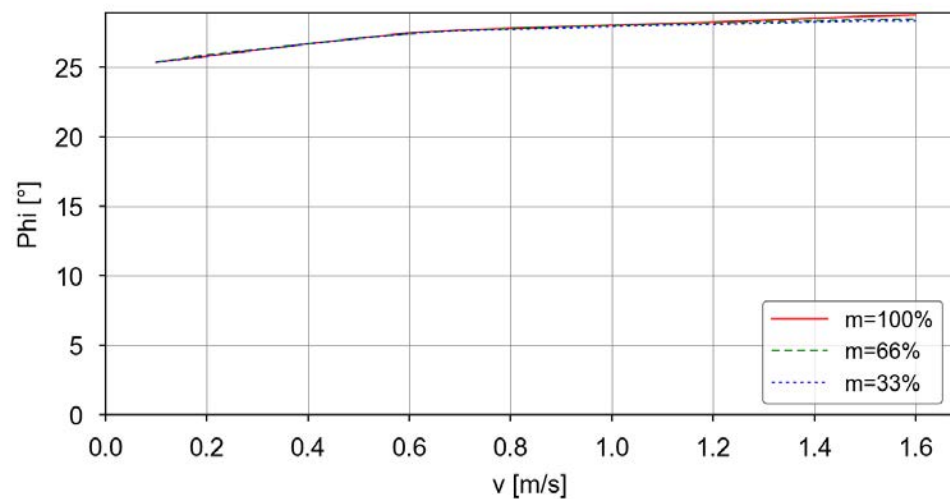
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.483
1	0.483	0.967
2	0.967	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

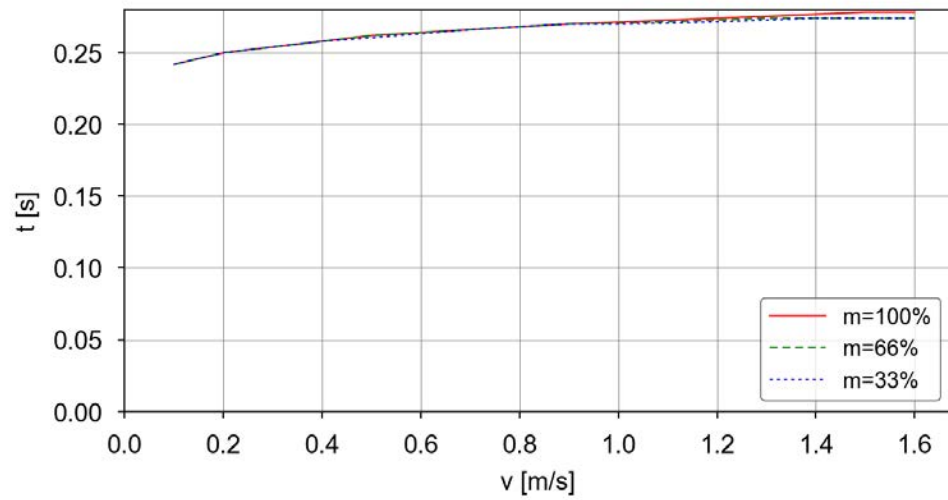


Continues on next page

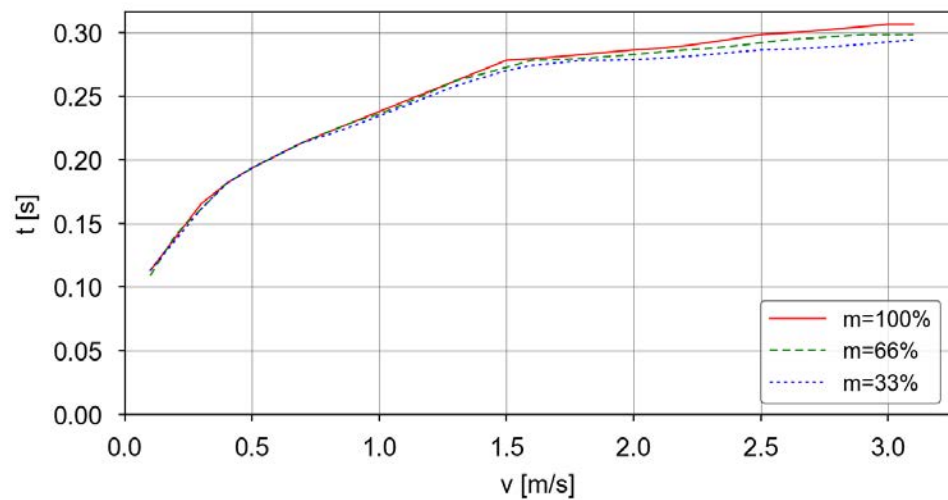
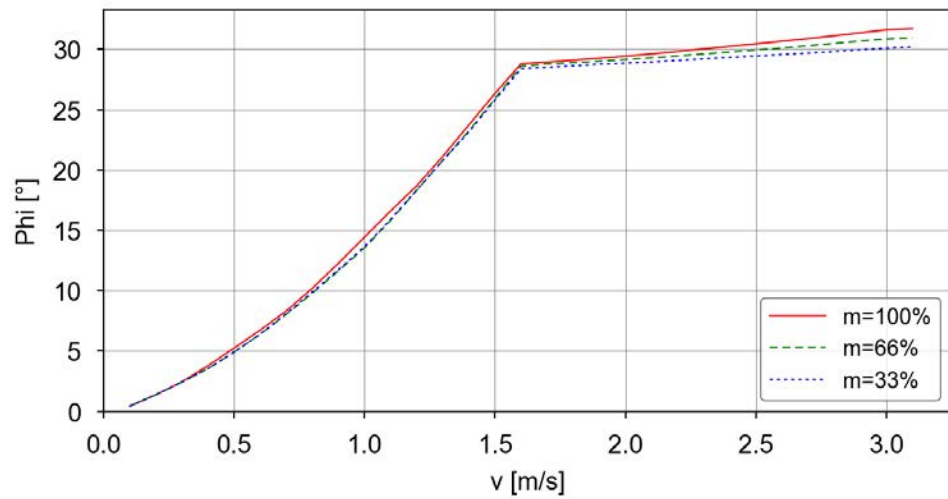
6 IRB 1600

6.4 IRB 1600 1.45 m 10 kg

Continued

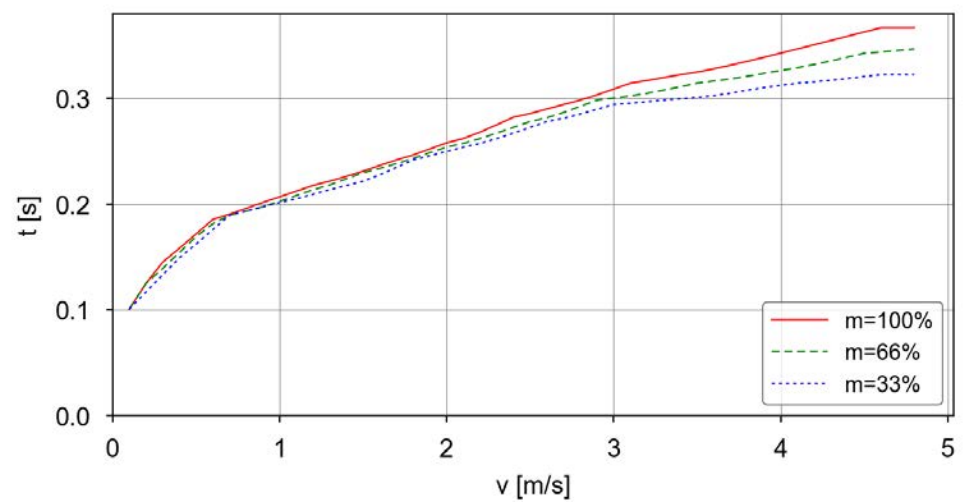
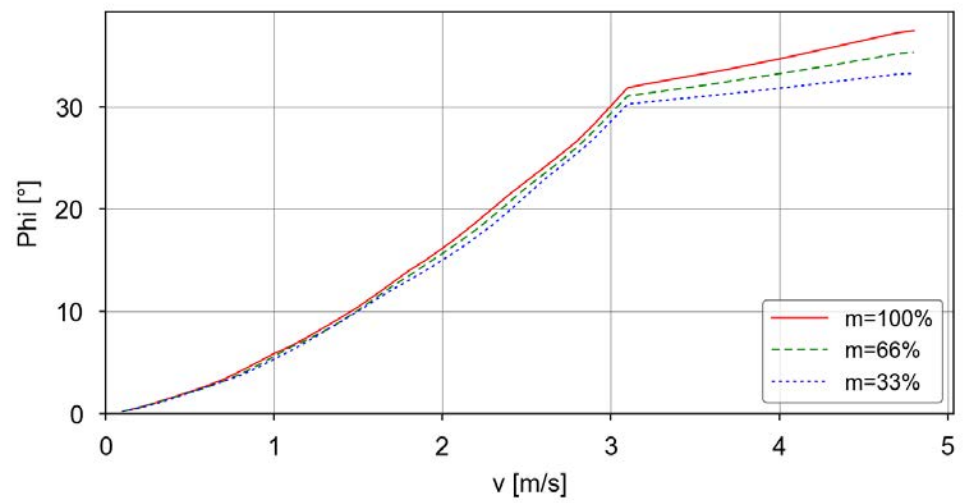


Extension zone 1, stopping distance and stopping time



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Extension zone 2, stopping distance and stopping time



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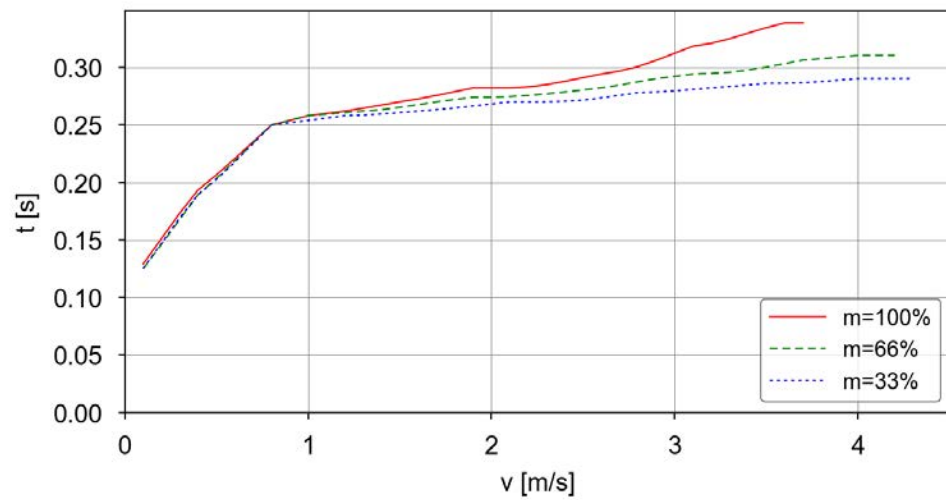
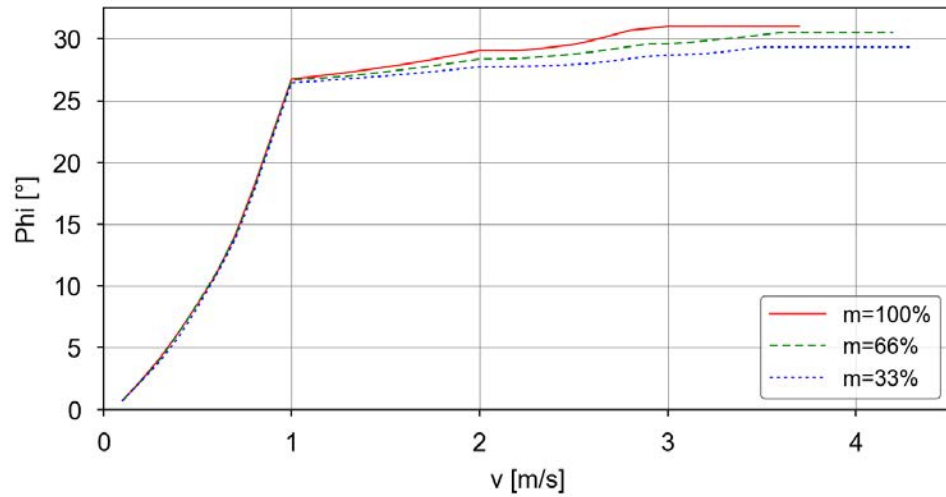
6 IRB 1600

6.4 IRB 1600 1.45 m 10 kg

Continued

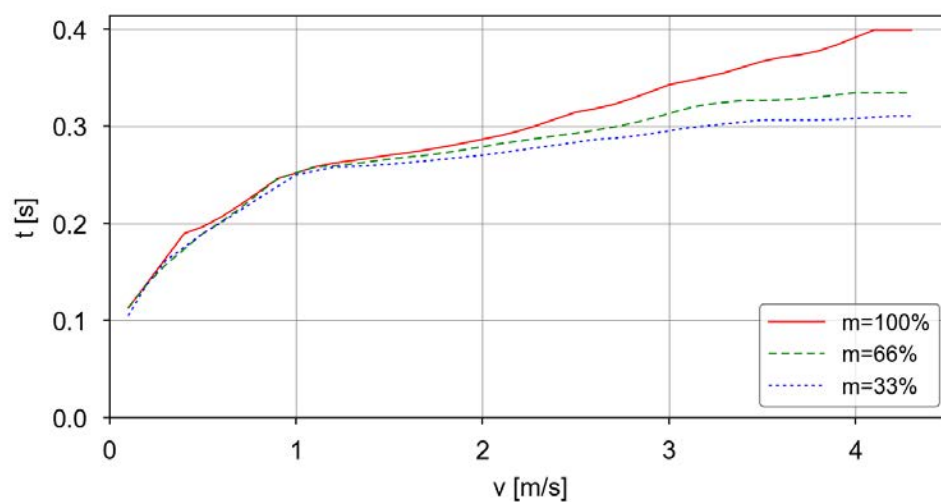
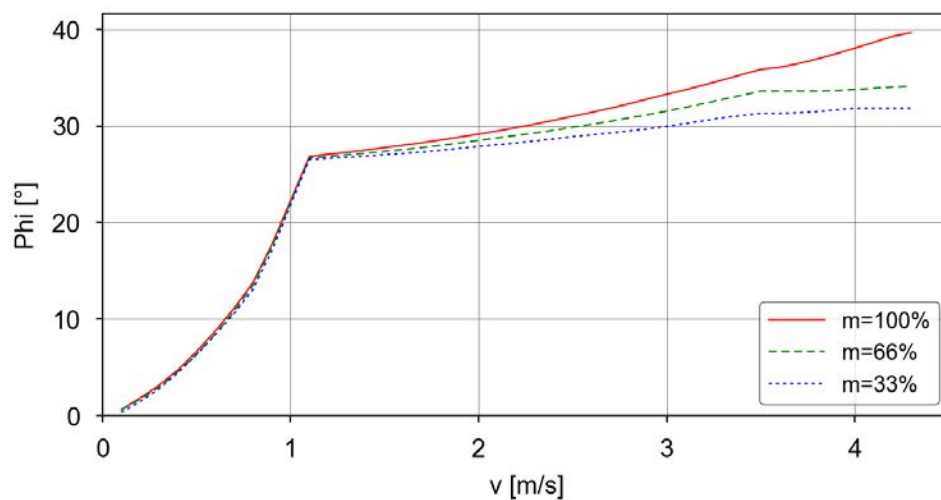
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

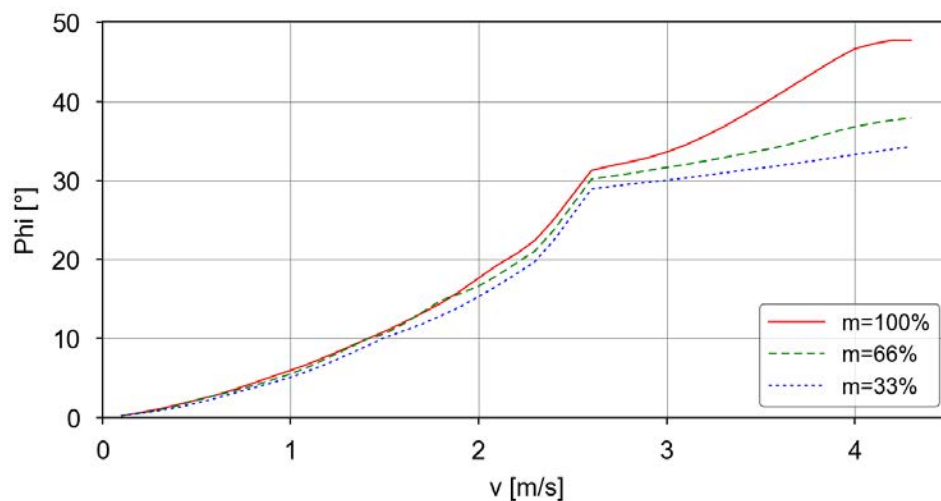


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

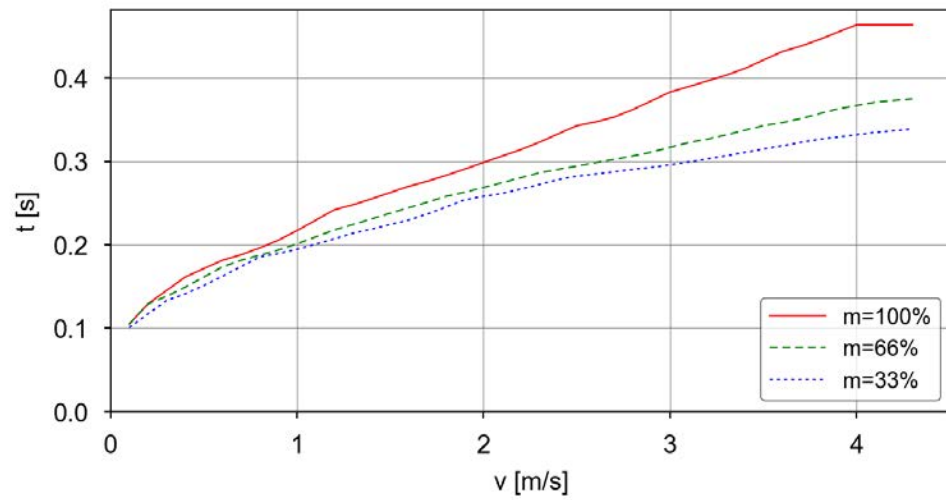


Continues on next page

6 IRB 1600

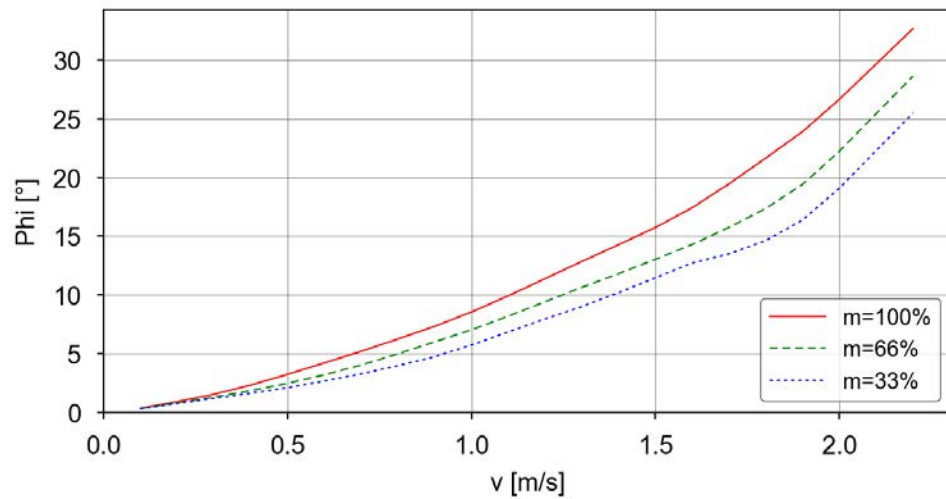
6.4 IRB 1600 1.45 m 10 kg

Continued

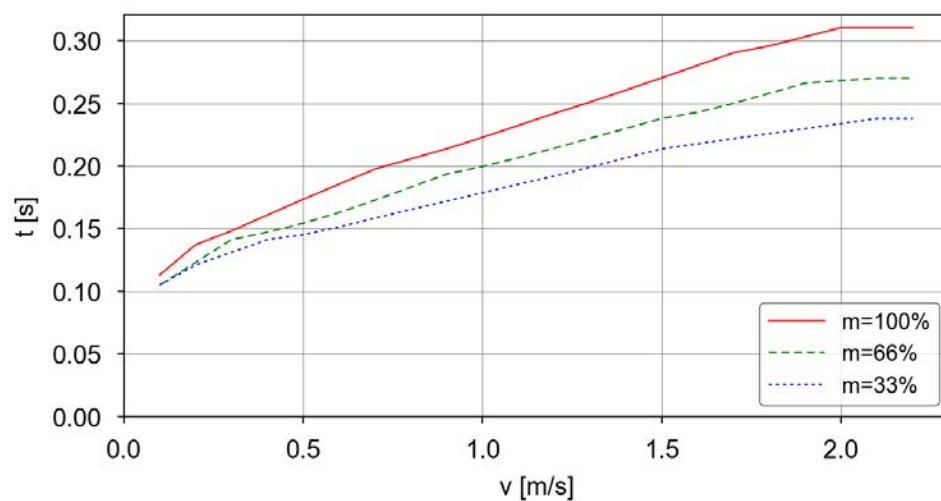


Category 1, Axis 3

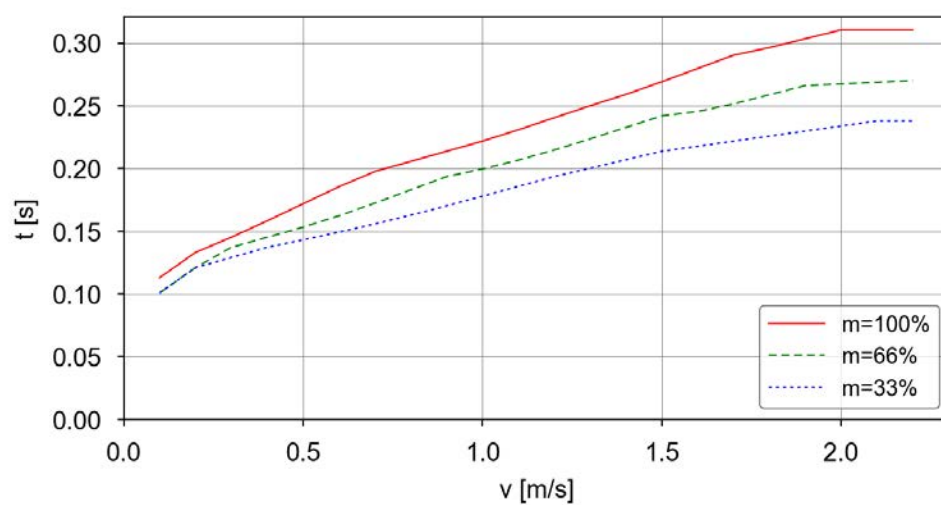
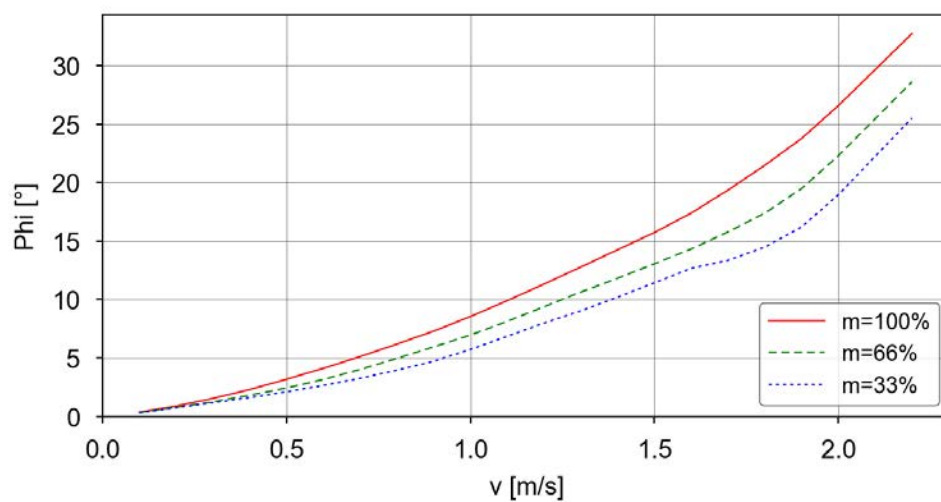
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



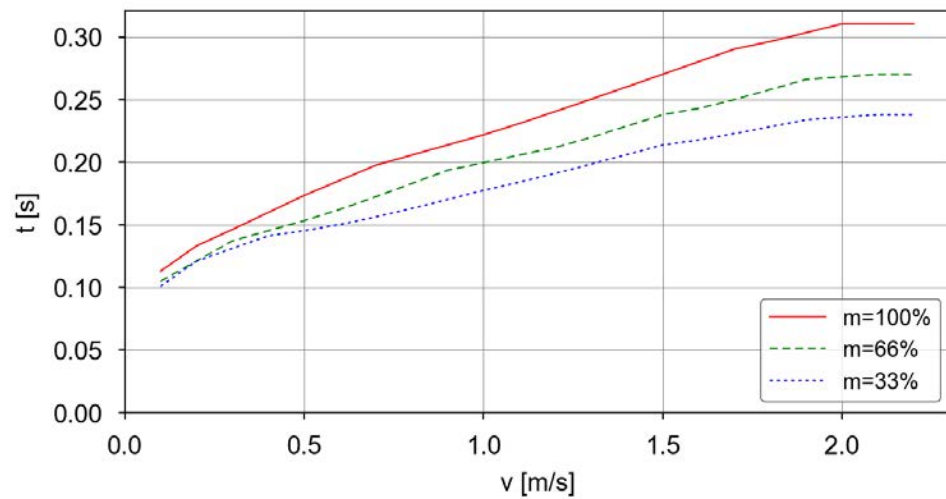
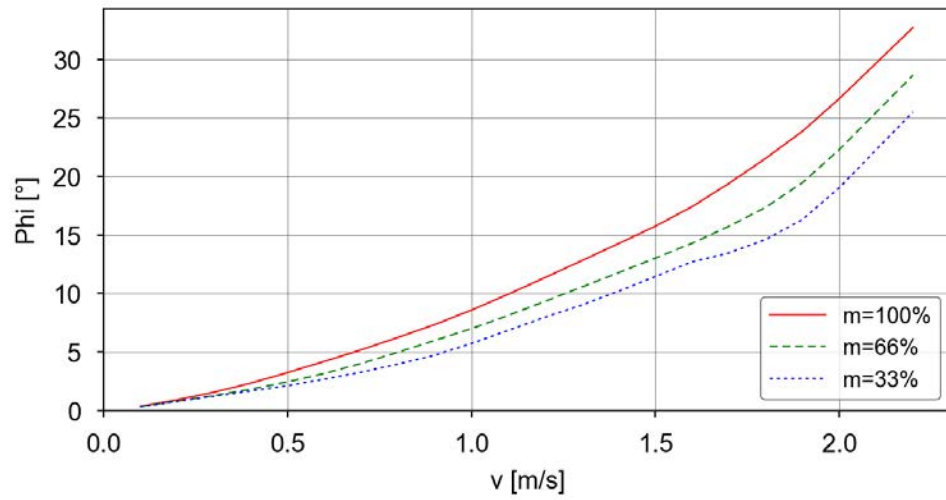
Continues on next page

6 IRB 1600

6.4 IRB 1600 1.45 m 10 kg

Continued

Extension zone 2, stopping distance and stopping time



6.5 IRB 1600ID 1.5 m 4 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	32.2	0.25
2	29.1	0.22
3	21.5	0.15

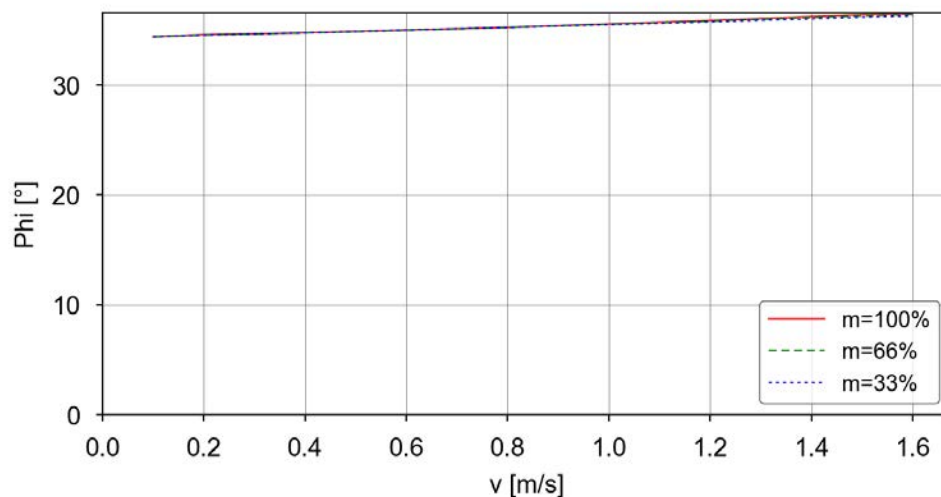
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.5
1	0.5	1.0
2	1.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

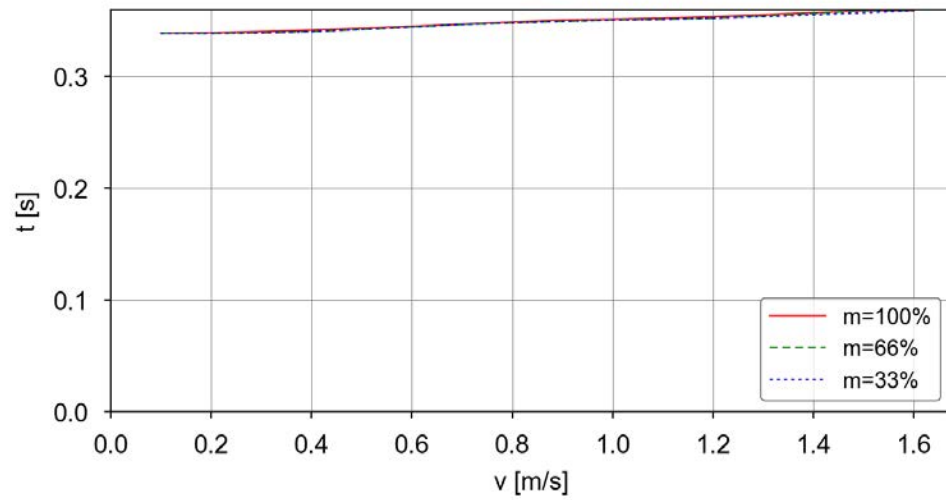


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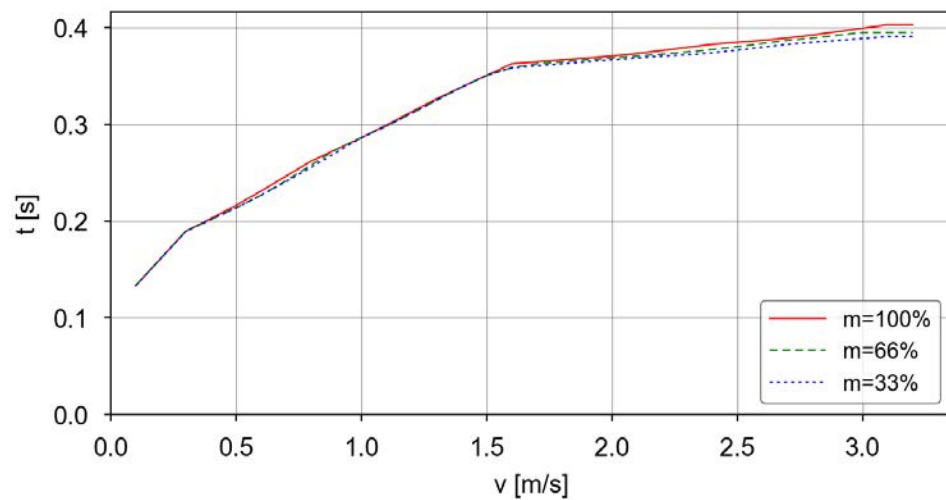
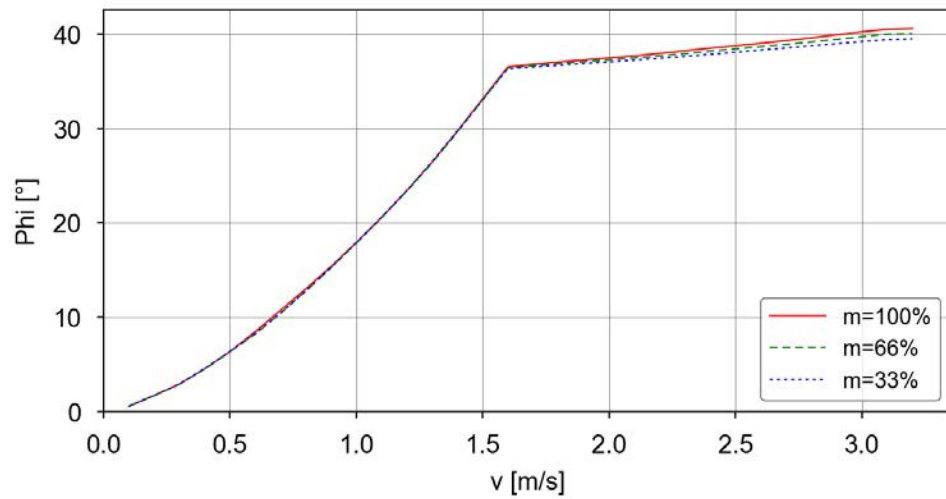
6 IRB 1600

6.5 IRB 1600ID 1.5 m 4 kg

Continued

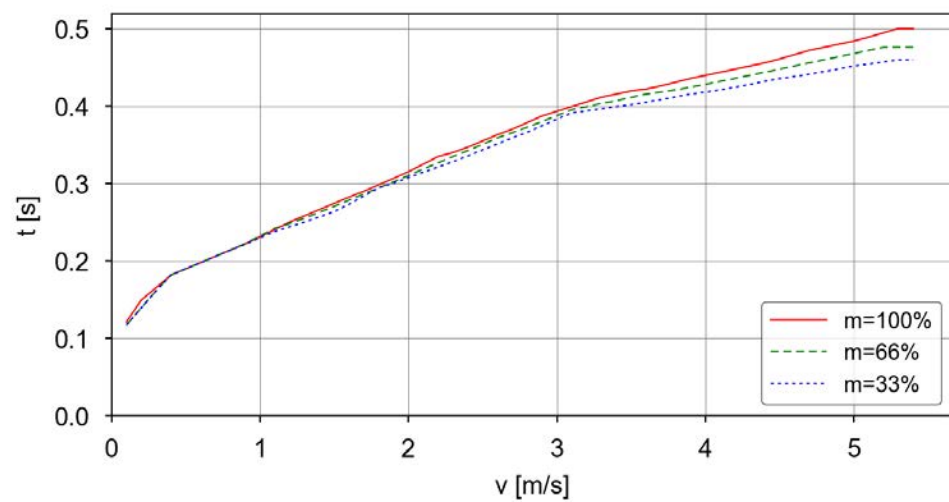
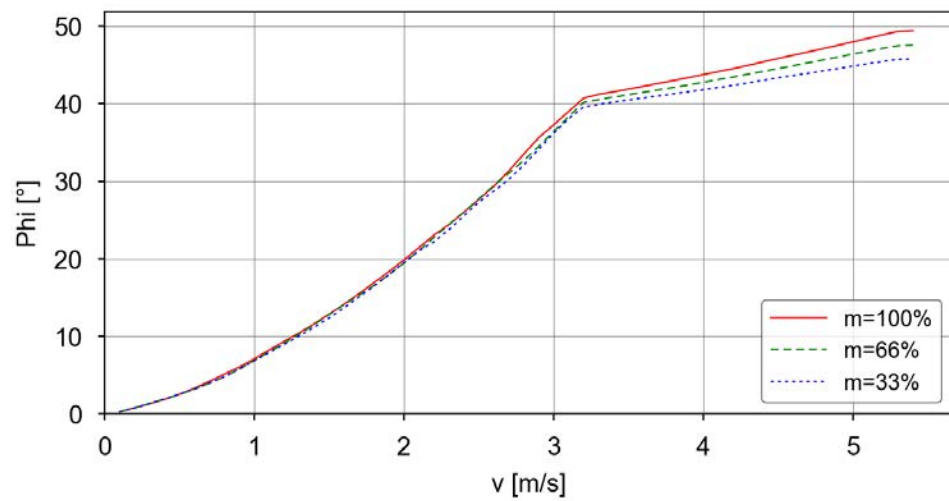


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

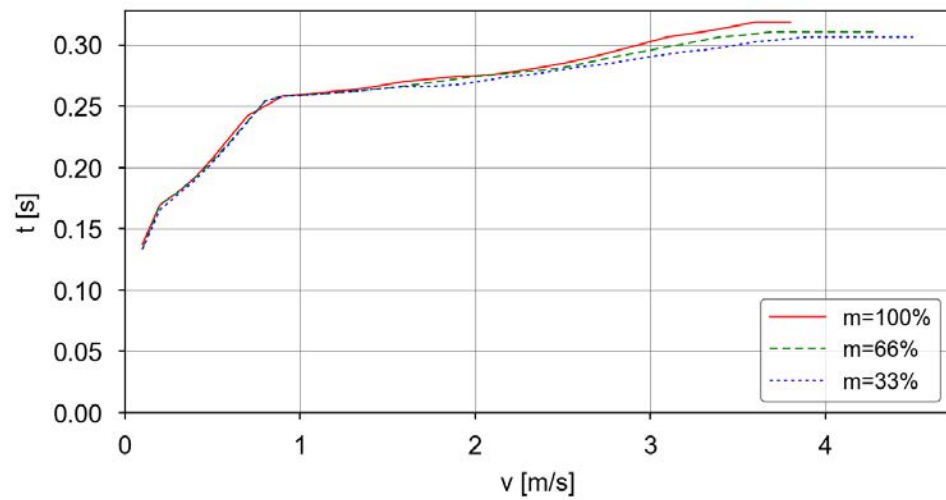
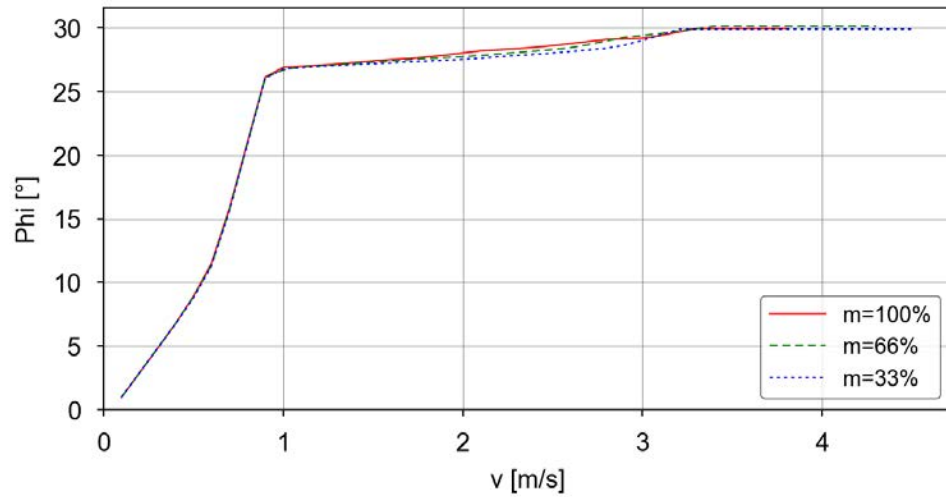
6 IRB 1600

6.5 IRB 1600ID 1.5 m 4 kg

Continued

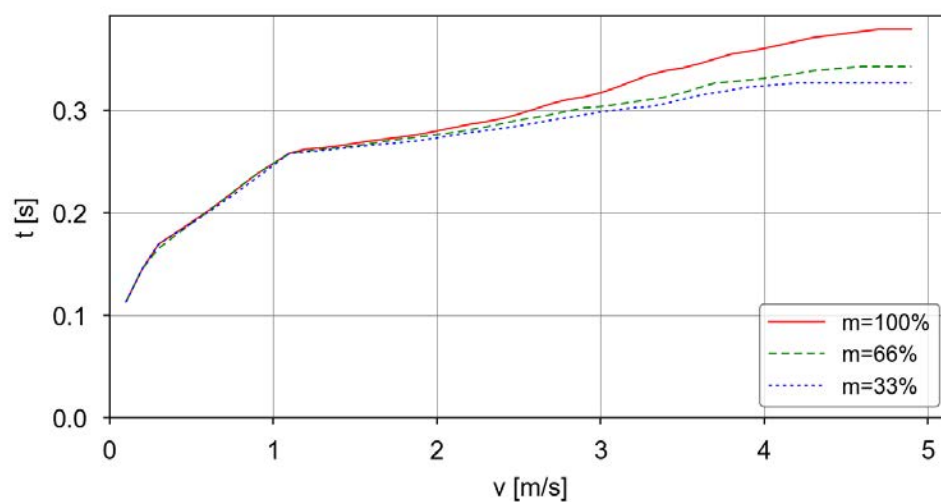
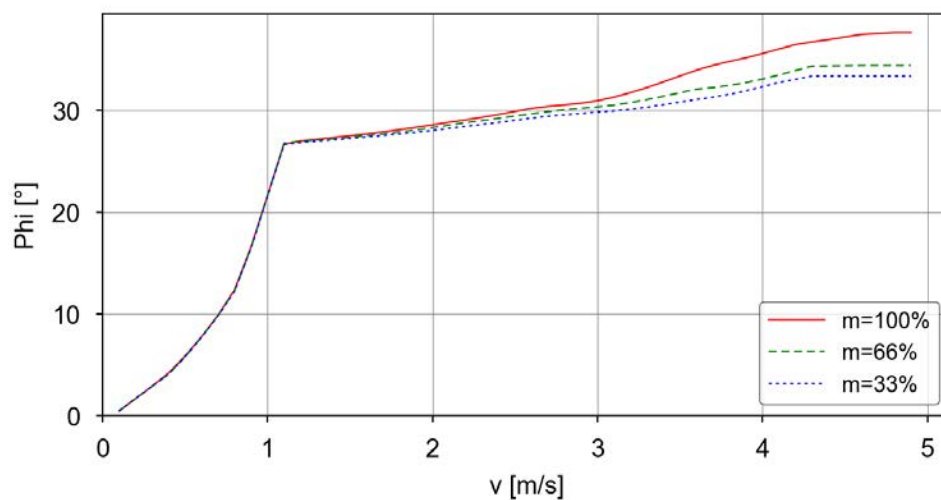
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

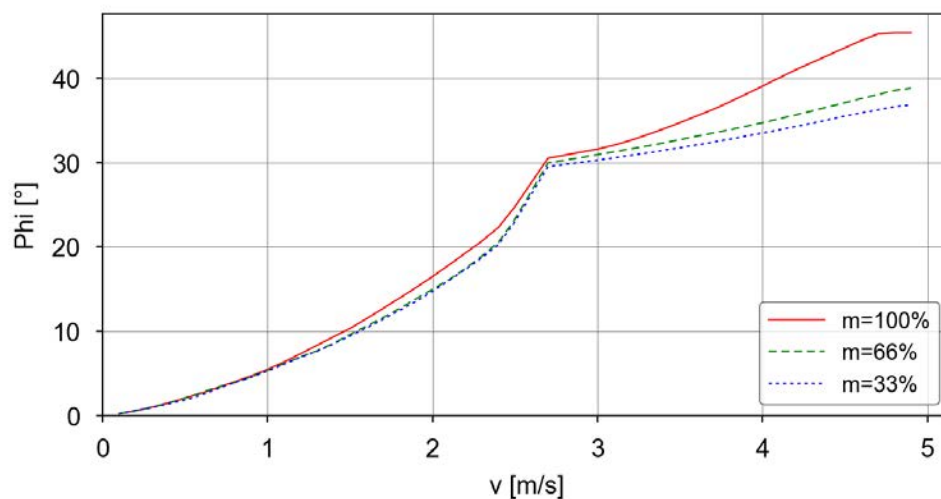


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

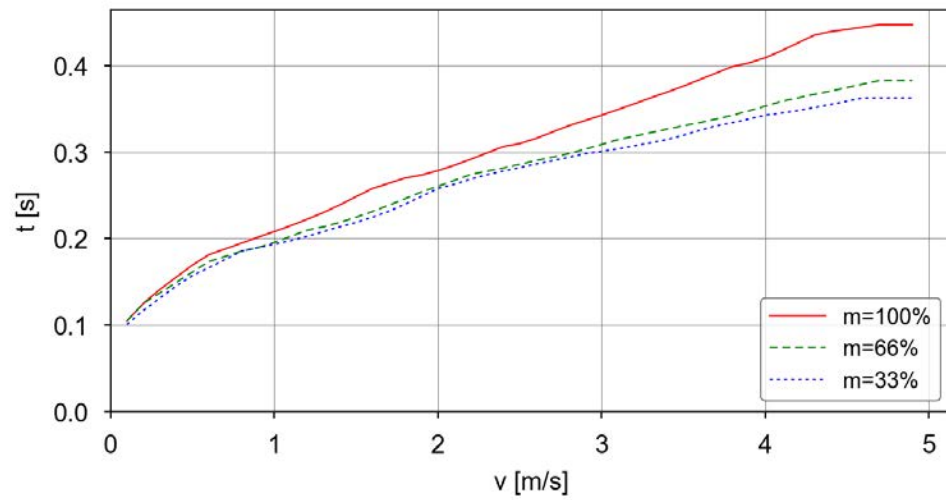


Continues on next page

6 IRB 1600

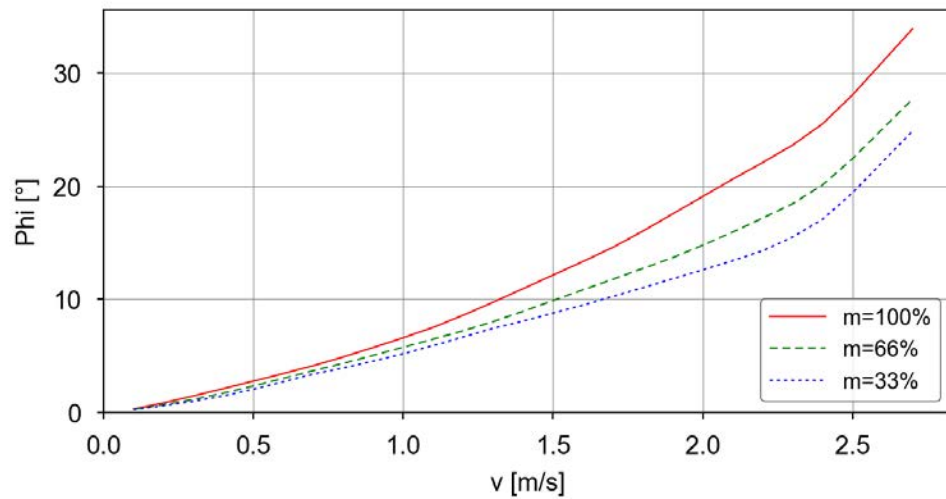
6.5 IRB 1600ID 1.5 m 4 kg

Continued

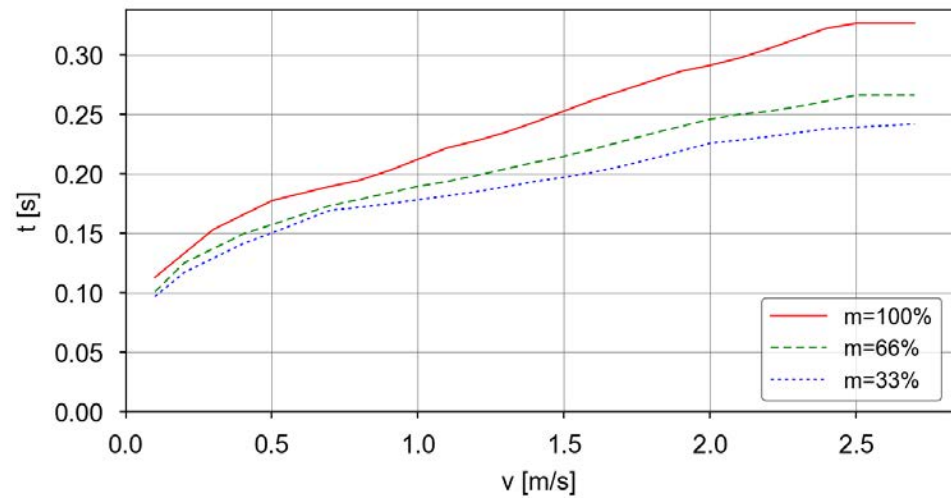


Category 1, Axis 3

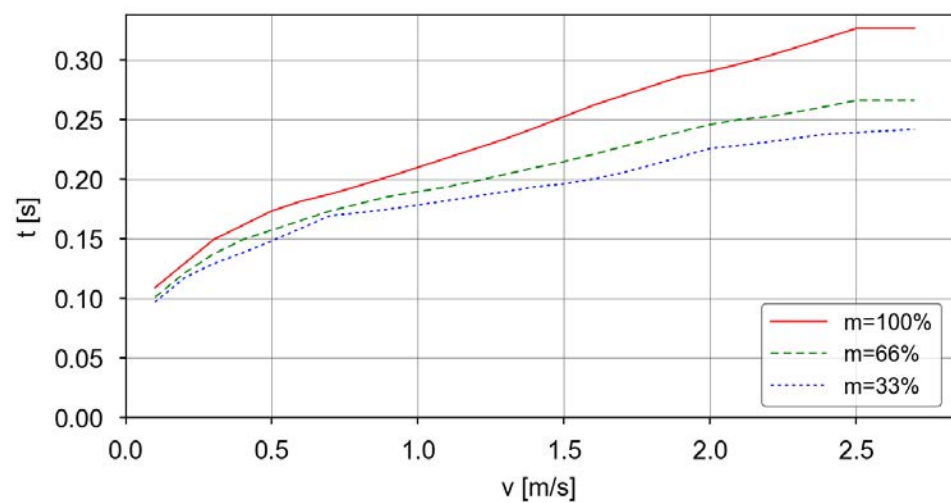
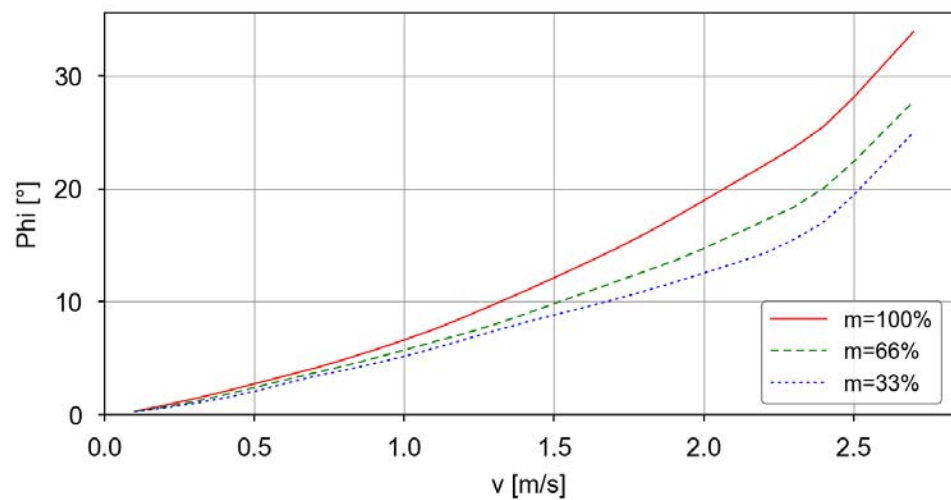
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



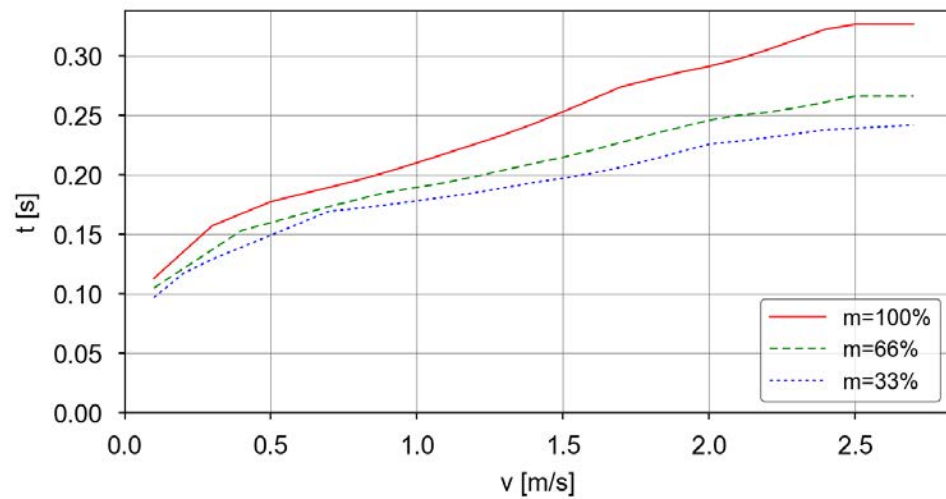
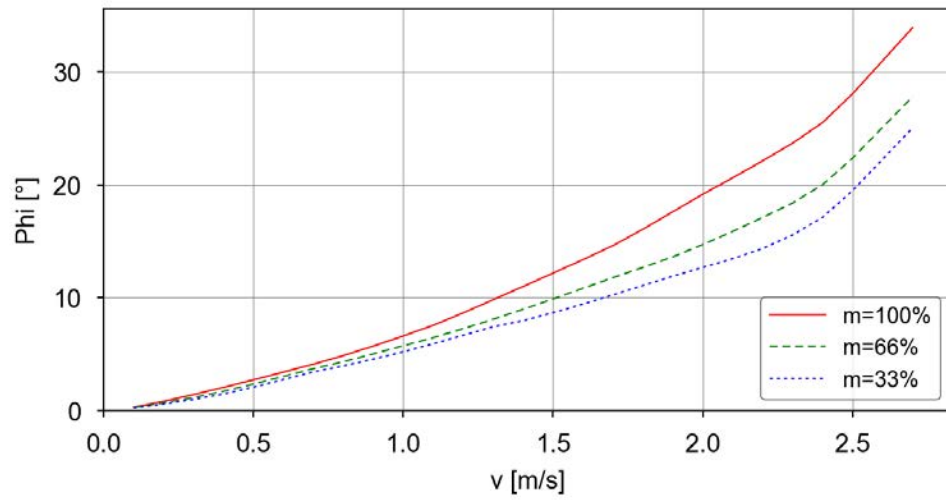
Continues on next page

6 IRB 1600

6.5 IRB 1600ID 1.5 m 4 kg

Continued

Extension zone 2, stopping distance and stopping time



7 IRB 1660

7.1 IRB 1660ID 1.55 m 4 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	29.6	0.22
2	40.2	0.34
3	26.8	0.2

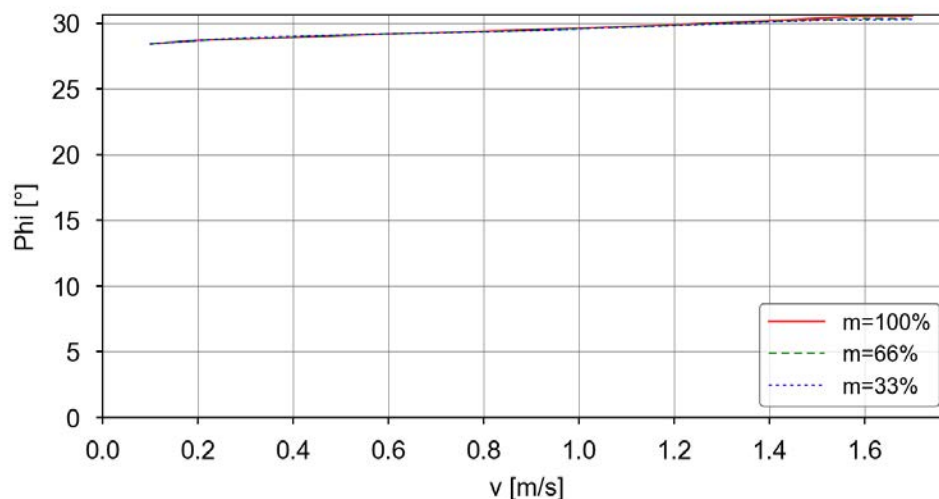
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.0
1	0.0	0.0
2	0.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

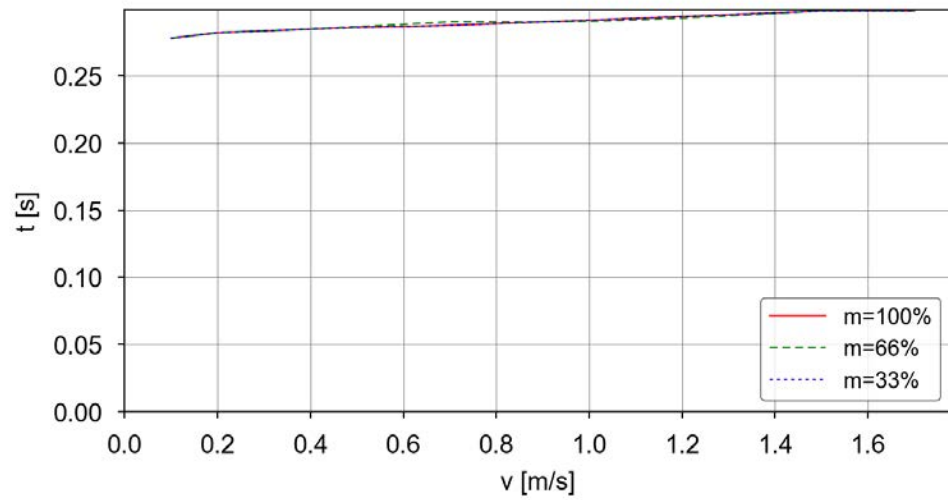


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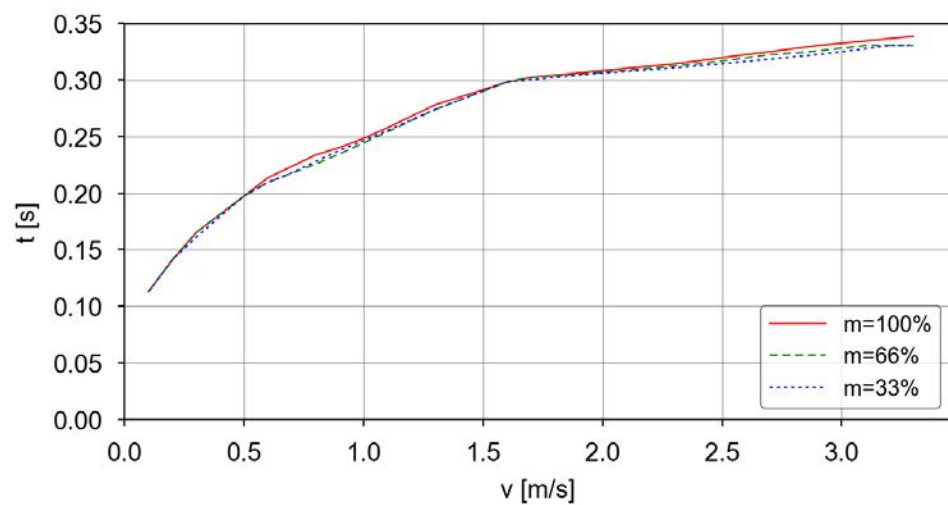
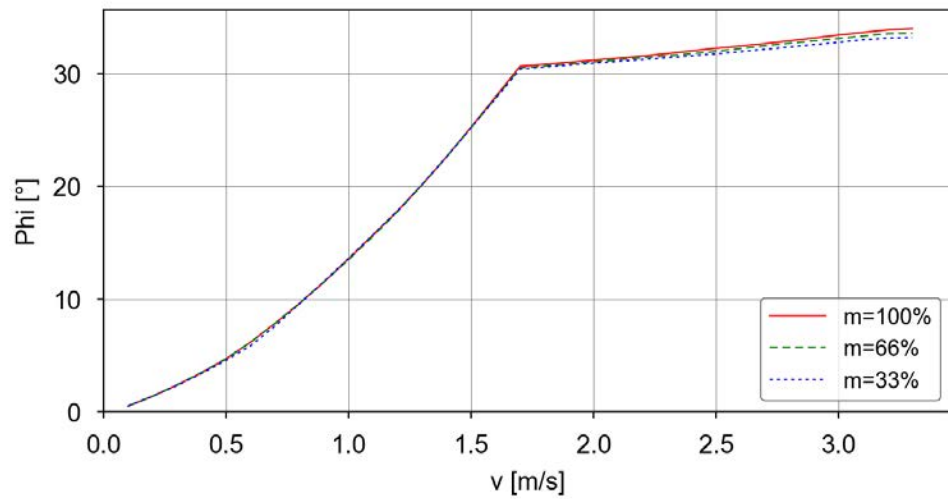
7 IRB 1660

7.1 IRB 1660ID 1.55 m 4 kg

Continued

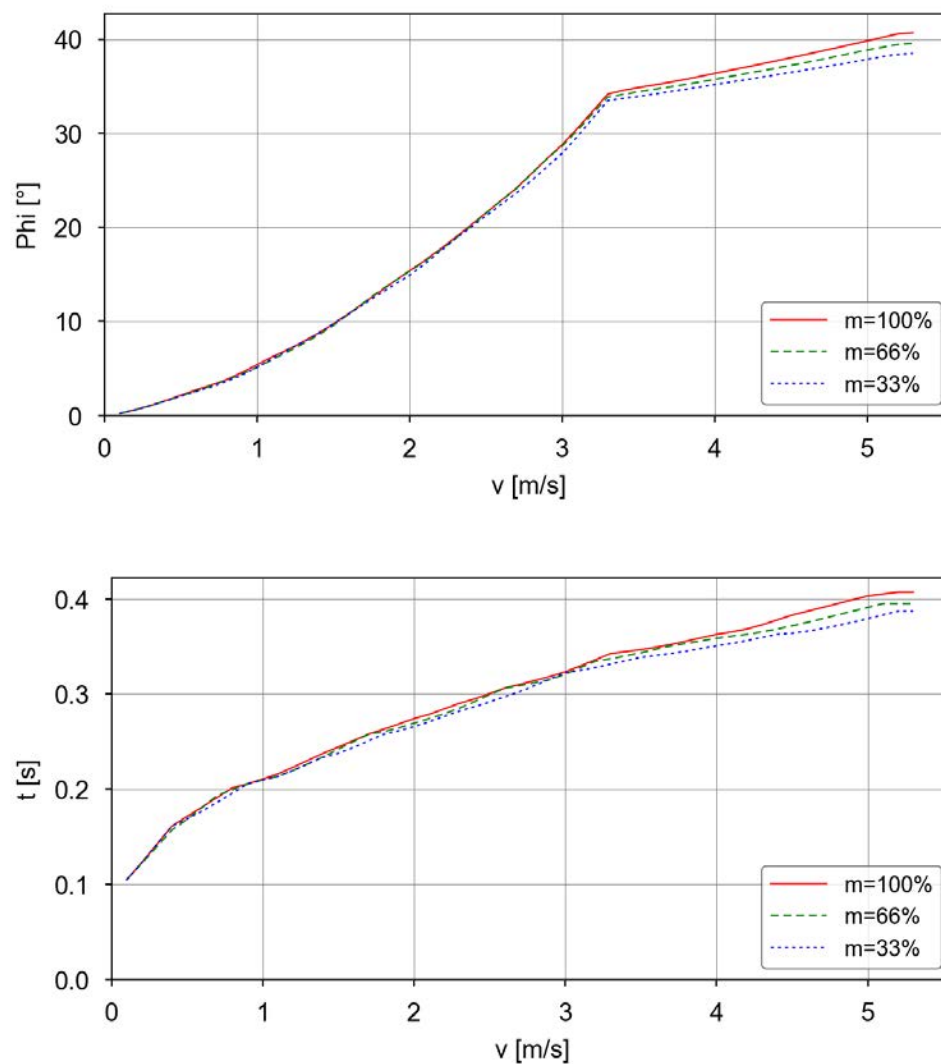


Extension zone 1, stopping distance and stopping time



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Extension zone 2, stopping distance and stopping time



Continues on next page

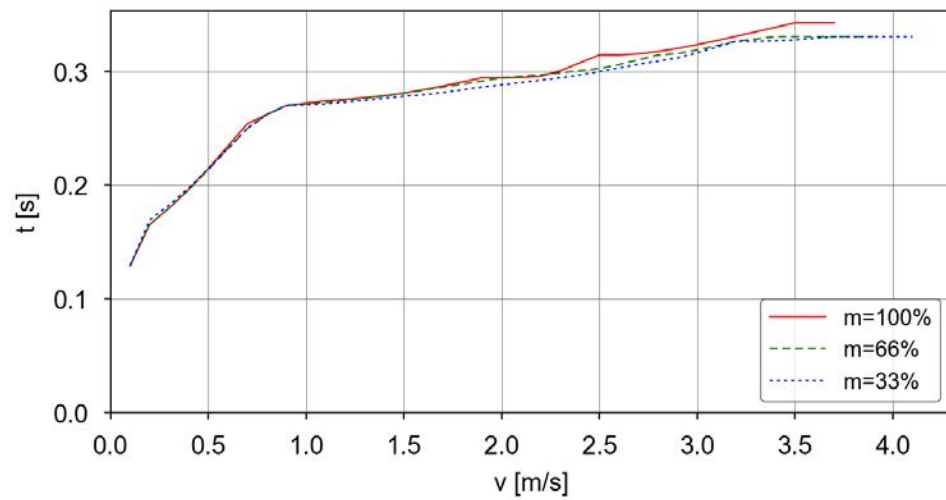
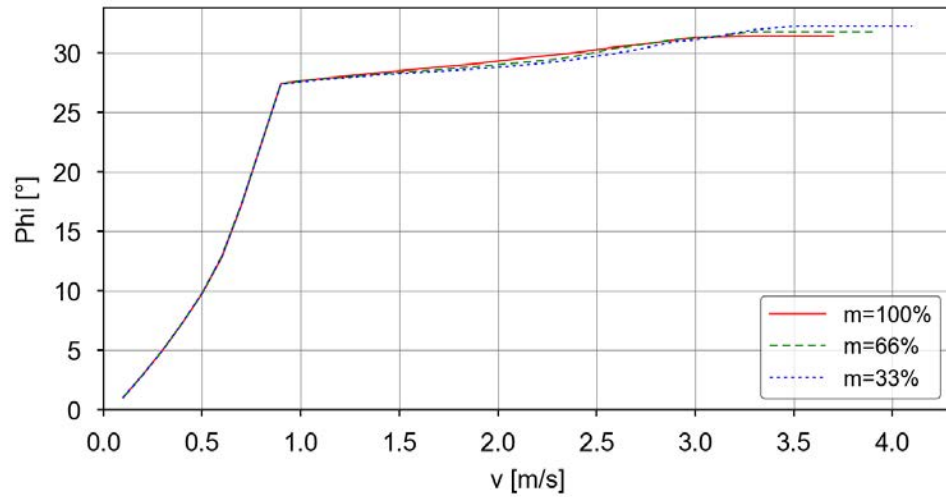
7 IRB 1660

7.1 IRB 1660ID 1.55 m 4 kg

Continued

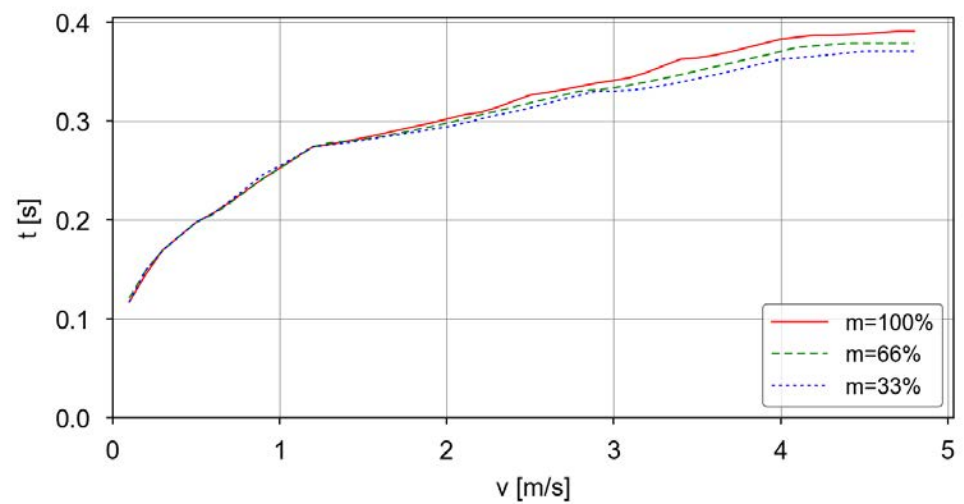
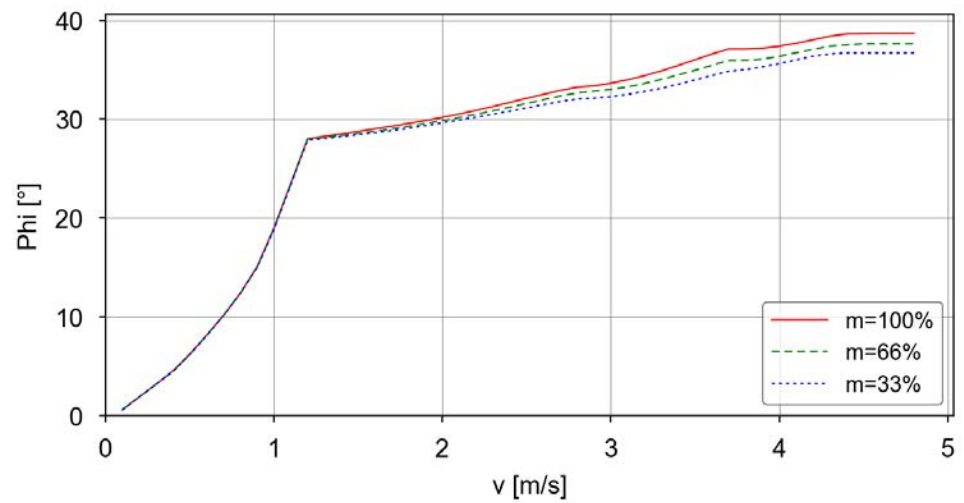
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

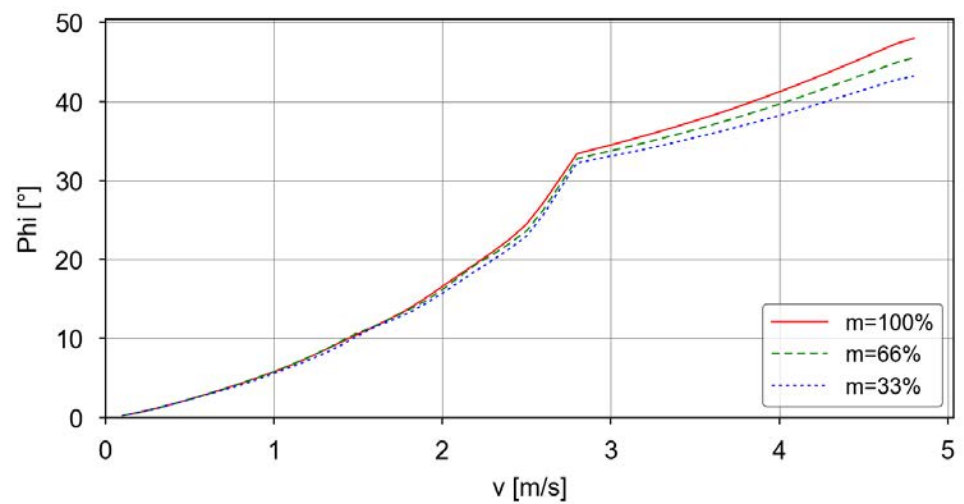


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

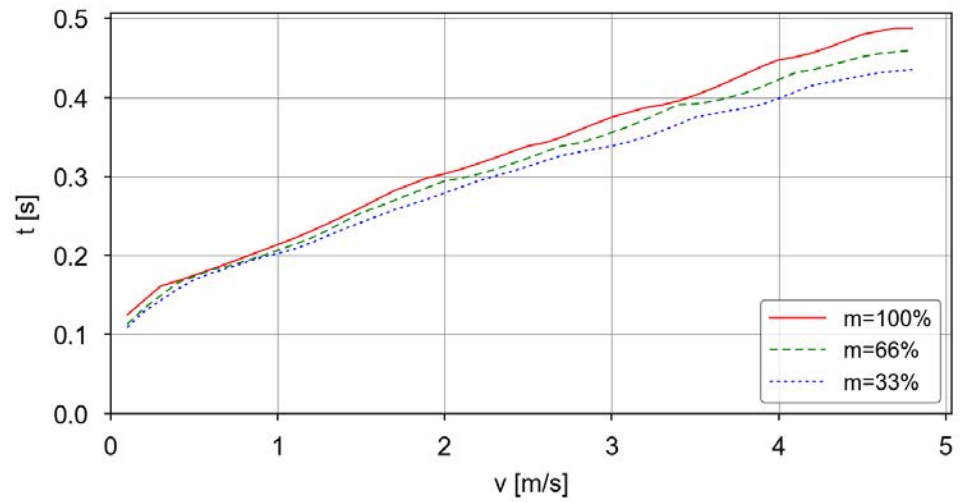


Continues on next page

7 IRB 1660

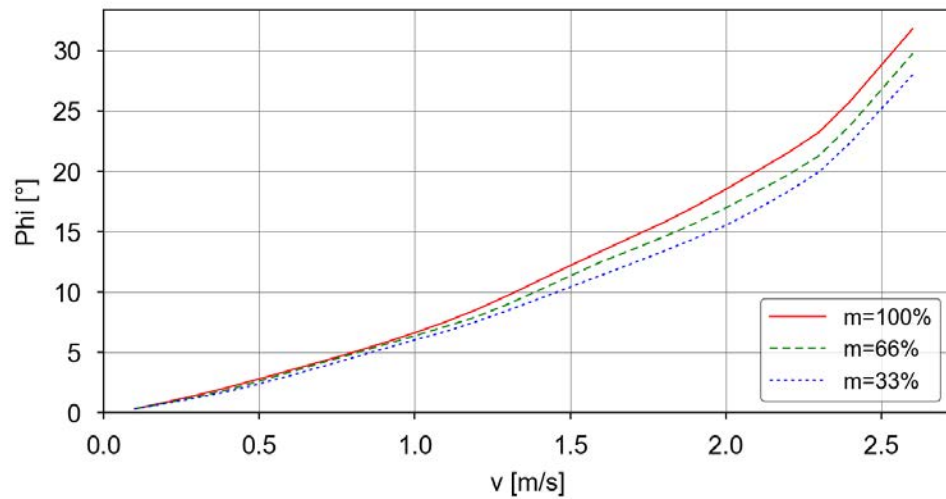
7.1 IRB 1660ID 1.55 m 4 kg

Continued

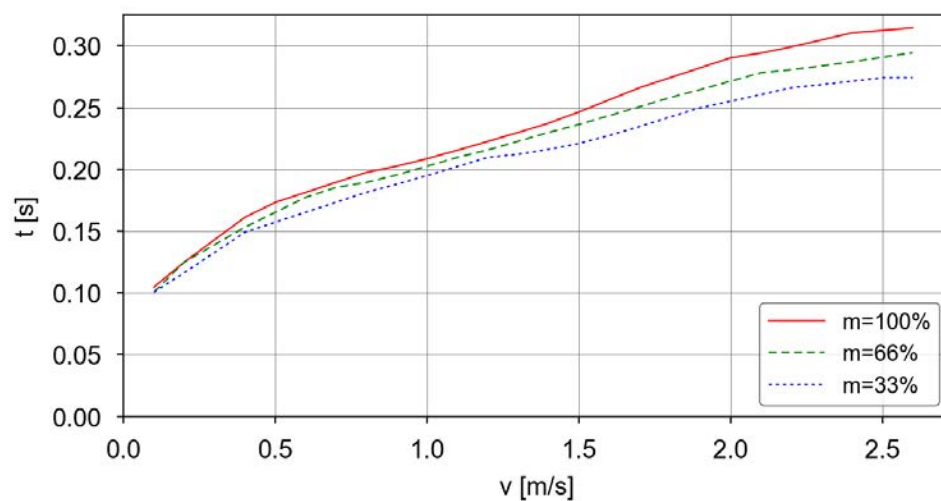


Category 1, Axis 3

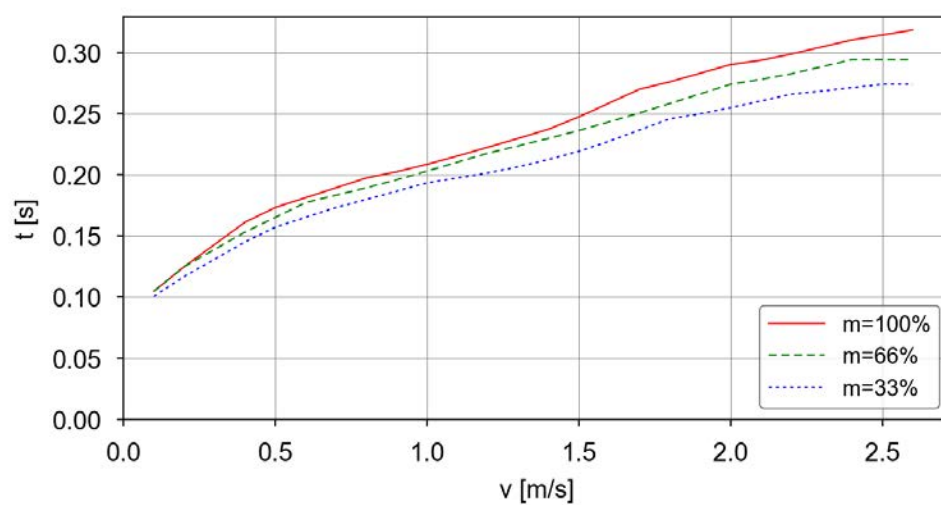
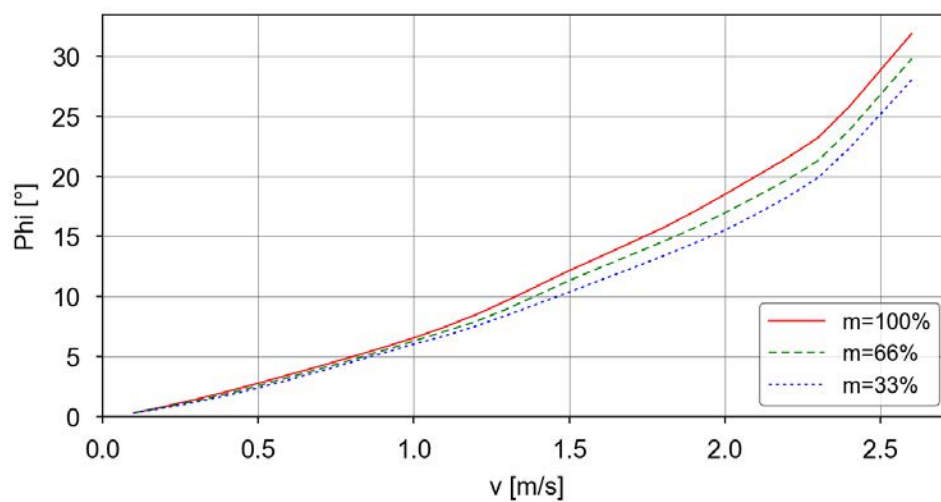
Extension zone 0, stopping distance and stopping time



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Extension zone 1, stopping distance and stopping time



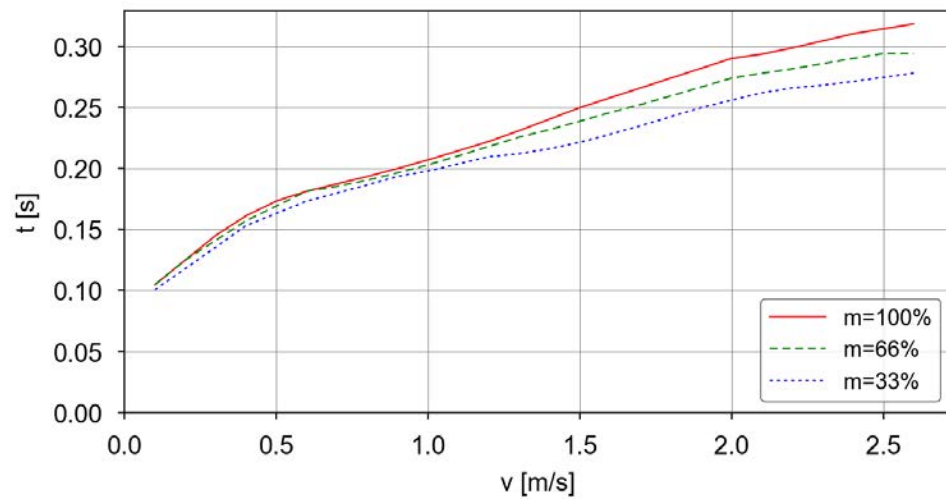
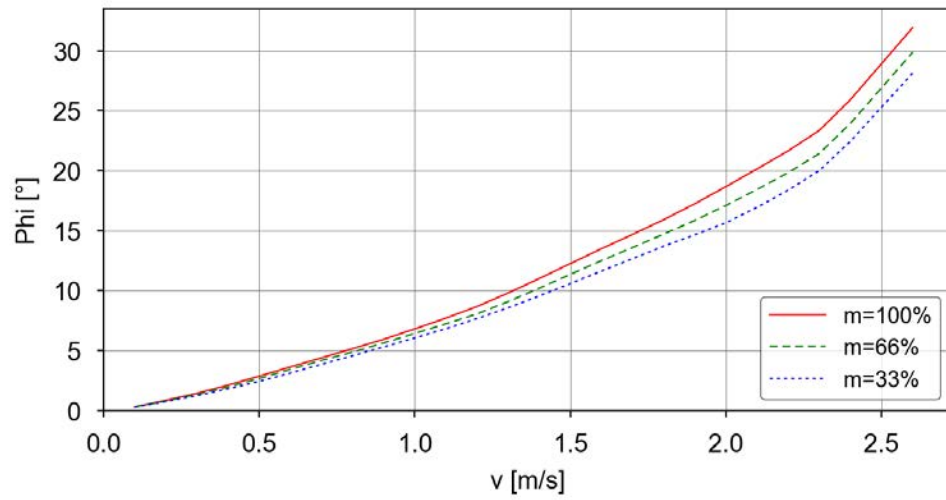
Continues on next page

7 IRB 1660

7.1 IRB 1660ID 1.55 m 4 kg

Continued

Extension zone 2, stopping distance and stopping time



7.2 IRB 1660ID 1.55 m 6 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	29.5	0.22
2	39.5	0.32
3	26.6	0.2

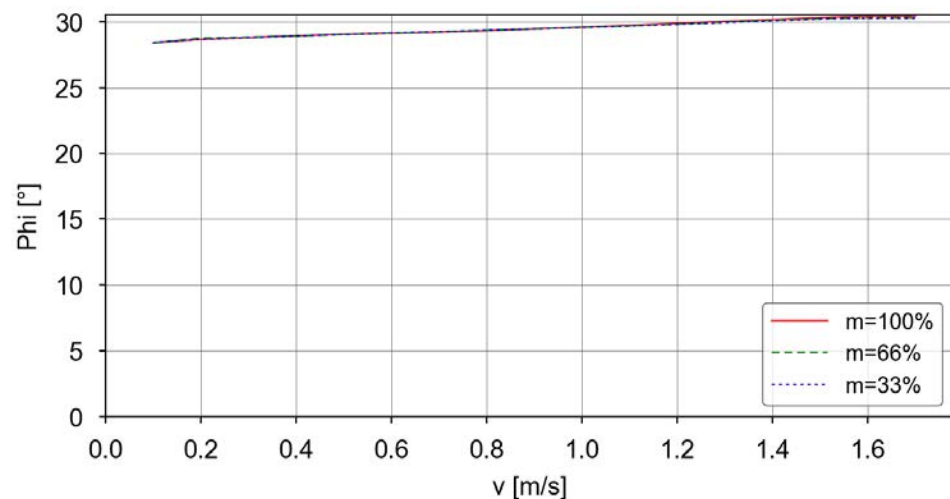
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.0
1	0.0	0.0
2	0.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

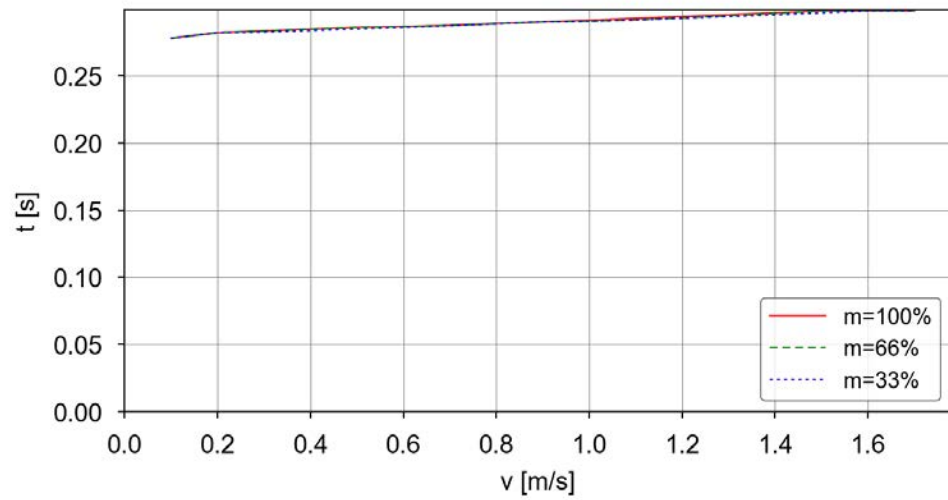


Continues on next page

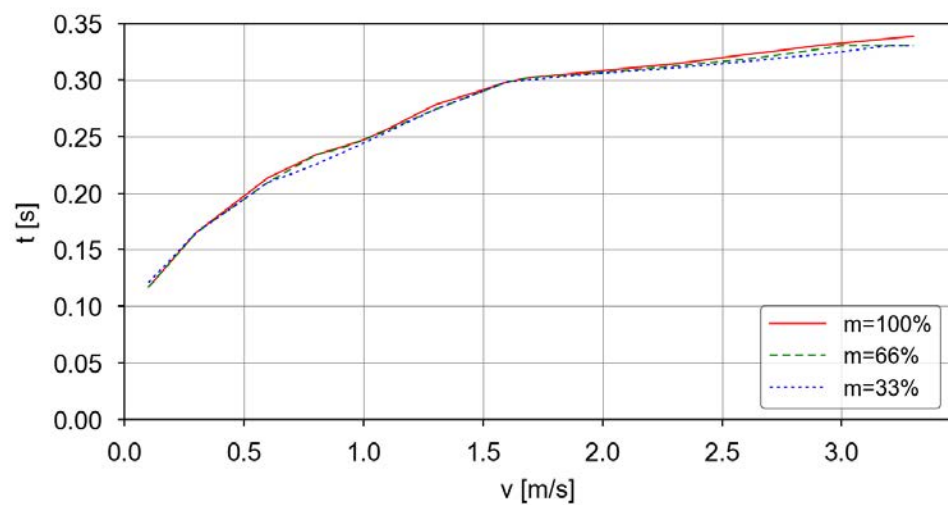
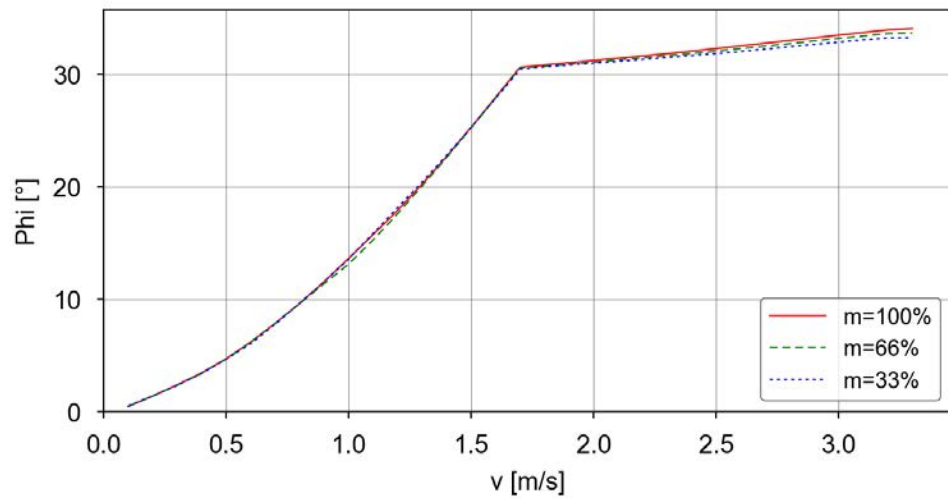
7 IRB 1660

7.2 IRB 1660ID 1.55 m 6 kg

Continued

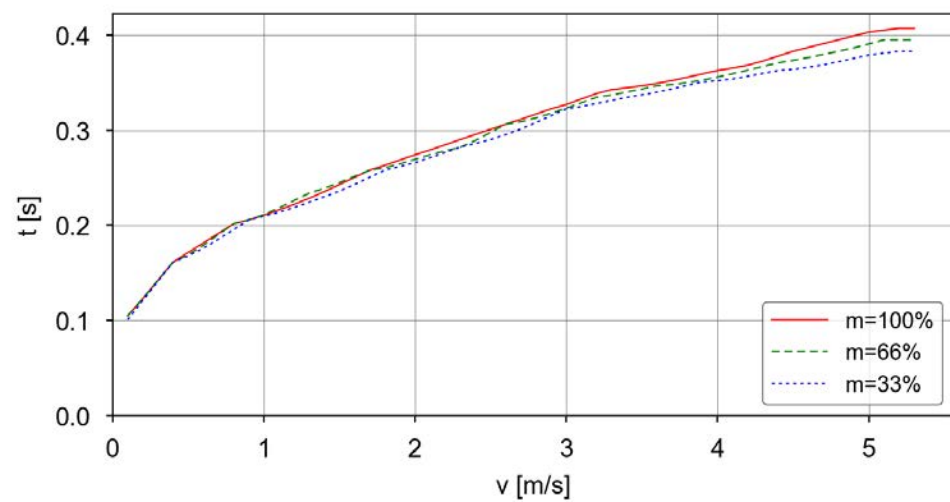
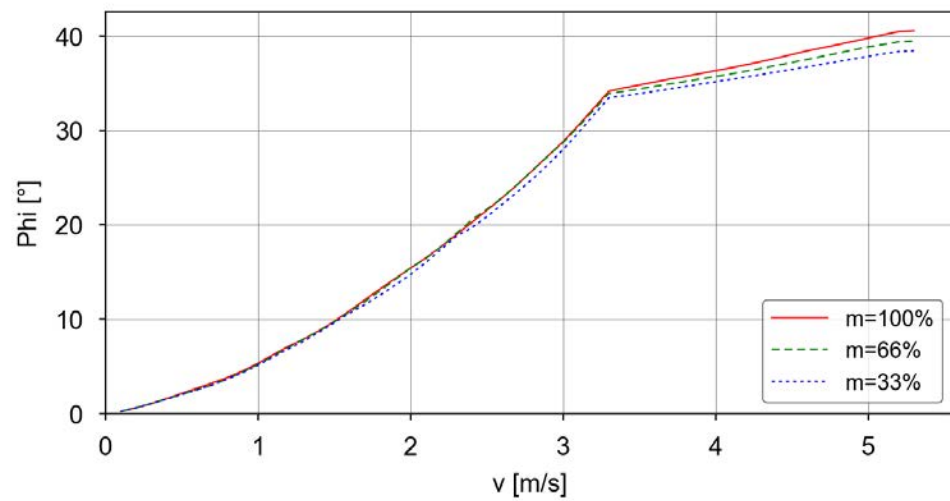


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

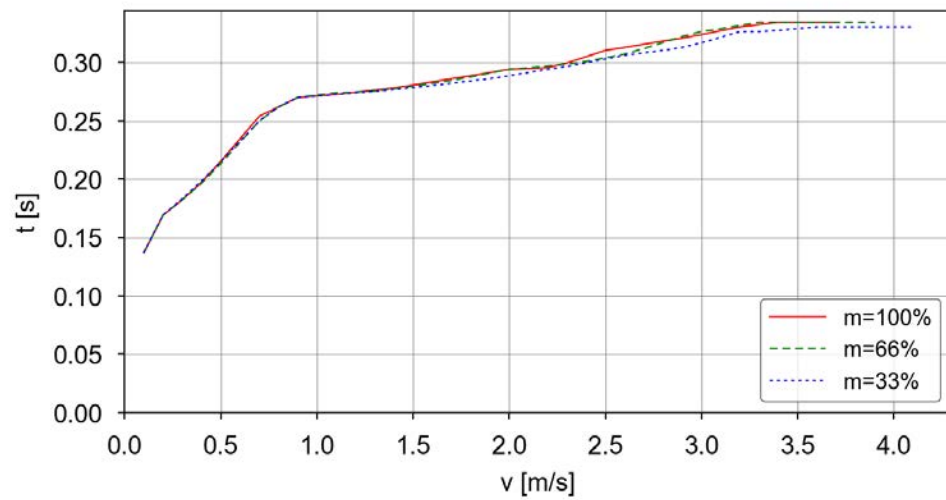
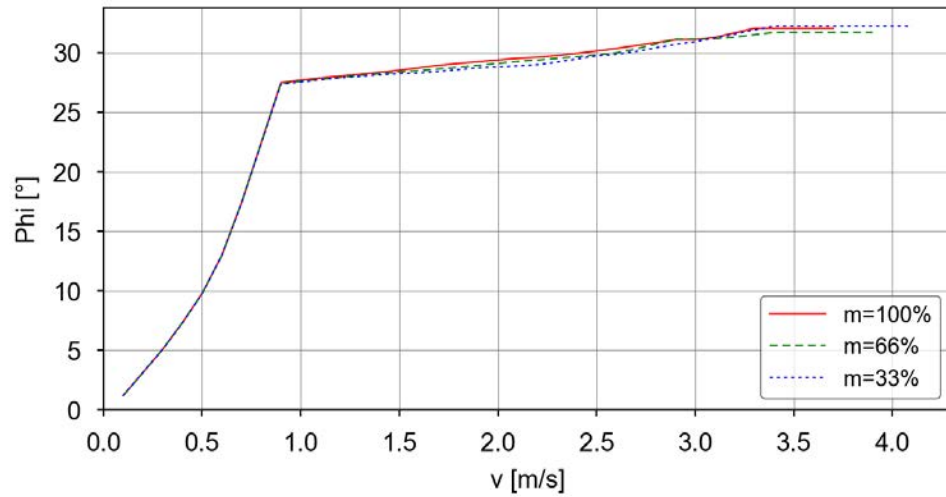
7 IRB 1660

7.2 IRB 1660ID 1.55 m 6 kg

Continued

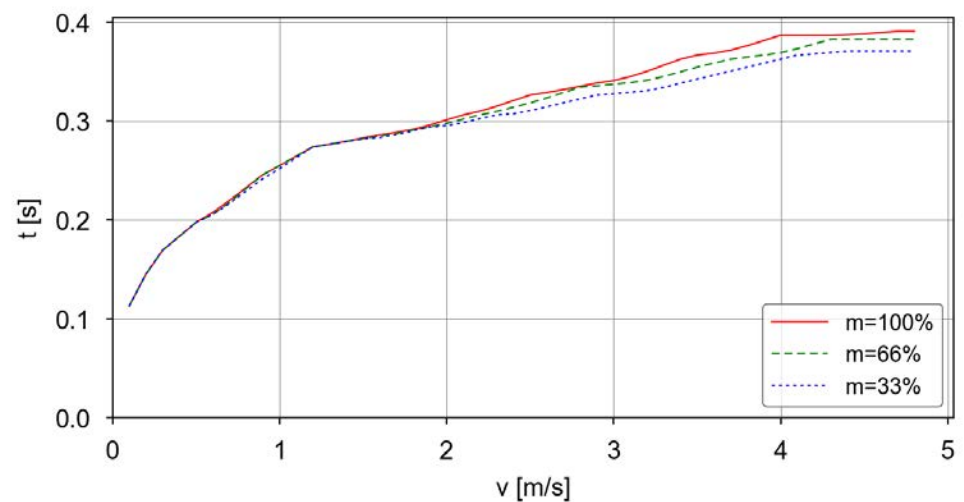
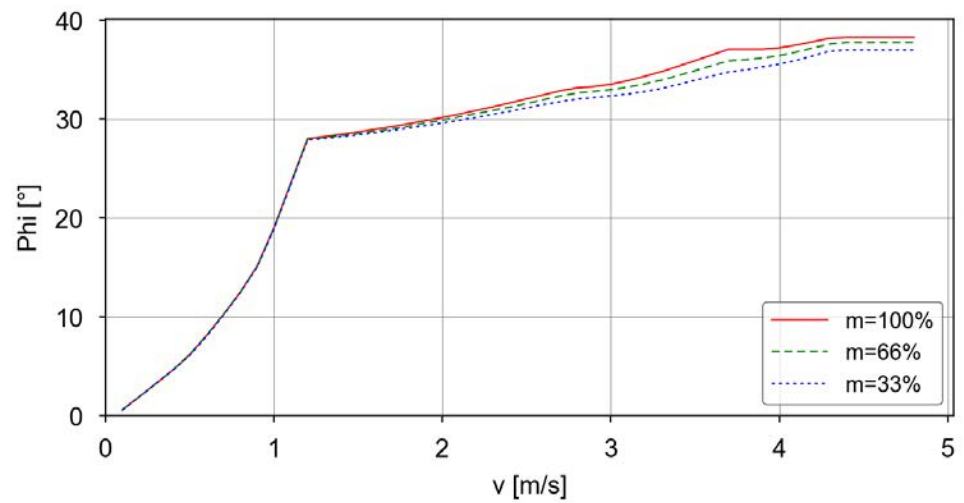
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

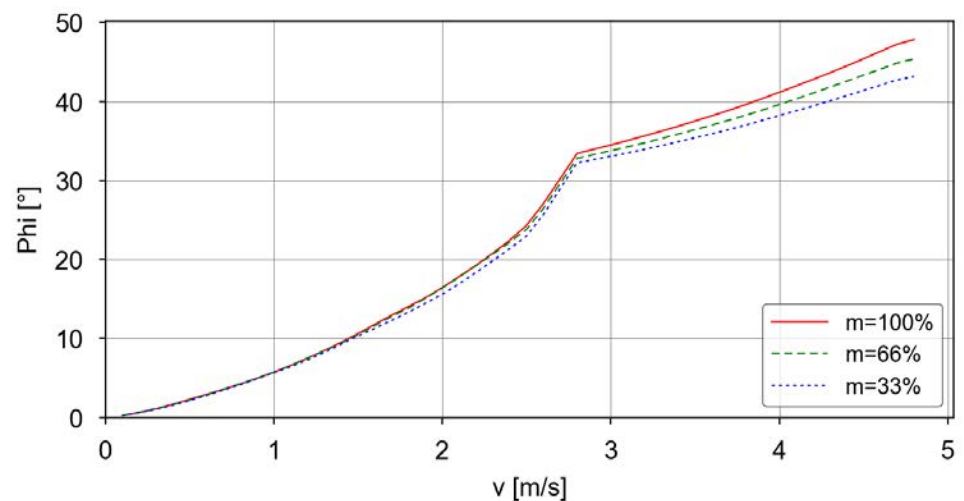


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

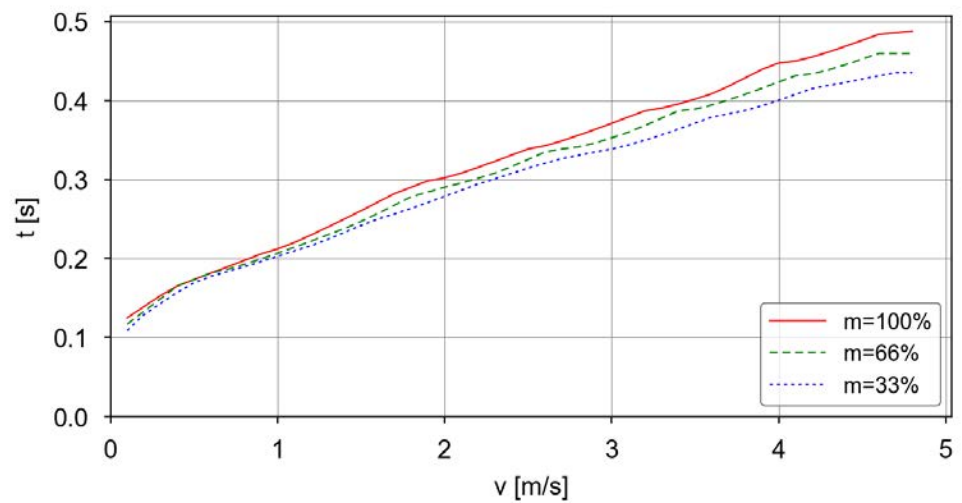


Continues on next page

7 IRB 1660

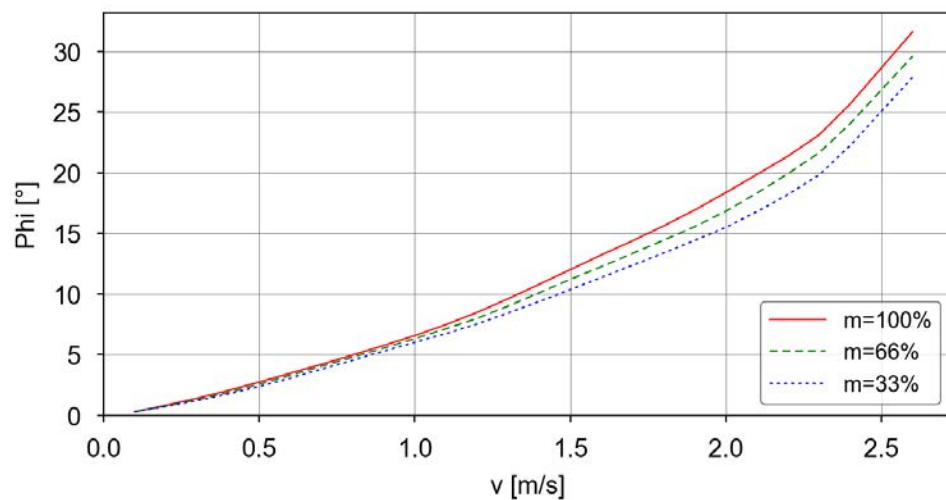
7.2 IRB 1660ID 1.55 m 6 kg

Continued

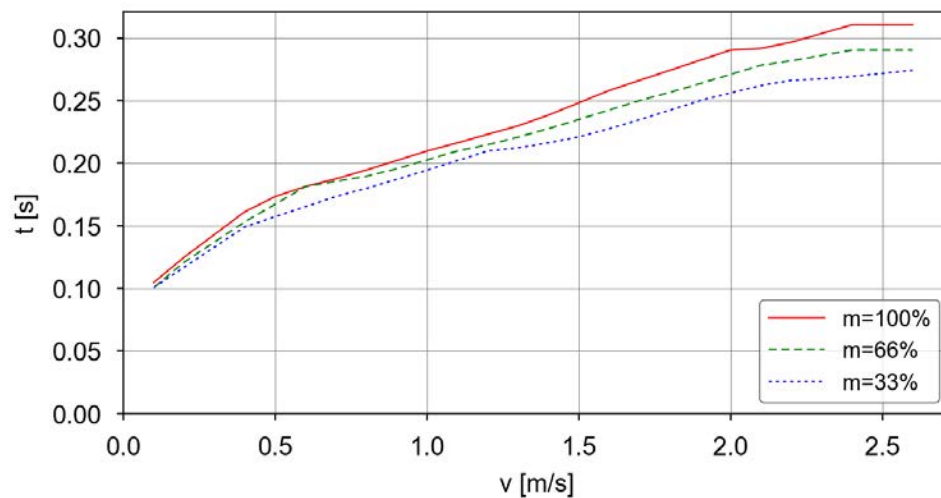


Category 1, Axis 3

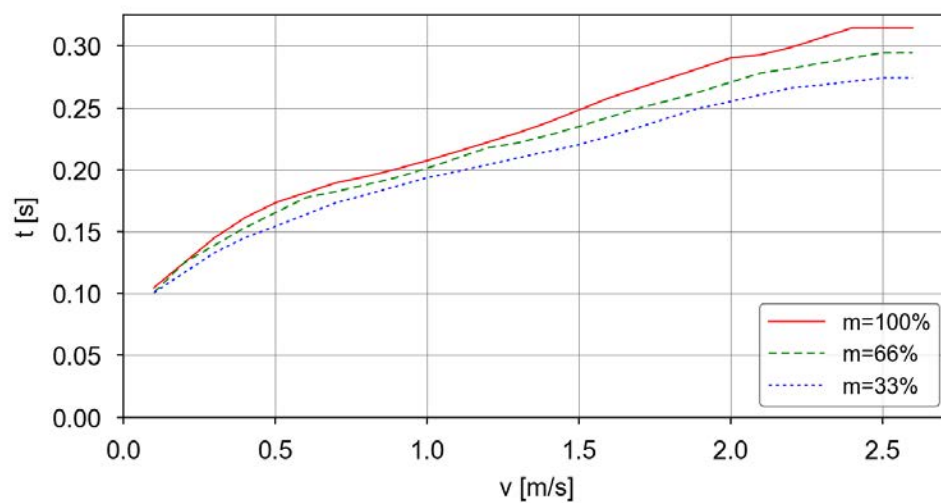
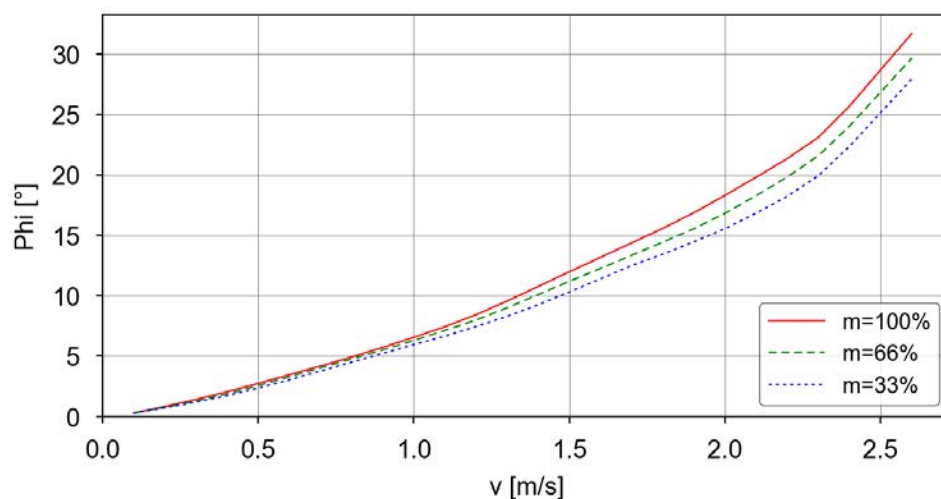
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



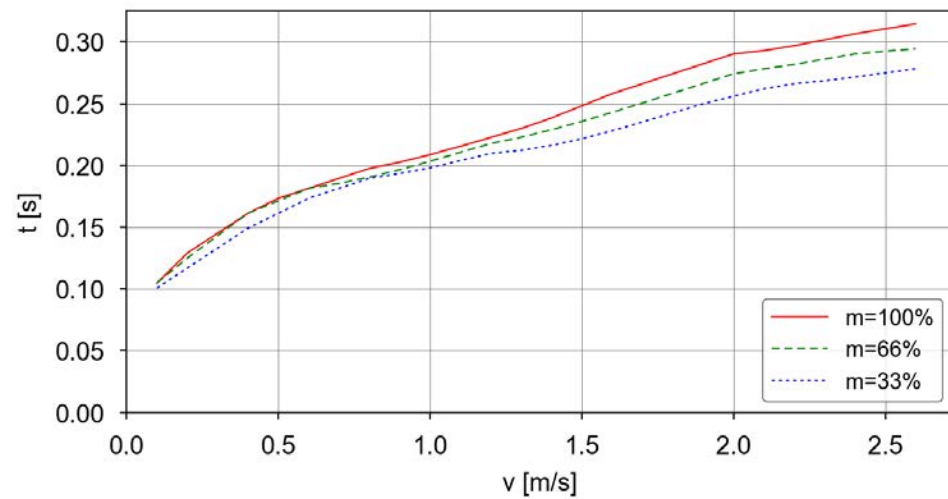
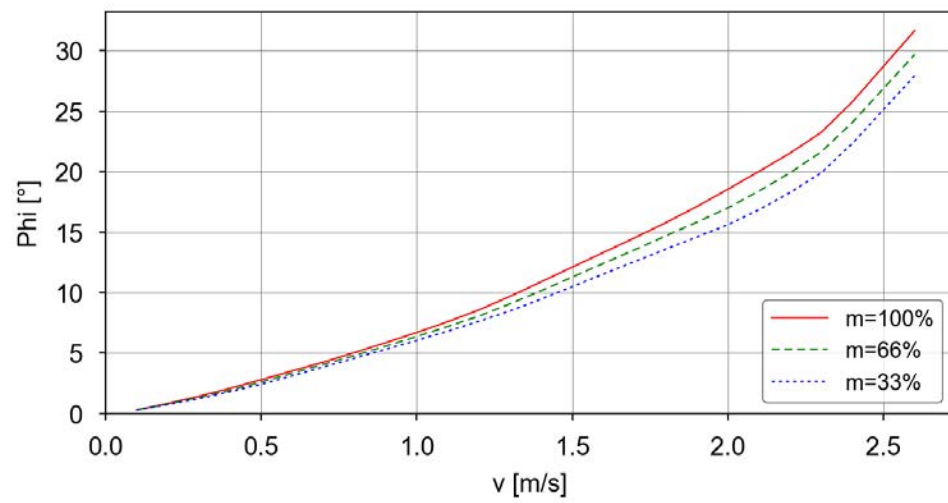
Continues on next page

7 IRB 1660

7.2 IRB 1660ID 1.55 m 6 kg

Continued

Extension zone 2, stopping distance and stopping time



8 IRB 2600

8.1 IRB 2600 1.65 m 12 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	26.6	0.2
2	26.9	0.2
3	18.2	0.12

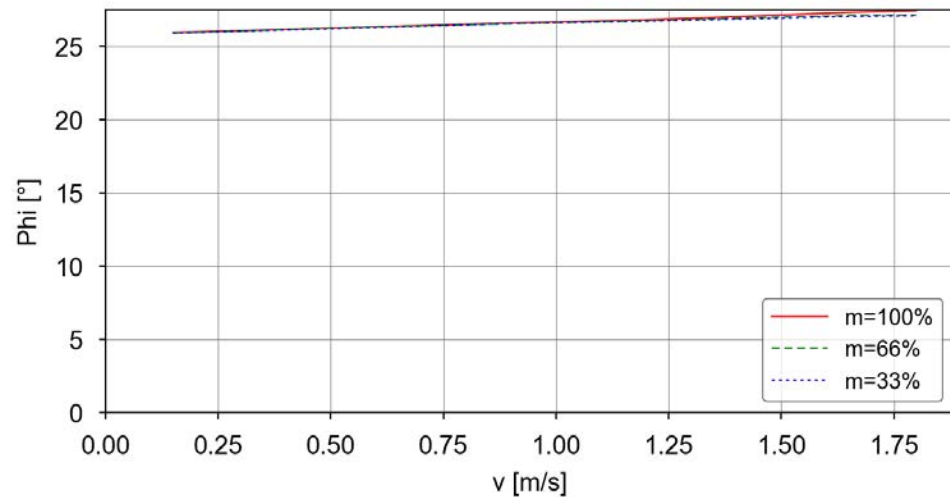
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.0
1	0.0	0.0
2	0.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

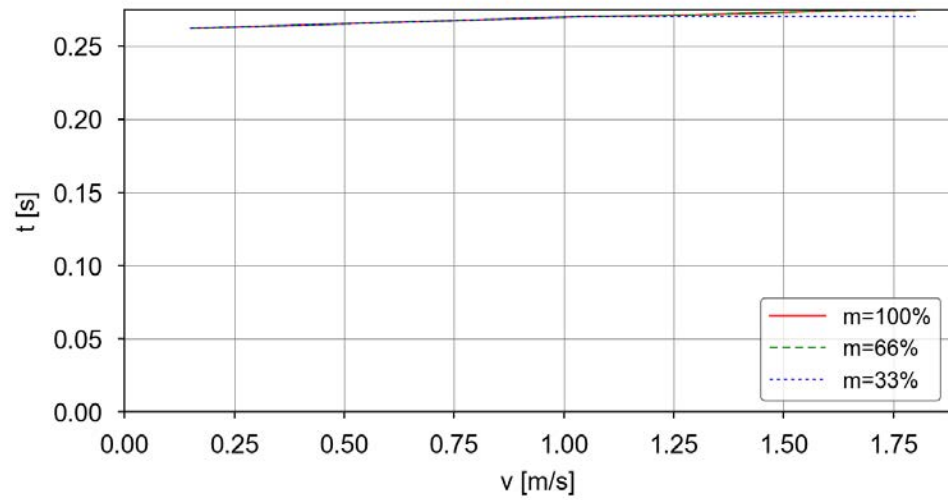


Continues on next page

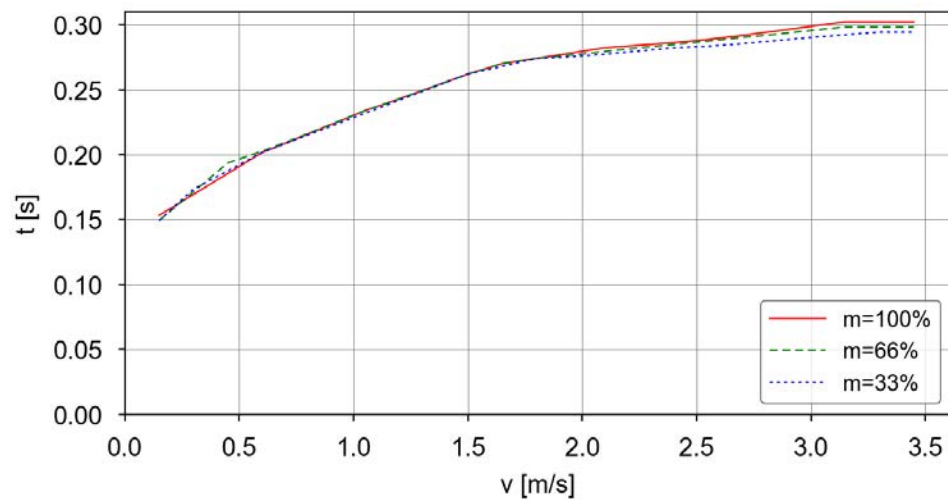
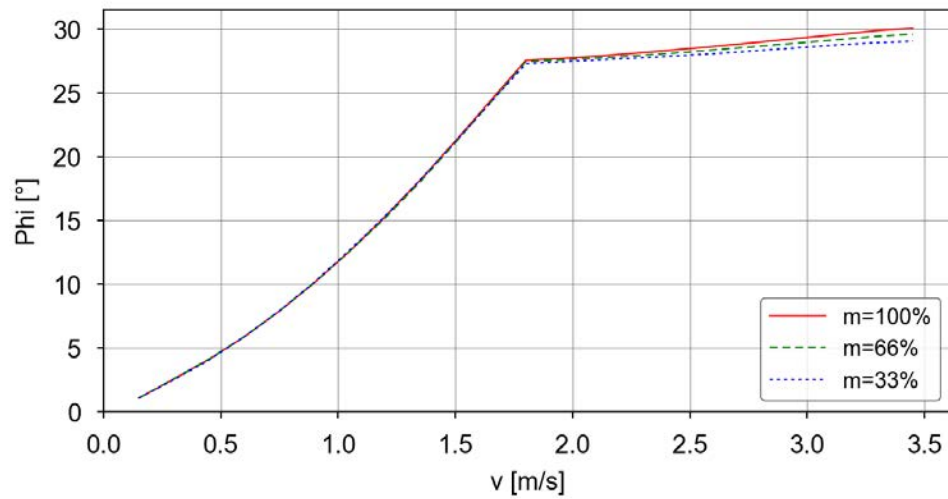
8 IRB 2600

8.1 IRB 2600 1.65 m 12 kg

Continued

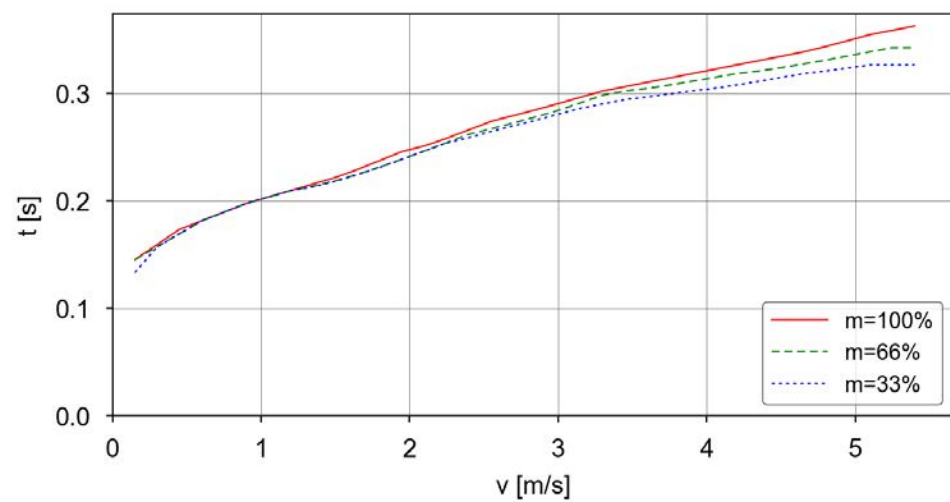
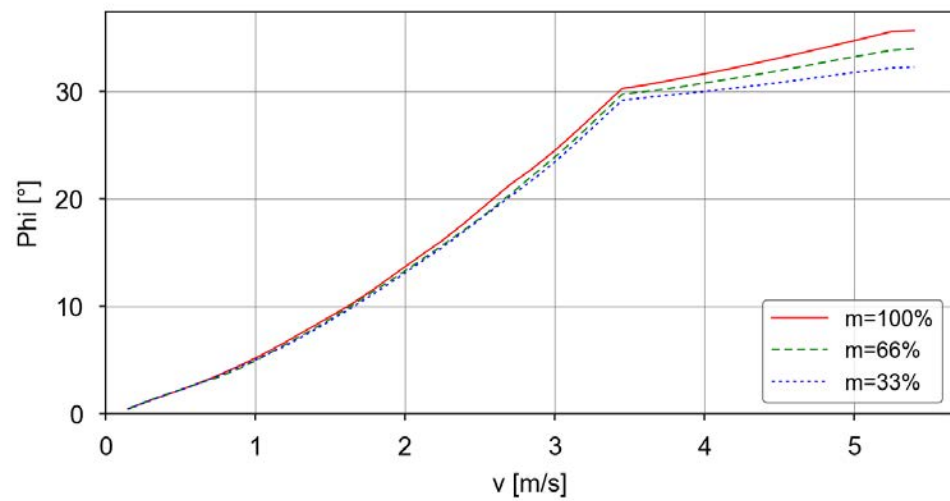


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

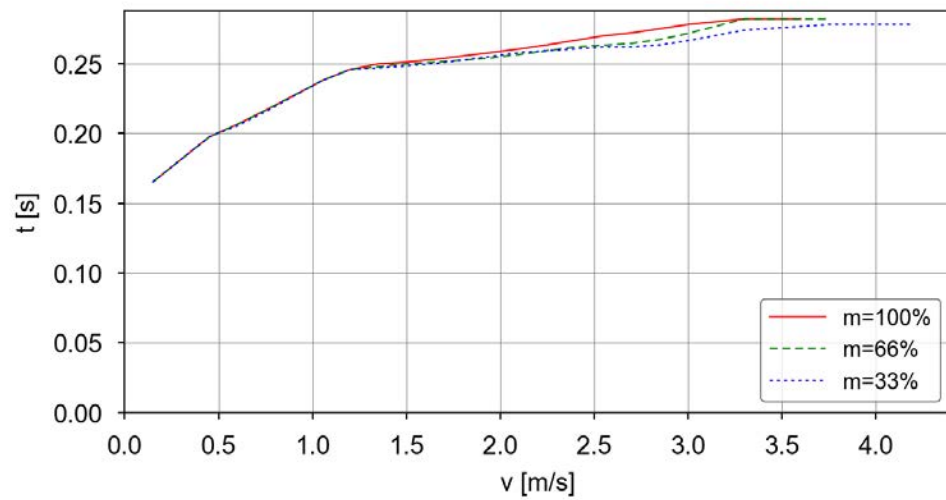
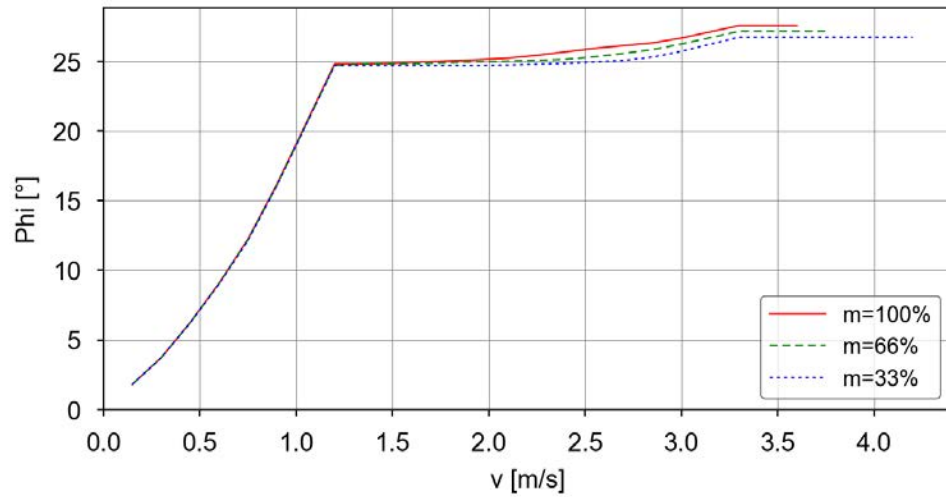
8 IRB 2600

8.1 IRB 2600 1.65 m 12 kg

Continued

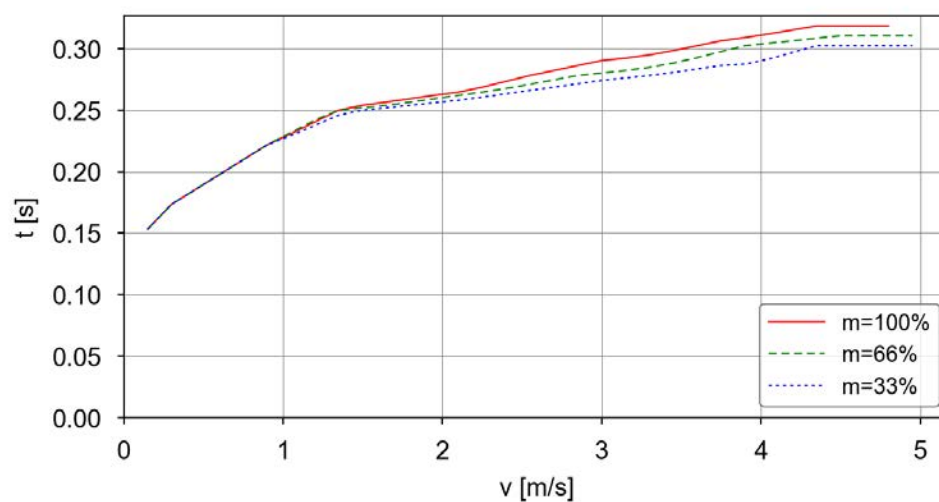
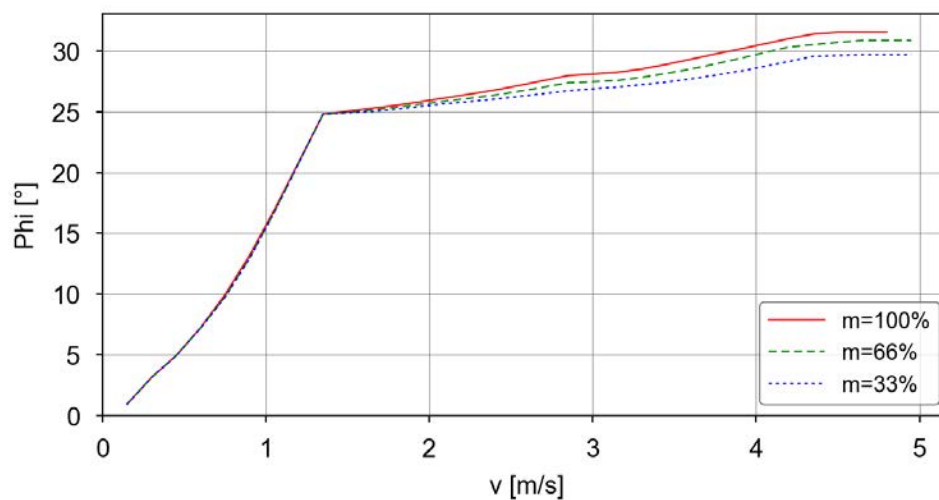
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

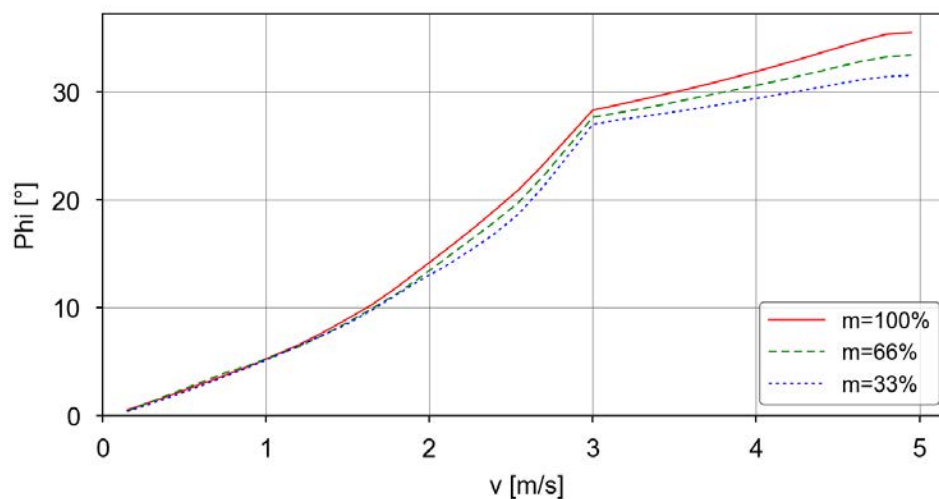


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

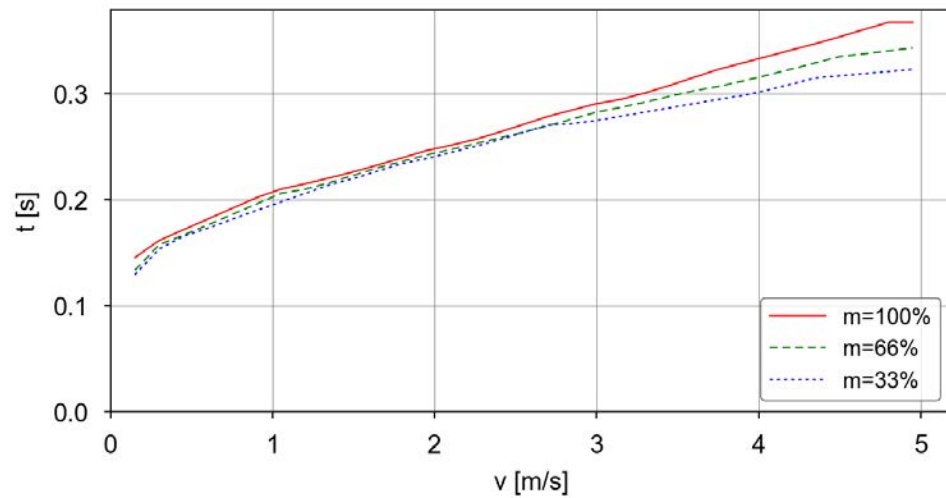


Continues on next page

8 IRB 2600

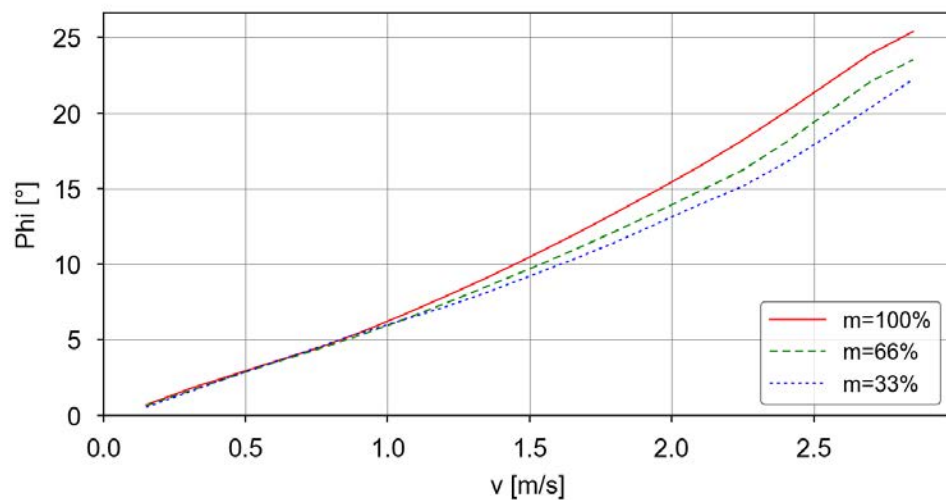
8.1 IRB 2600 1.65 m 12 kg

Continued

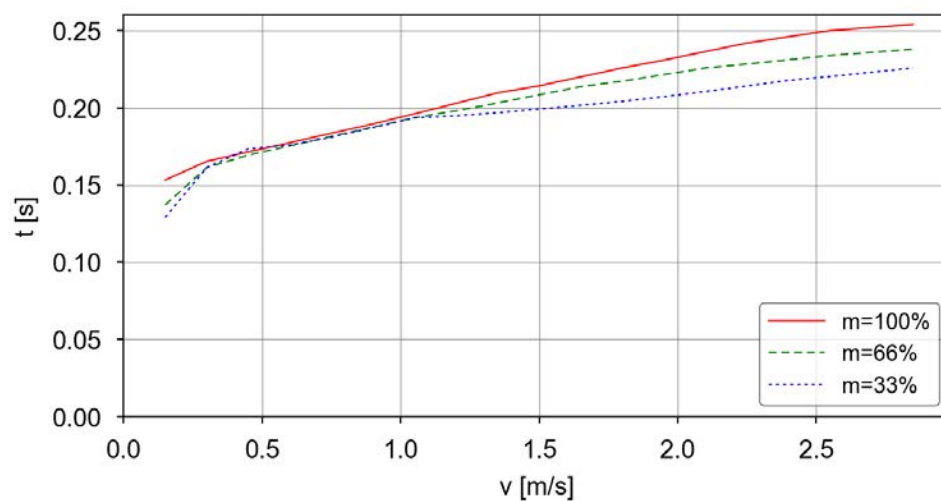


Category 1, Axis 3

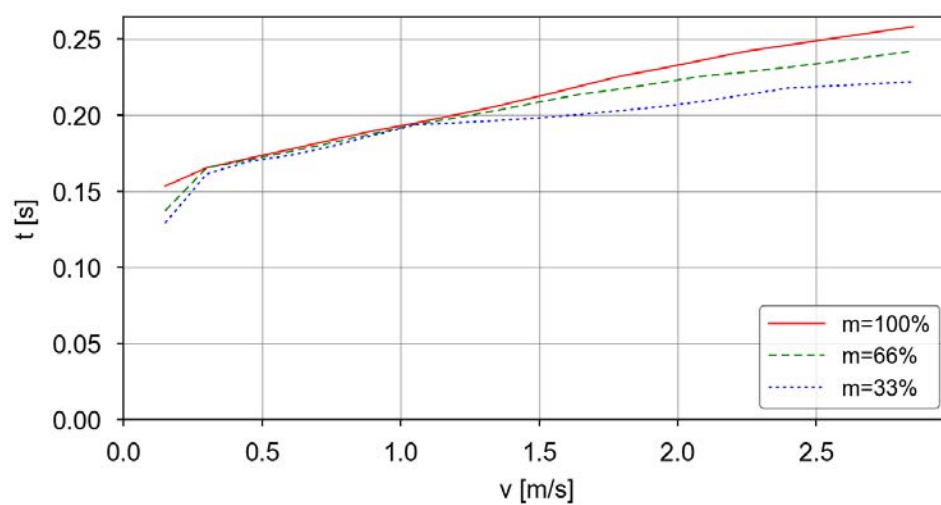
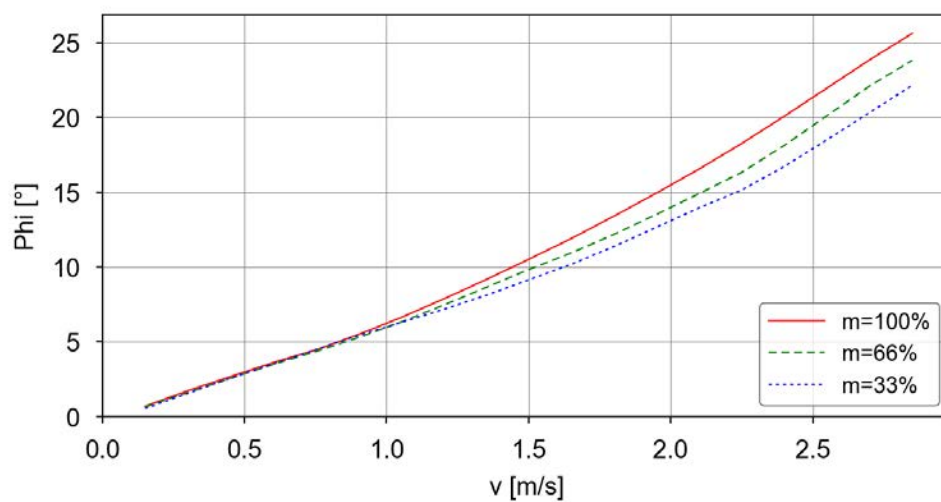
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



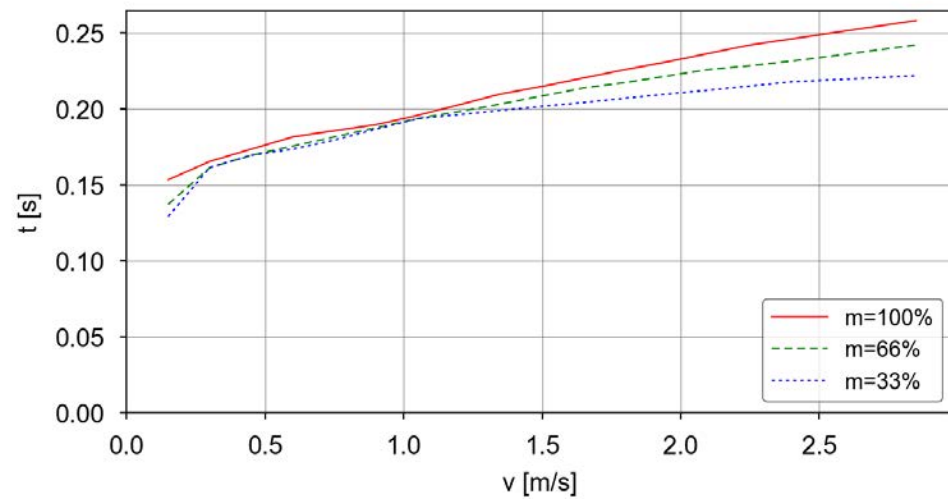
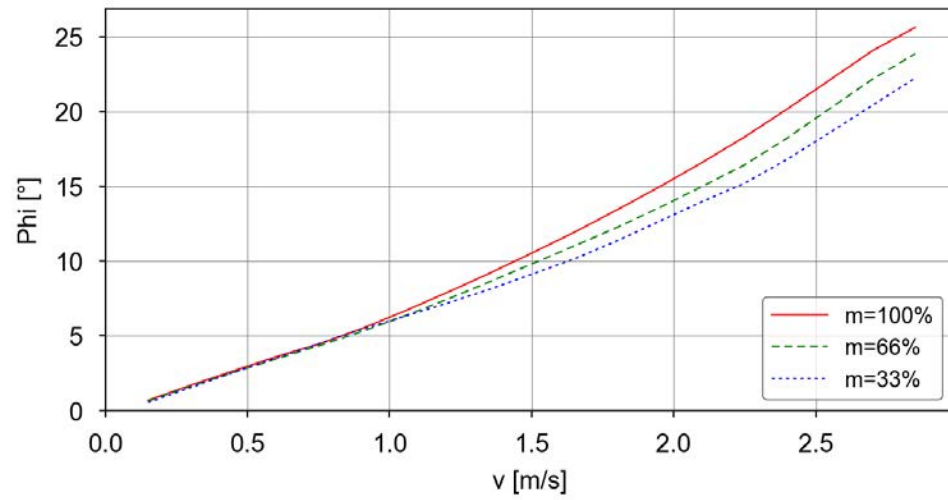
Continues on next page

8 IRB 2600

8.1 IRB 2600 1.65 m 12 kg

Continued

Extension zone 2, stopping distance and stopping time



8.2 IRB 2600 1.65 m 20 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	28.7	0.22
2	30.5	0.25
3	22.4	0.17

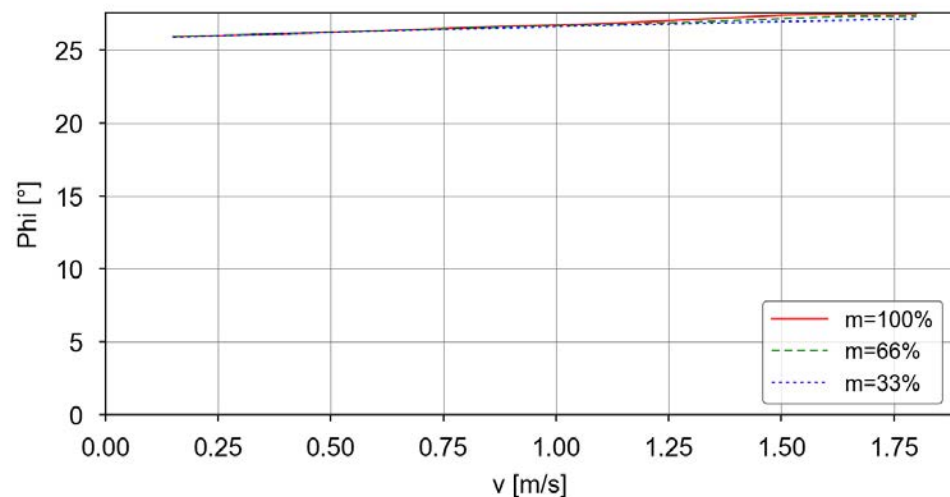
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.0
1	0.0	0.0
2	0.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

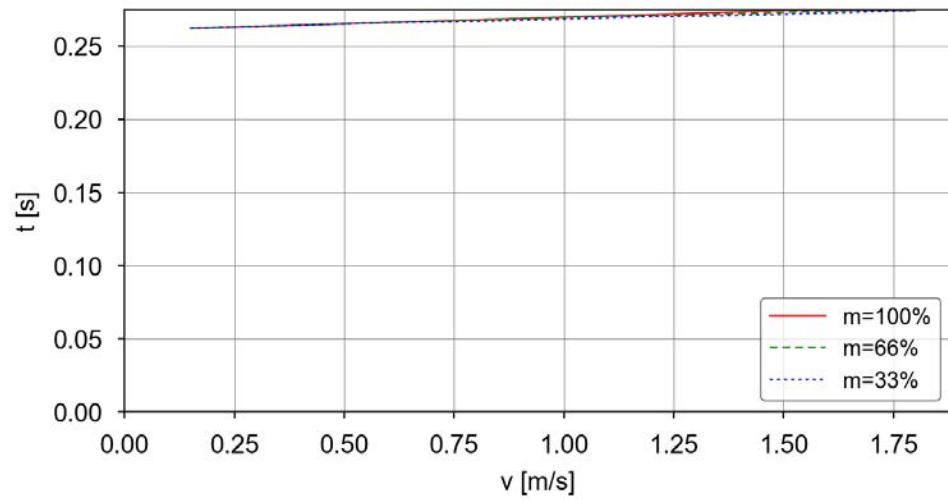


Continues on next page

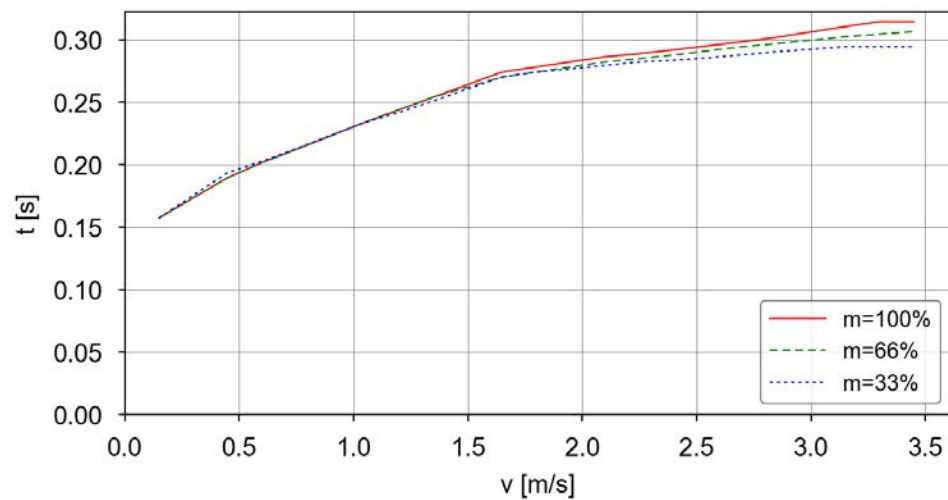
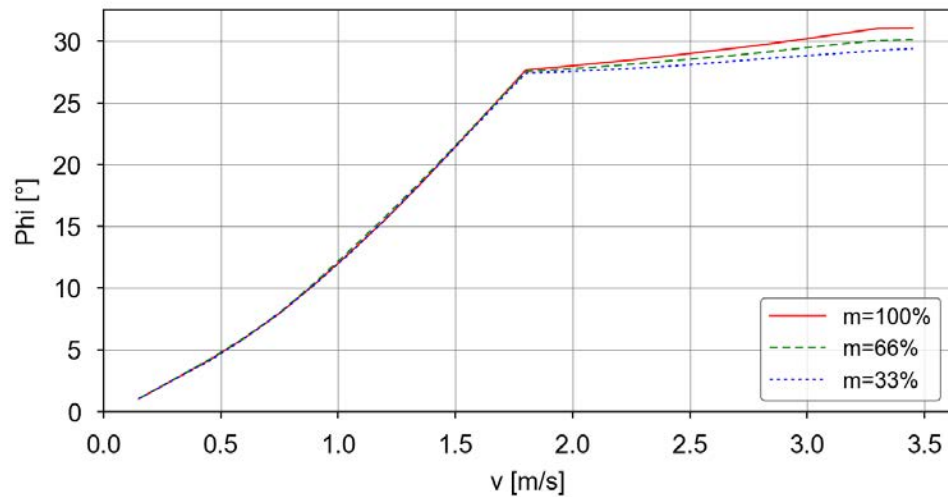
8 IRB 2600

8.2 IRB 2600 1.65 m 20 kg

Continued

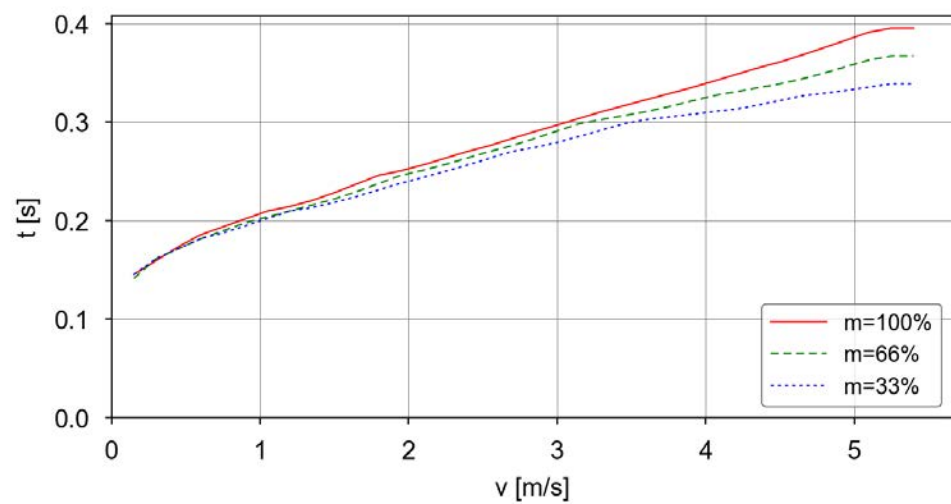
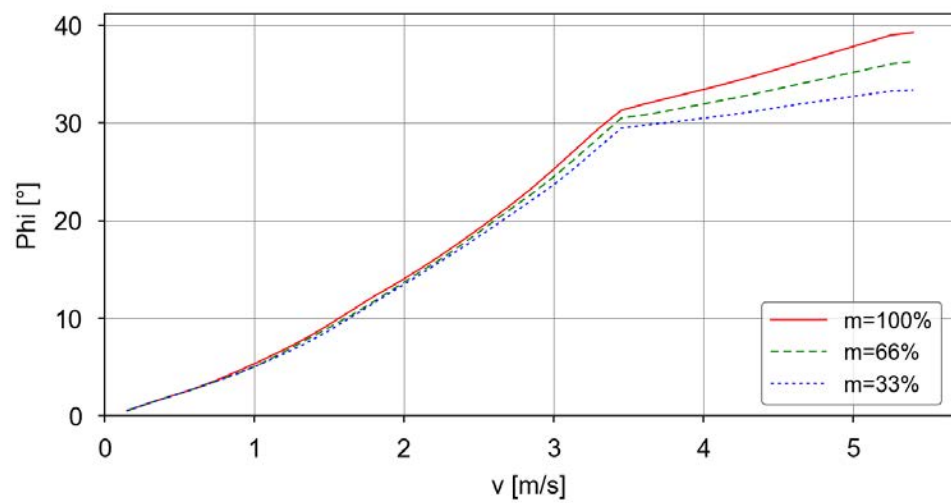


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

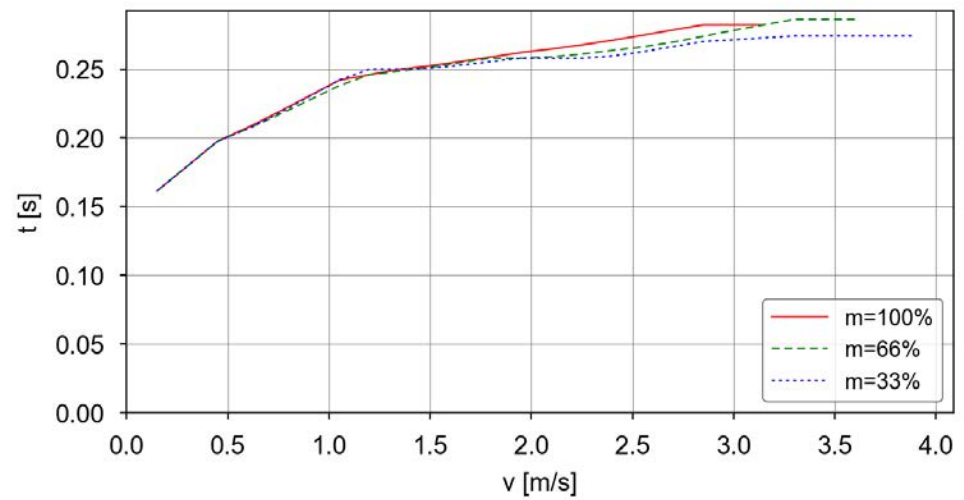
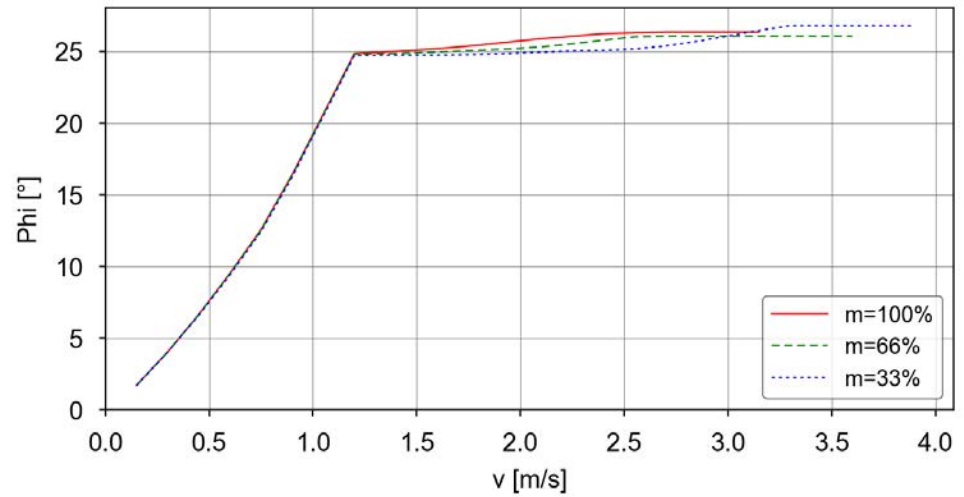
8 IRB 2600

8.2 IRB 2600 1.65 m 20 kg

Continued

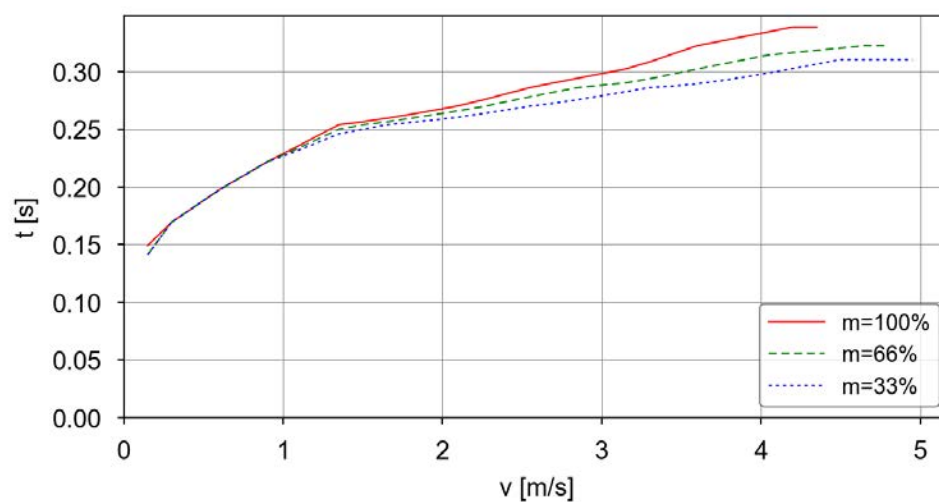
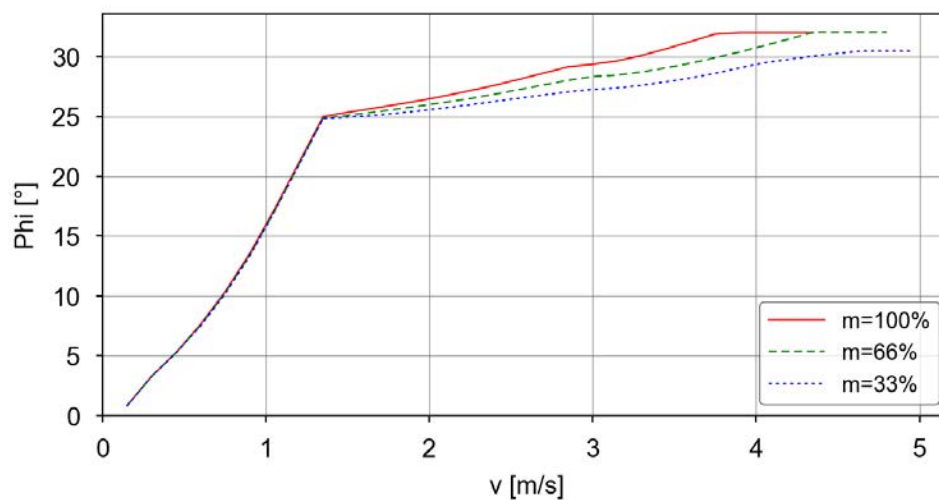
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

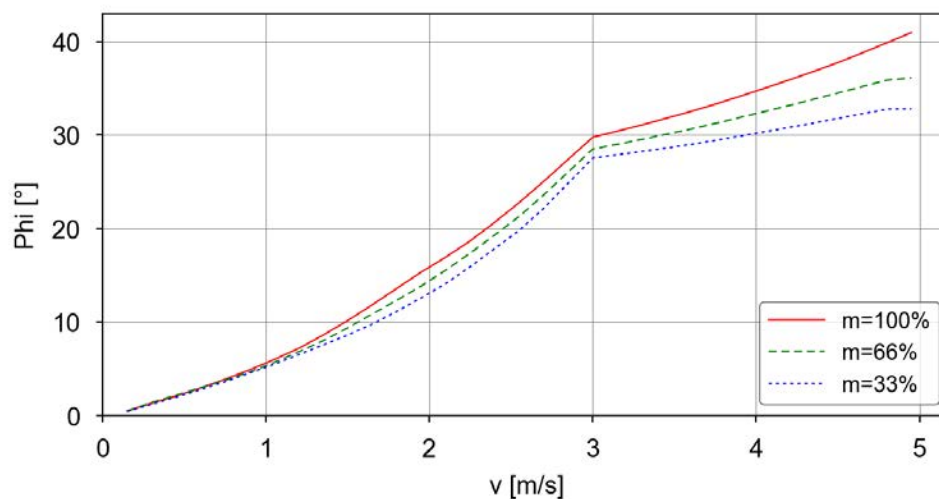


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

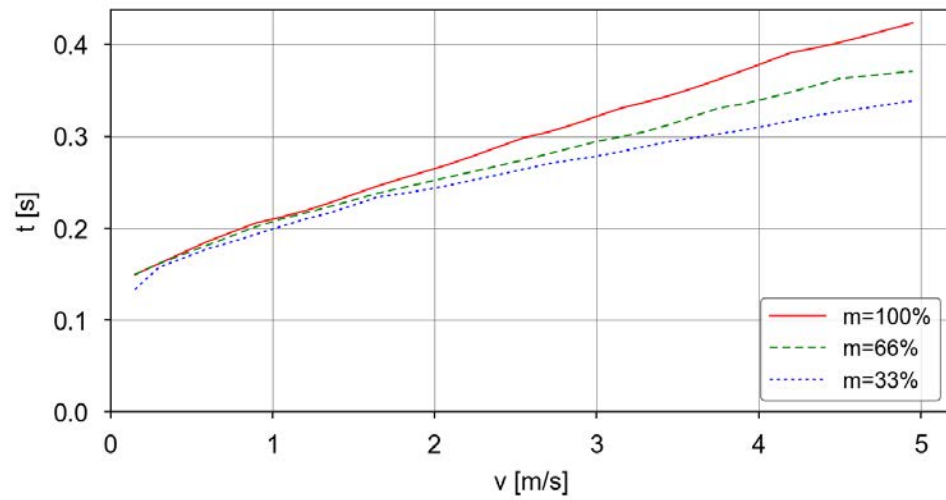


Continues on next page

8 IRB 2600

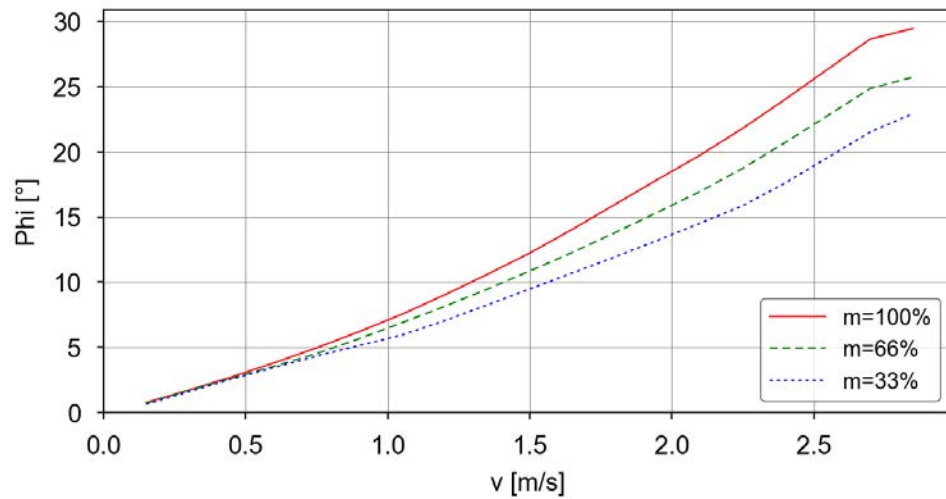
8.2 IRB 2600 1.65 m 20 kg

Continued

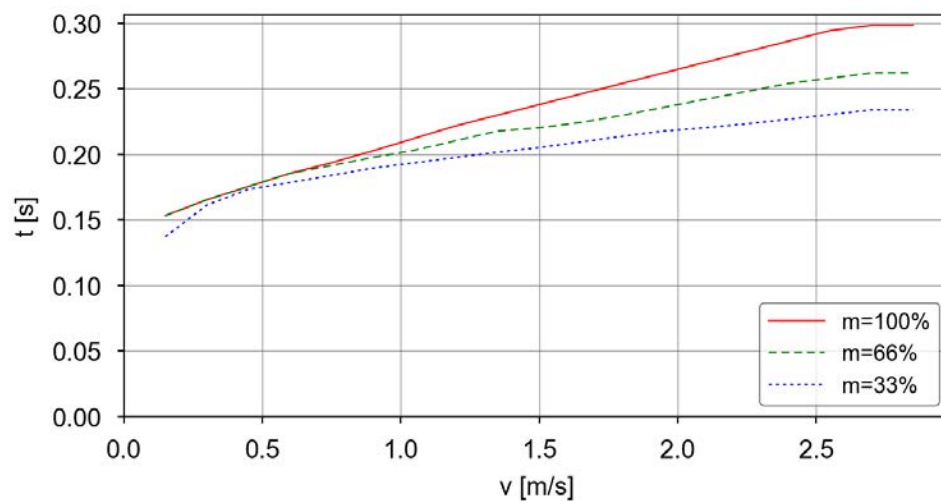


Category 1, Axis 3

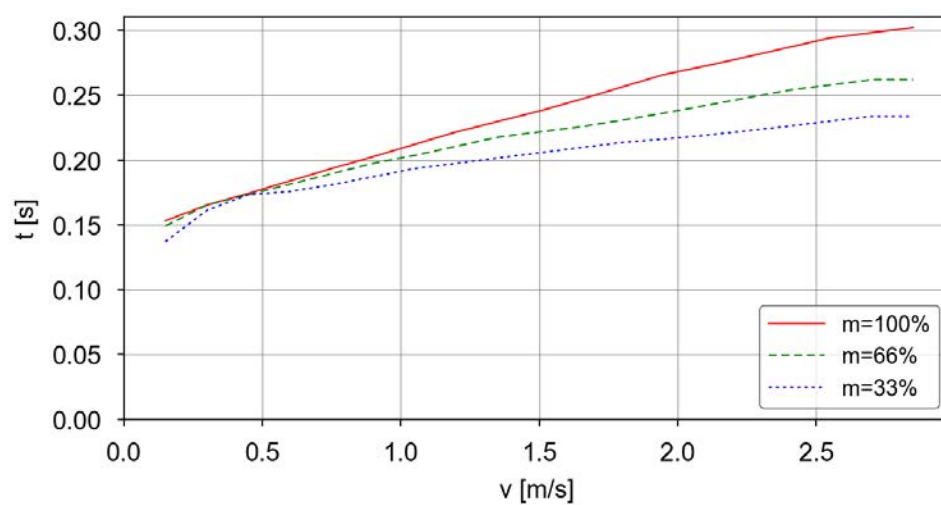
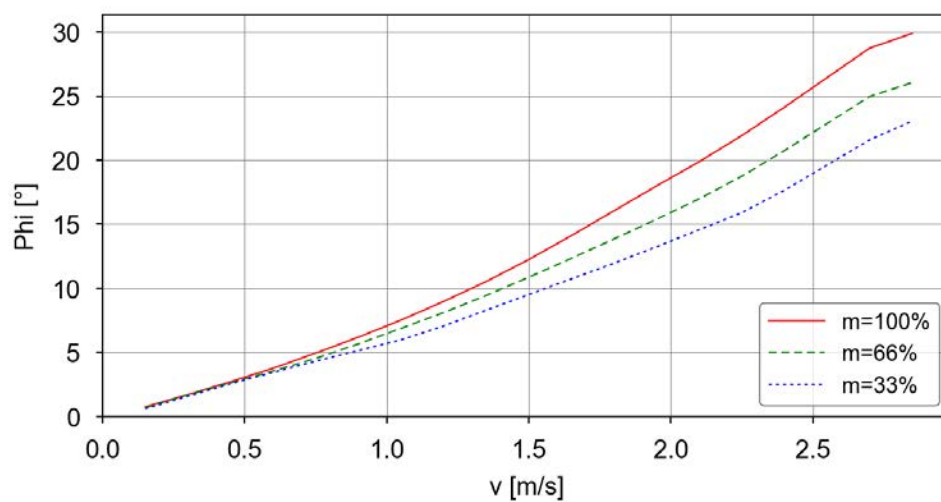
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



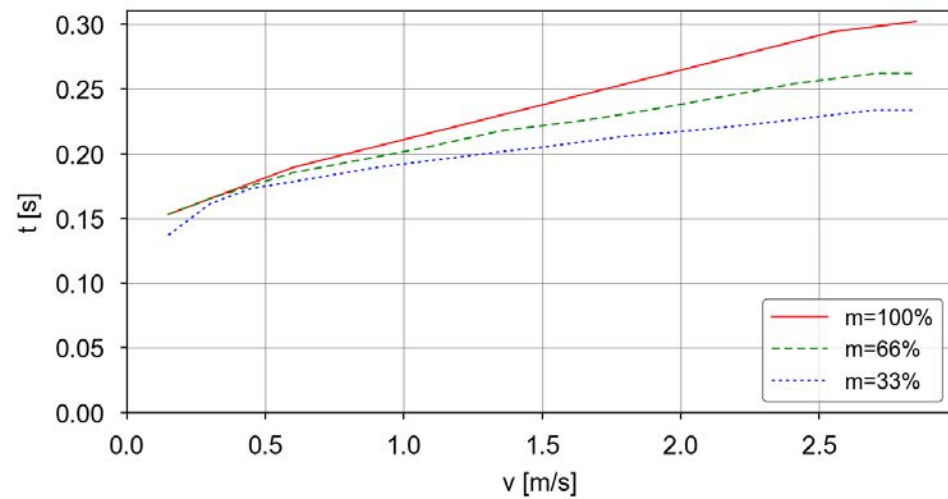
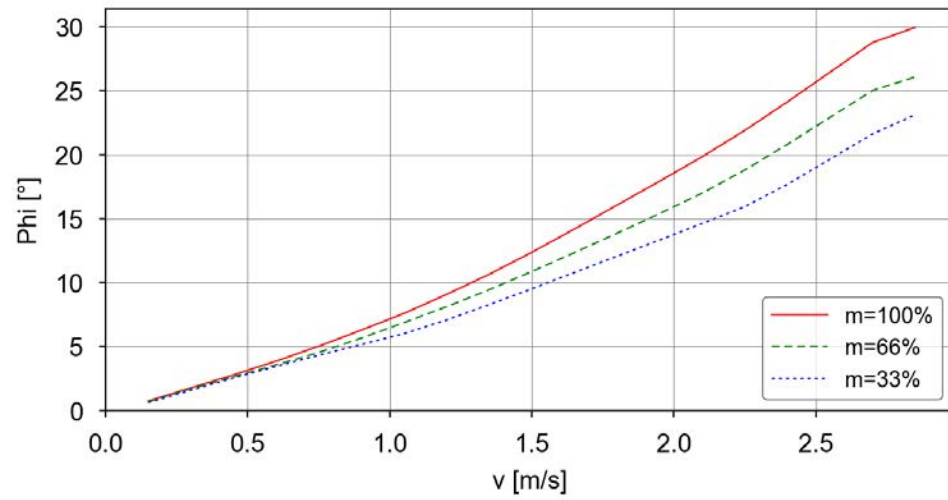
Continues on next page

8 IRB 2600

8.2 IRB 2600 1.65 m 20 kg

Continued

Extension zone 2, stopping distance and stopping time



8.3 IRB 2600 1.85 m 12 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	30.3	0.25
2	30.9	0.25
3	17.8	0.12

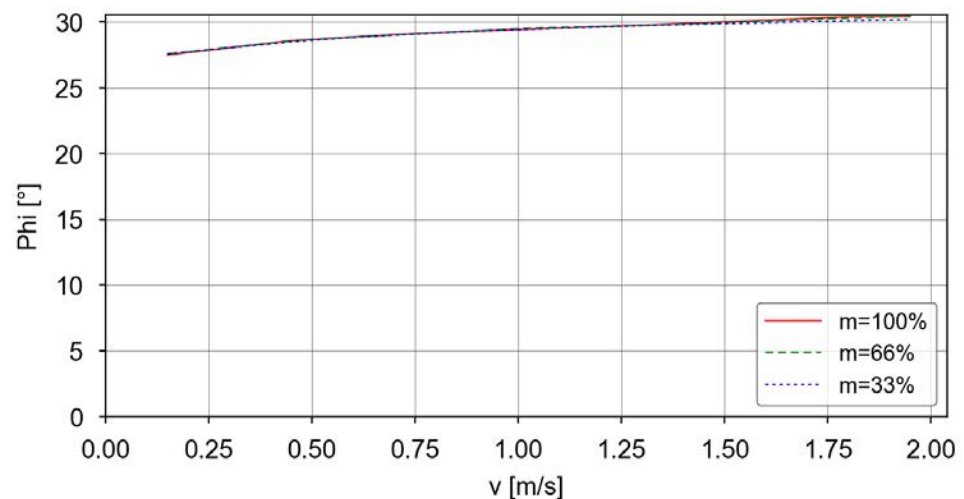
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.0
1	0.0	0.0
2	0.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

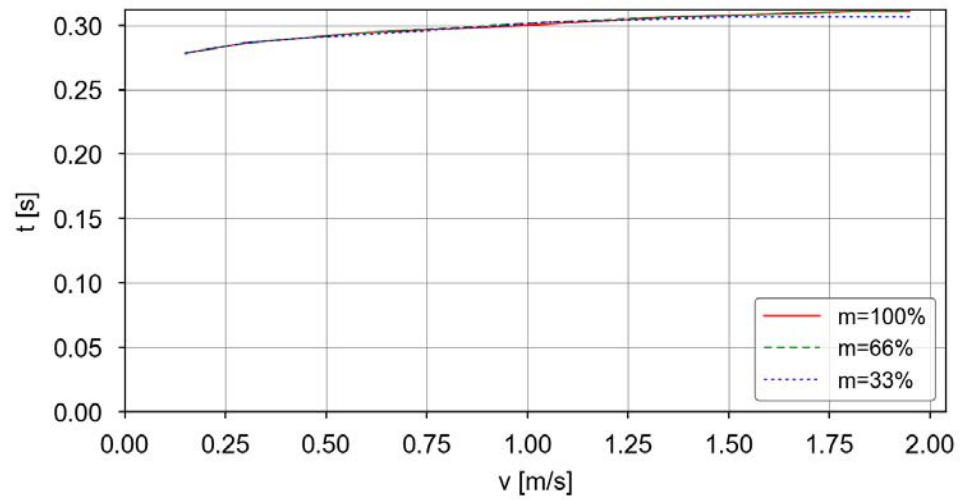


Continues on next page

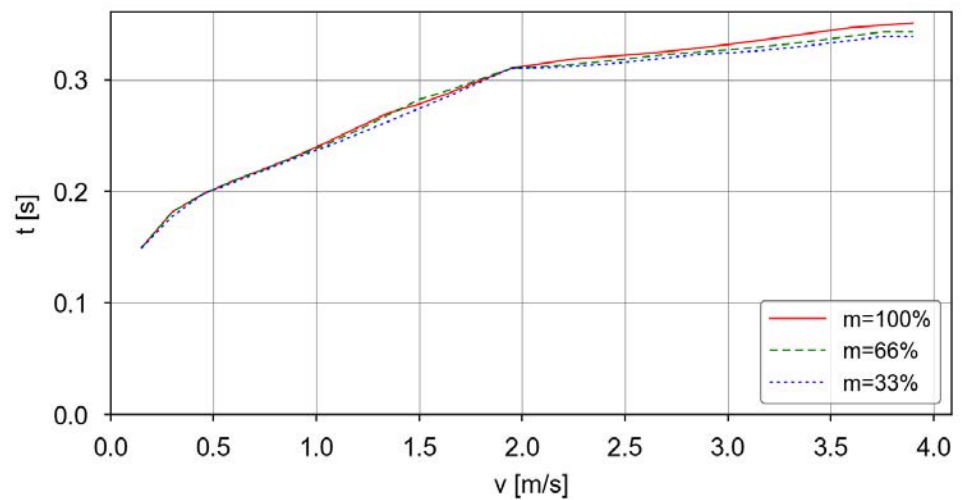
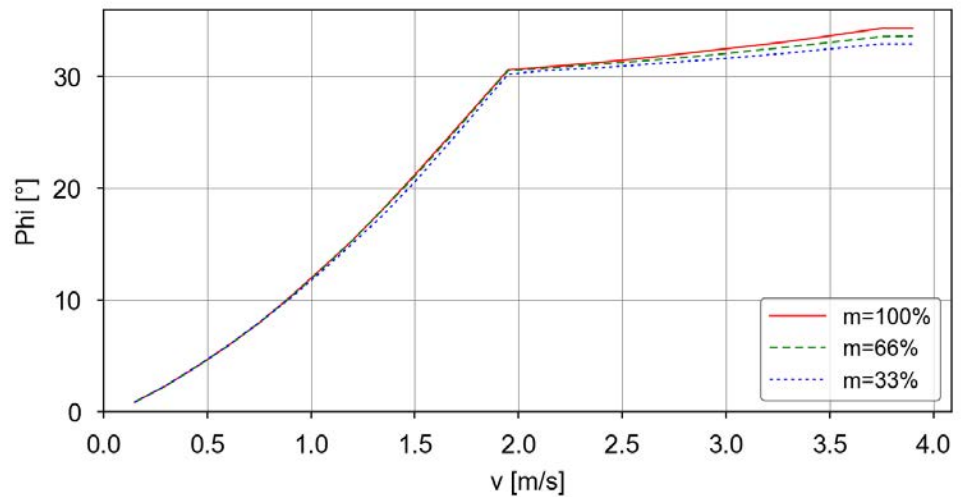
8 IRB 2600

8.3 IRB 2600 1.85 m 12 kg

Continued

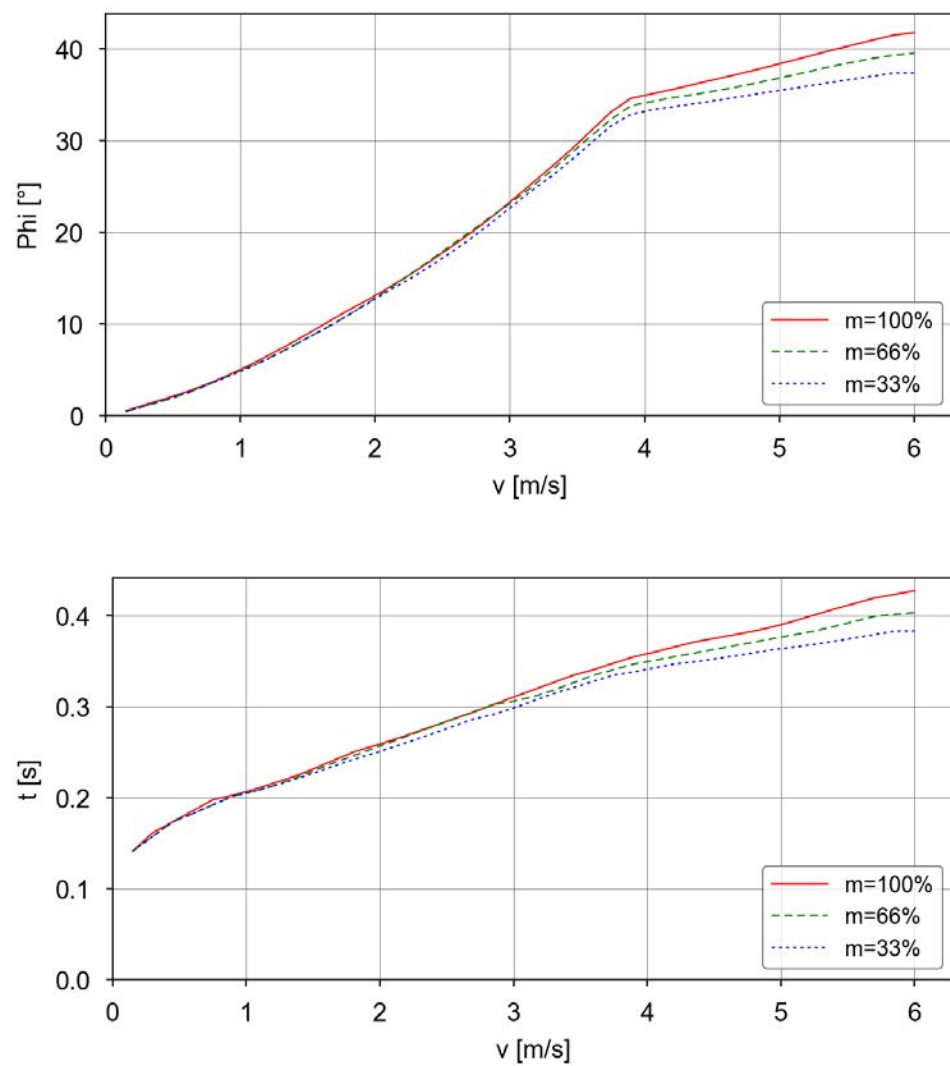


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

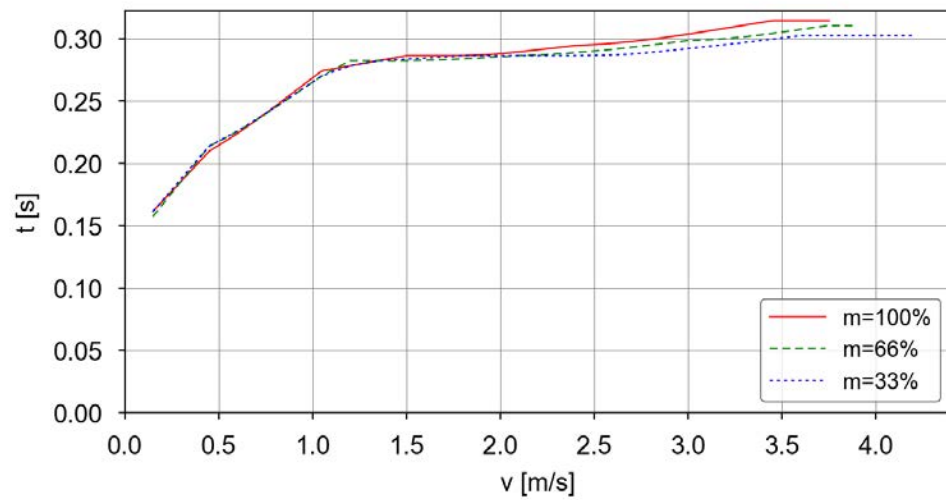
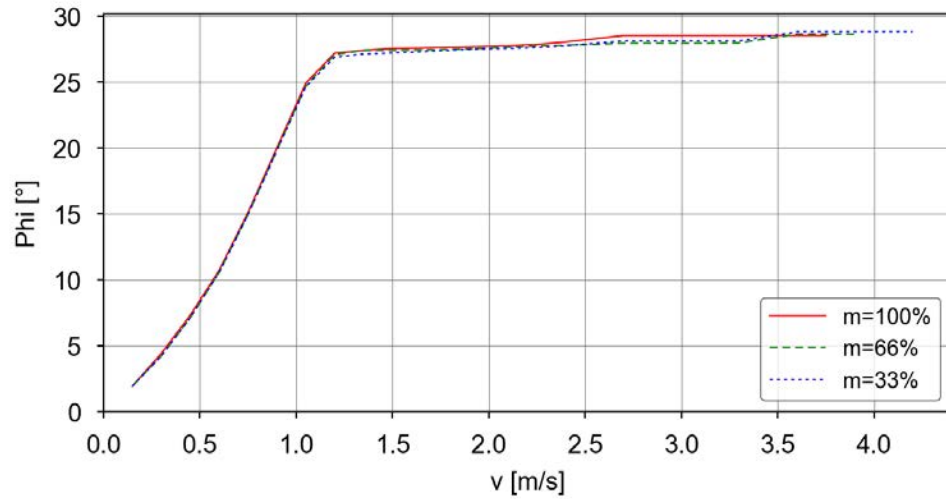
8 IRB 2600

8.3 IRB 2600 1.85 m 12 kg

Continued

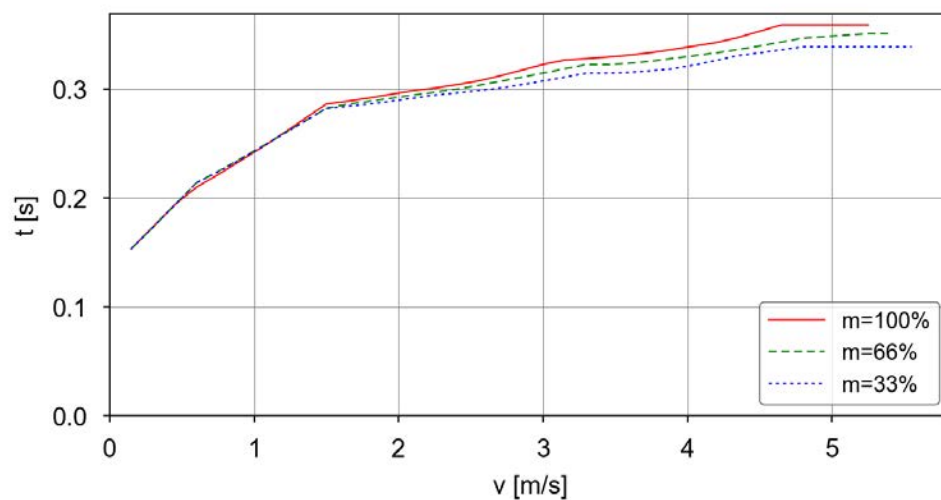
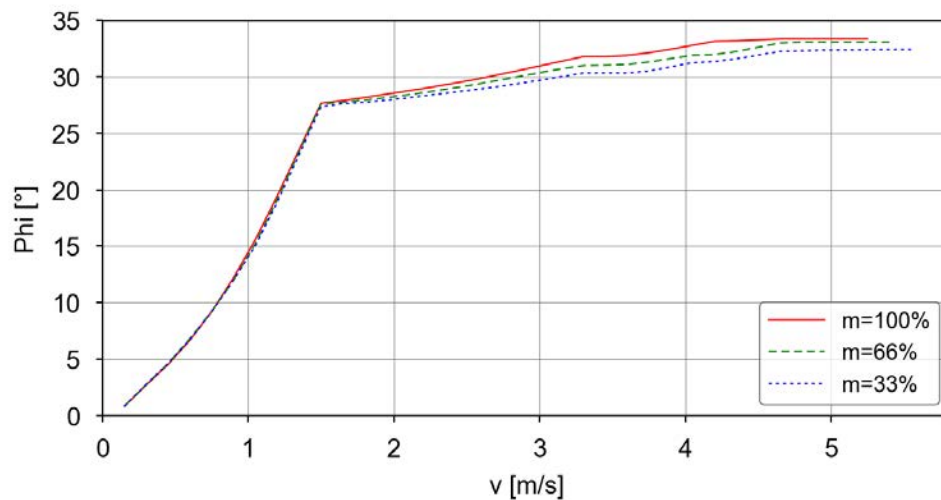
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

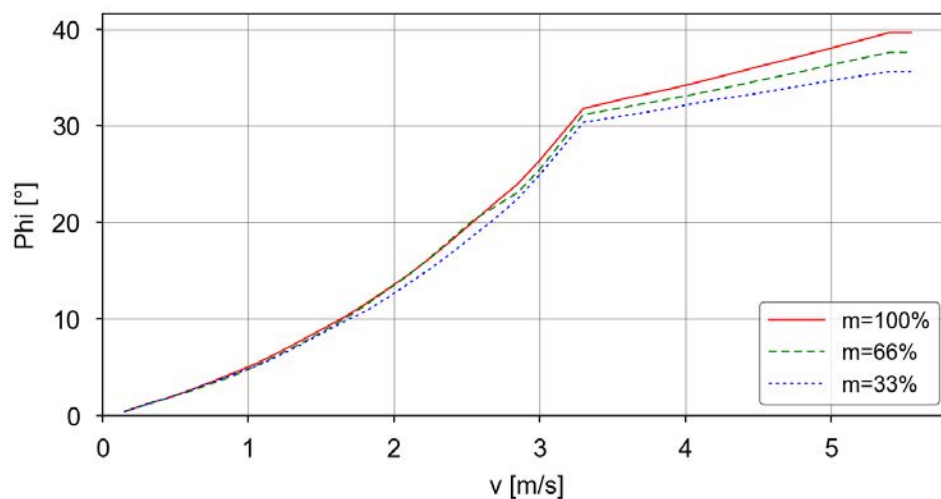


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

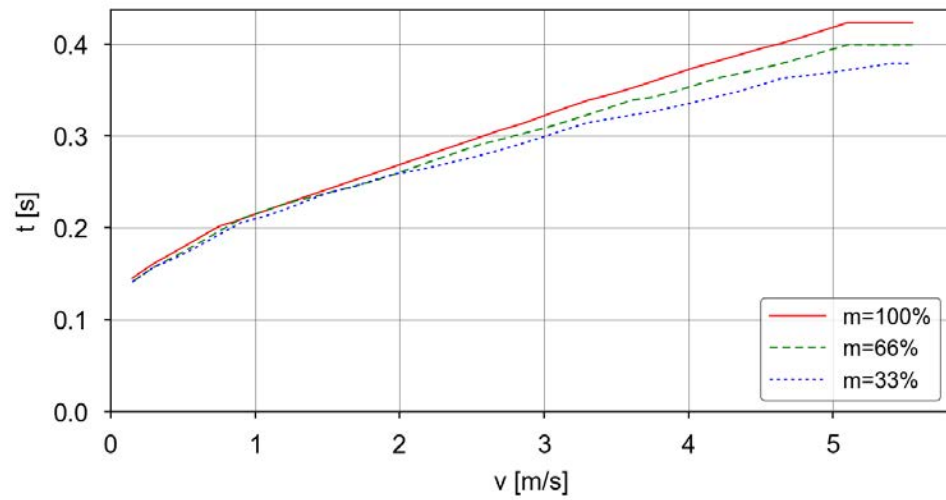


Continues on next page

8 IRB 2600

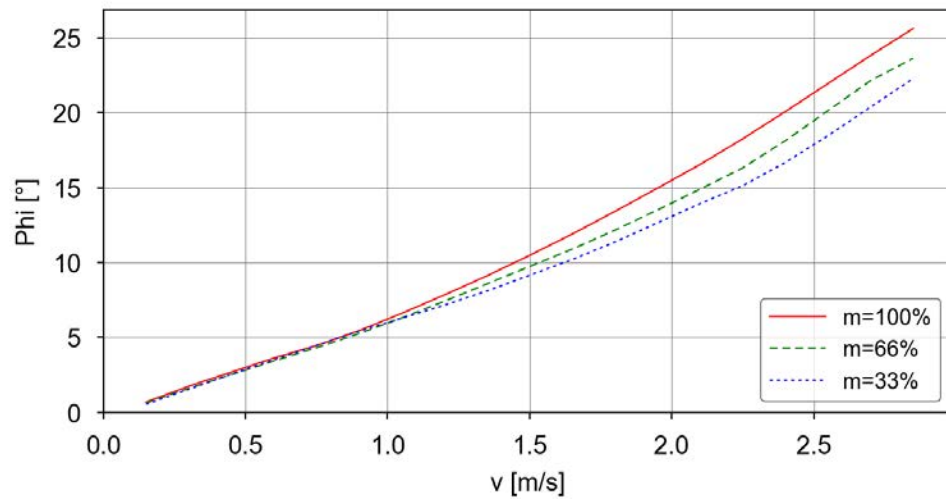
8.3 IRB 2600 1.85 m 12 kg

Continued

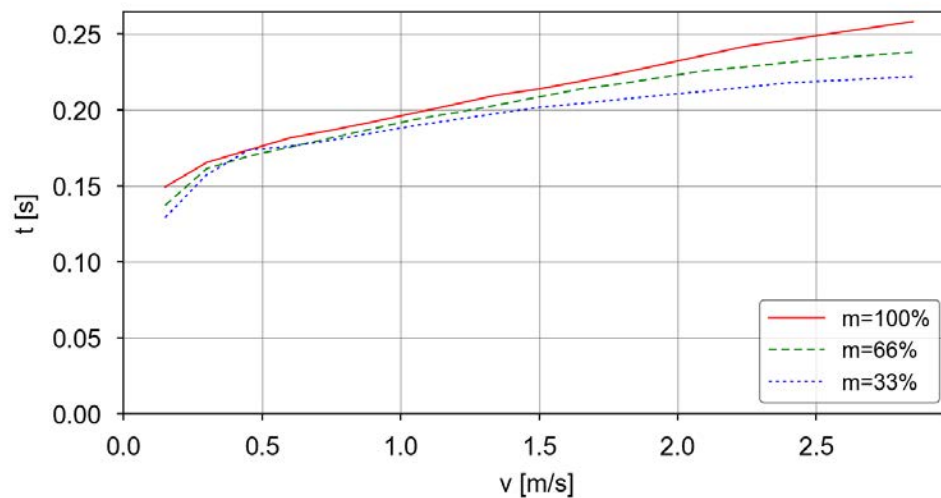


Category 1, Axis 3

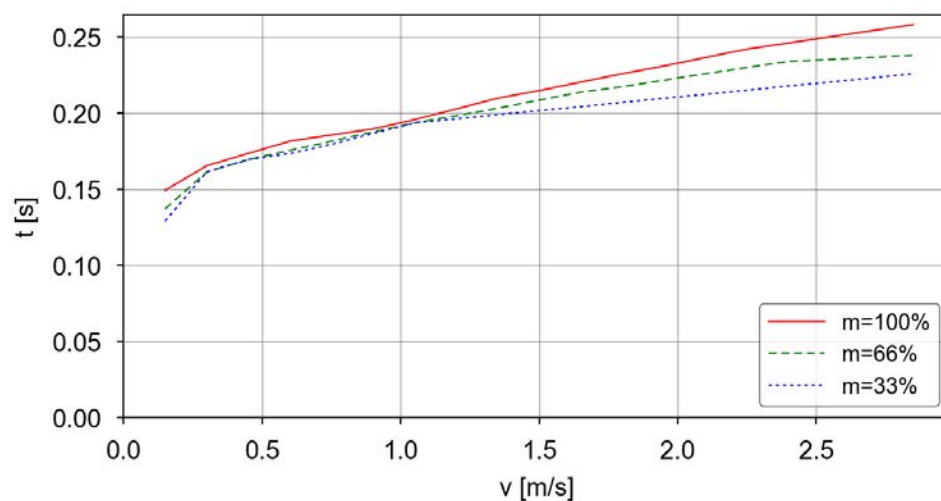
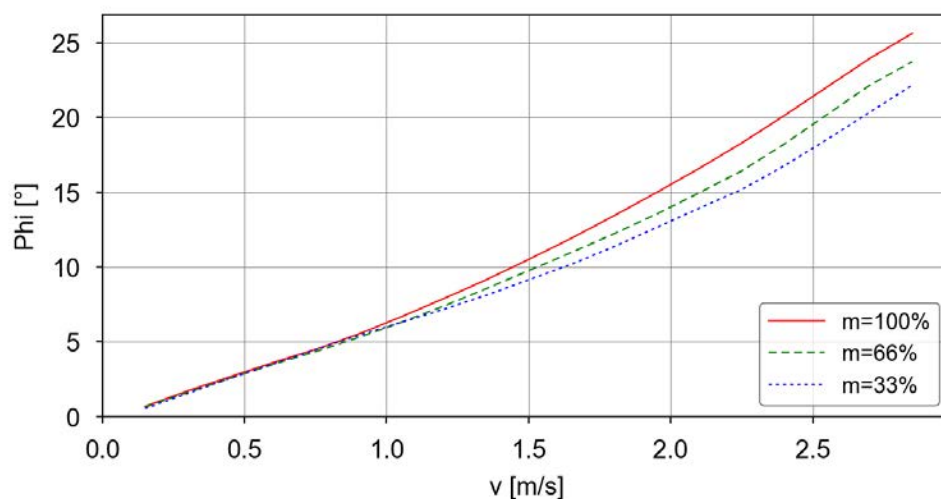
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



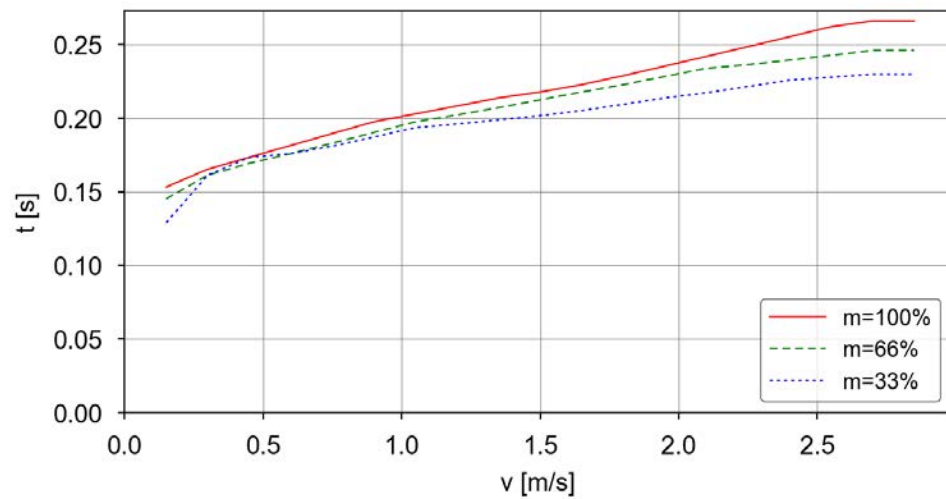
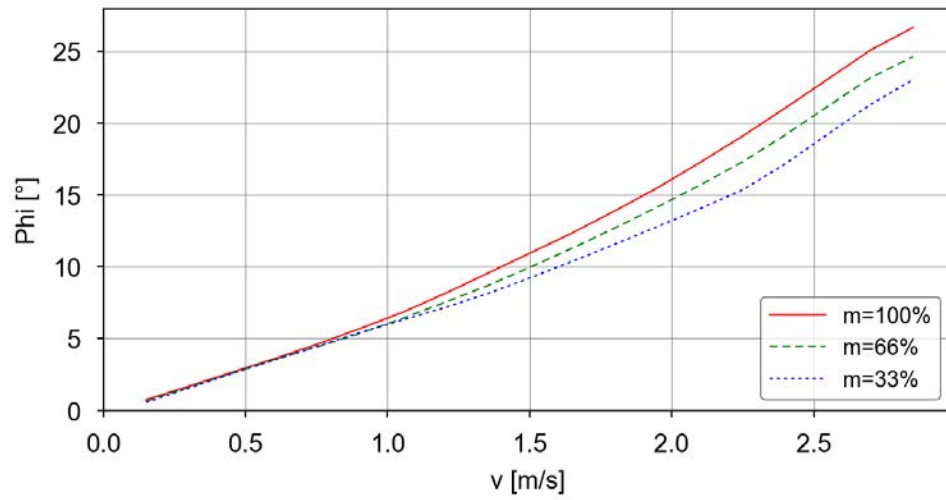
Continues on next page

8 IRB 2600

8.3 IRB 2600 1.85 m 12 kg

Continued

Extension zone 2, stopping distance and stopping time



8.4 IRB 2600ID 1.85 m 15 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	33.1	0.27
2	34.4	0.27
3	20.7	0.15

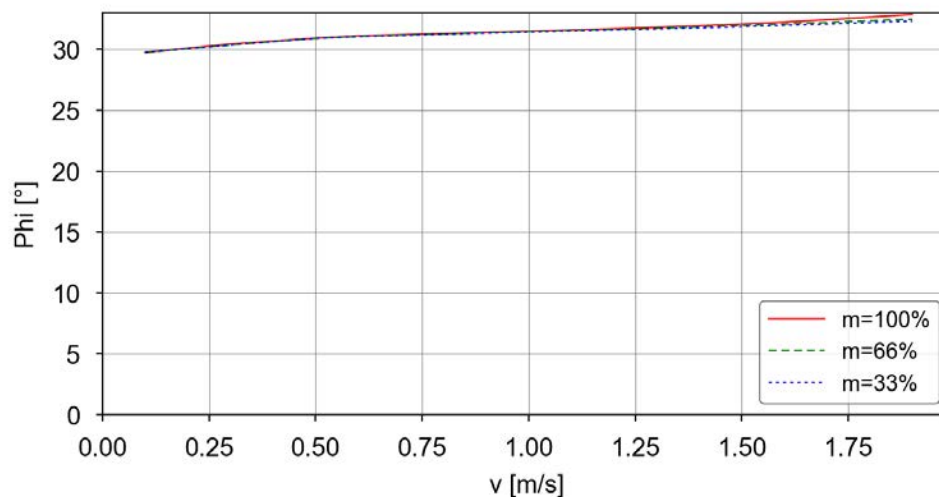
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.617
1	0.617	1.233
2	1.233	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

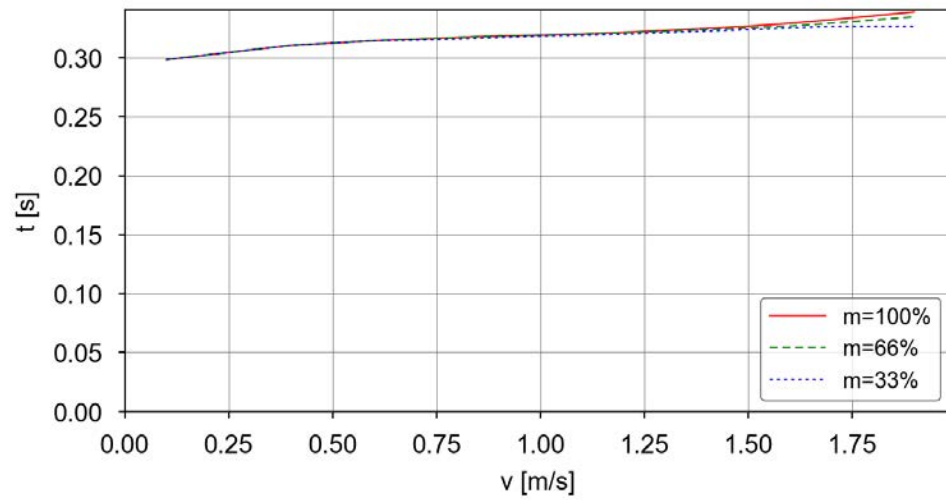


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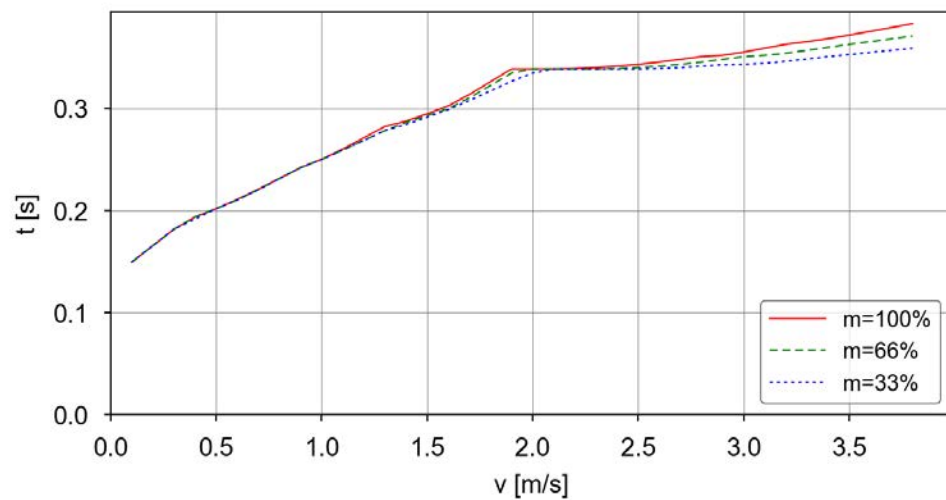
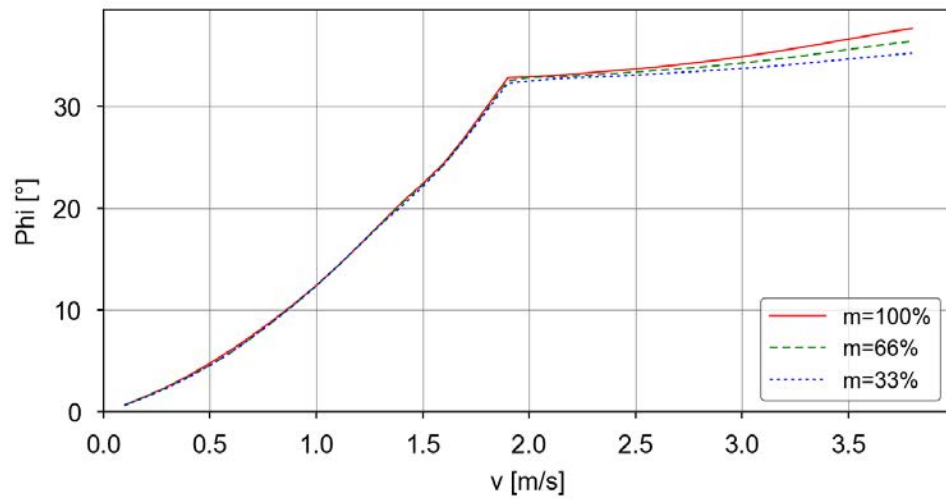
8 IRB 2600

8.4 IRB 2600ID 1.85 m 15 kg

Continued

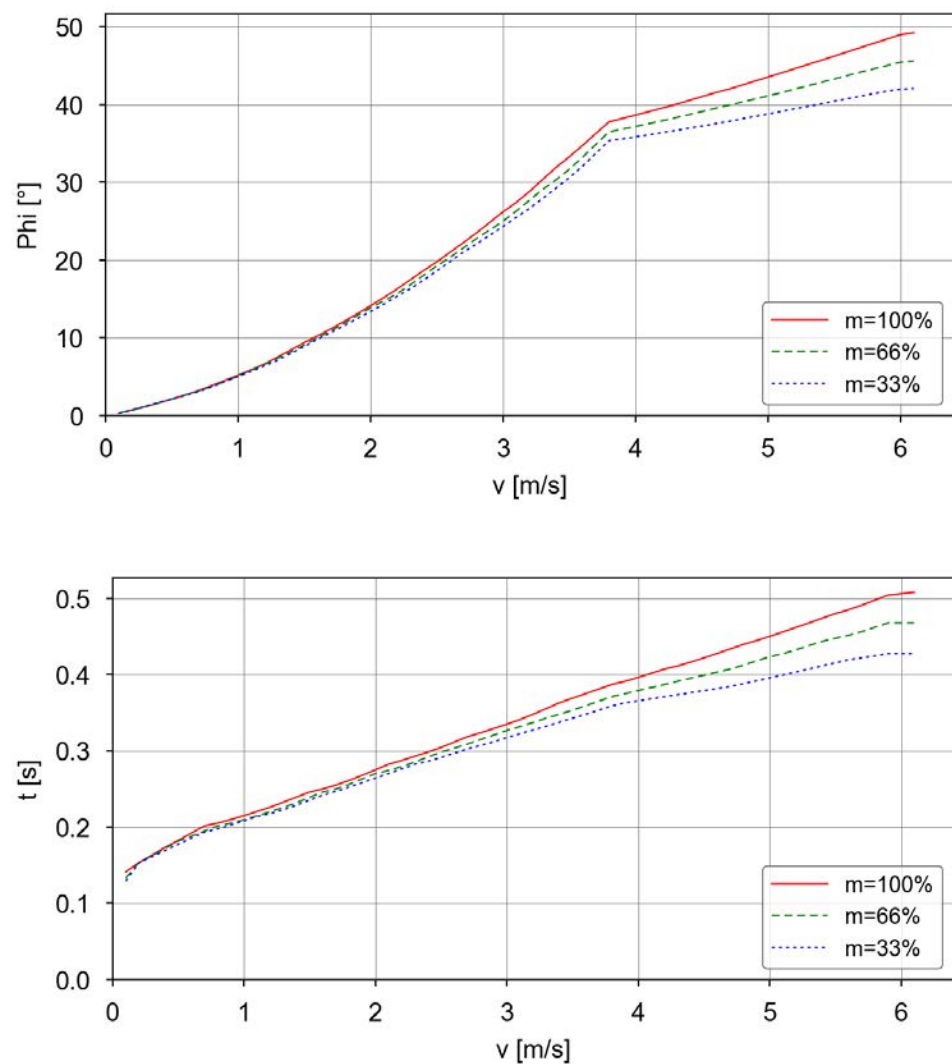


Extension zone 1, stopping distance and stopping time



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Extension zone 2, stopping distance and stopping time



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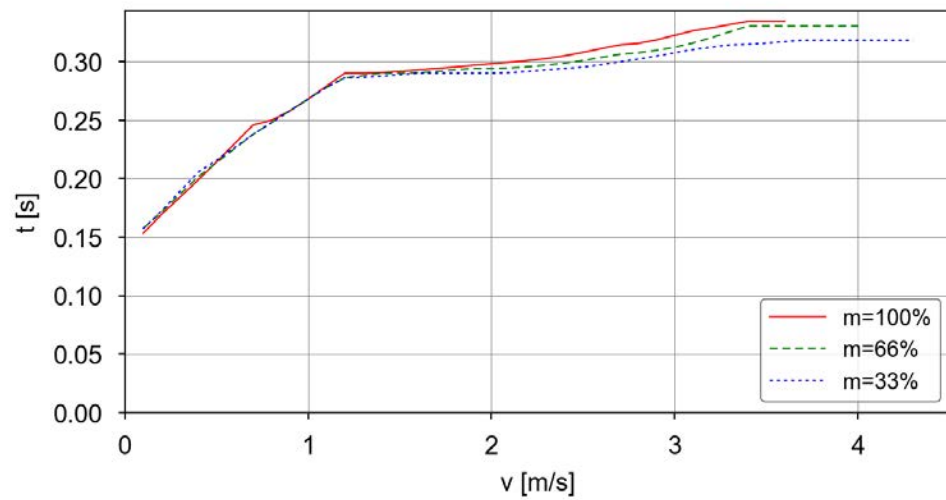
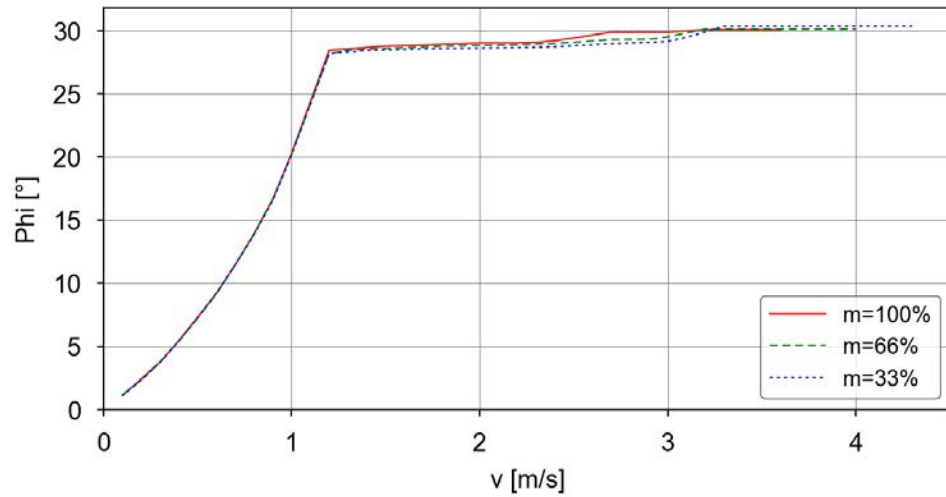
8 IRB 2600

8.4 IRB 2600ID 1.85 m 15 kg

Continued

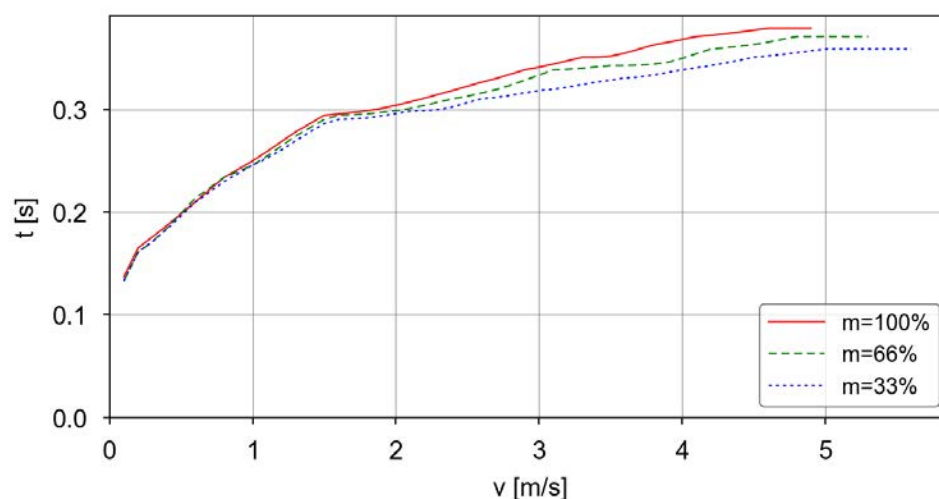
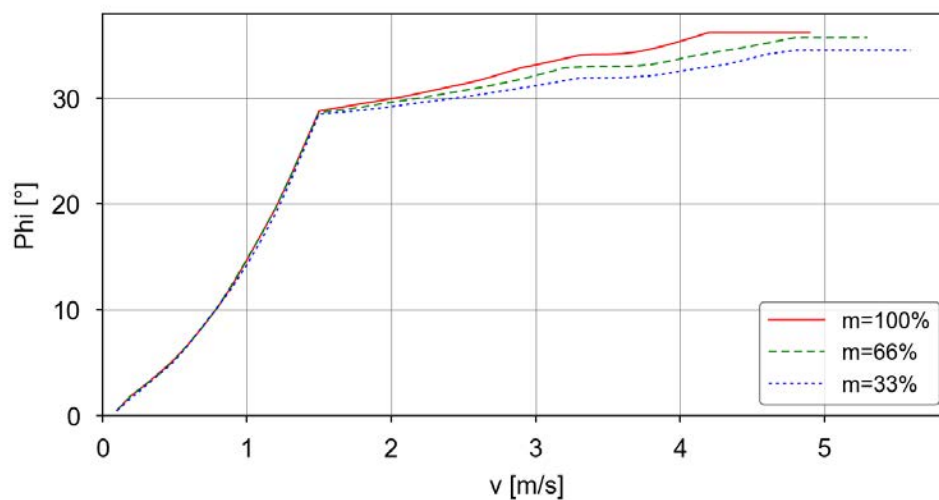
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

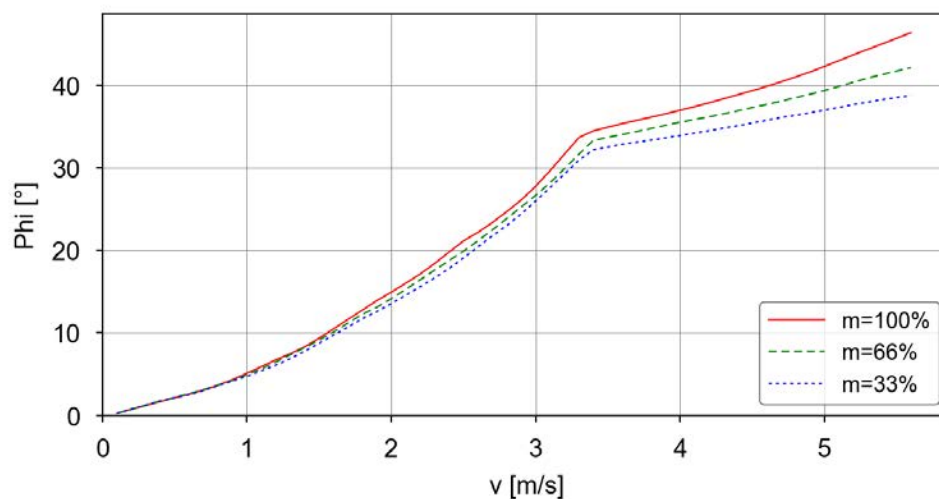


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

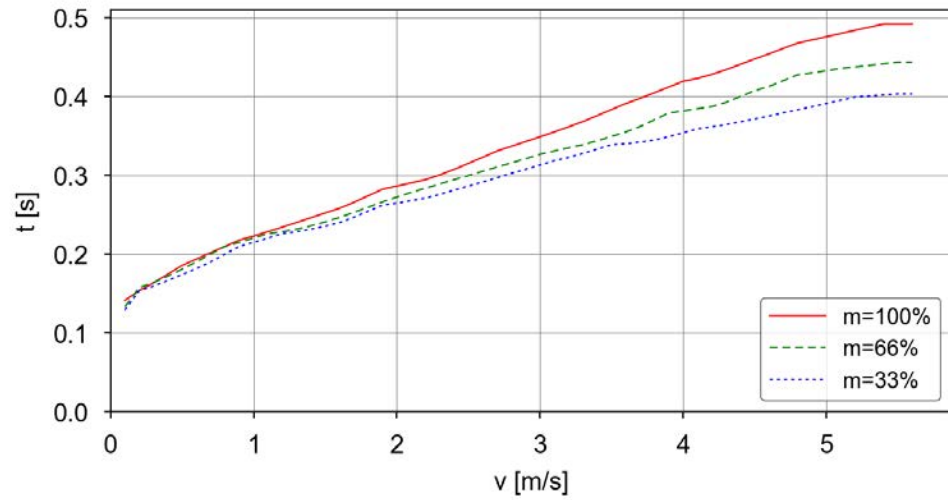


Continues on next page

8 IRB 2600

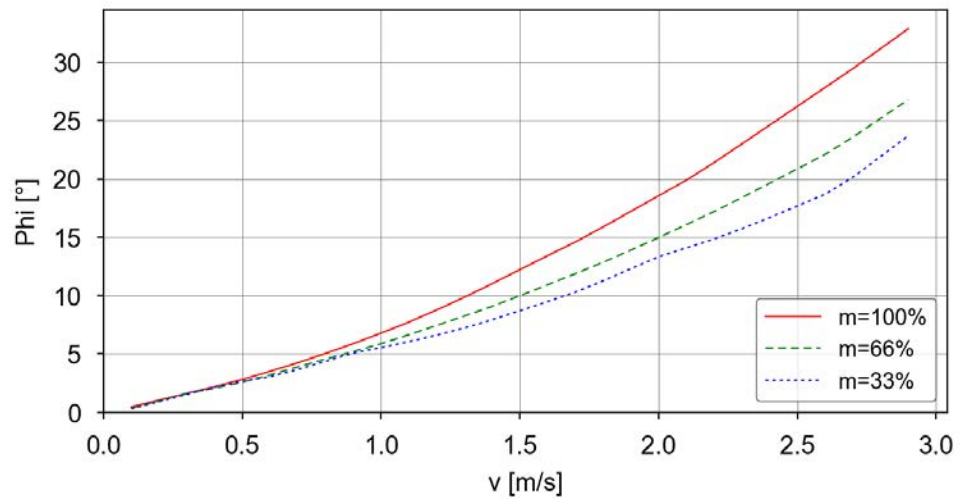
8.4 IRB 2600ID 1.85 m 15 kg

Continued

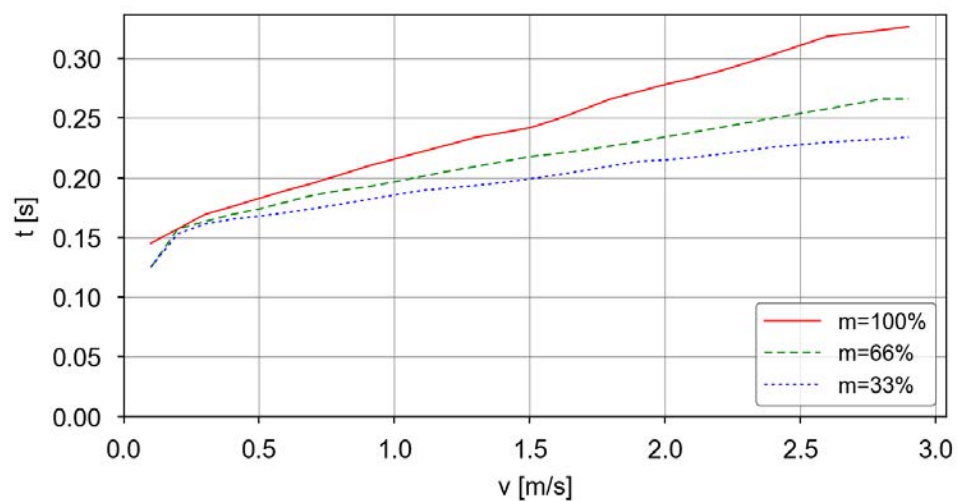


Category 1, Axis 3

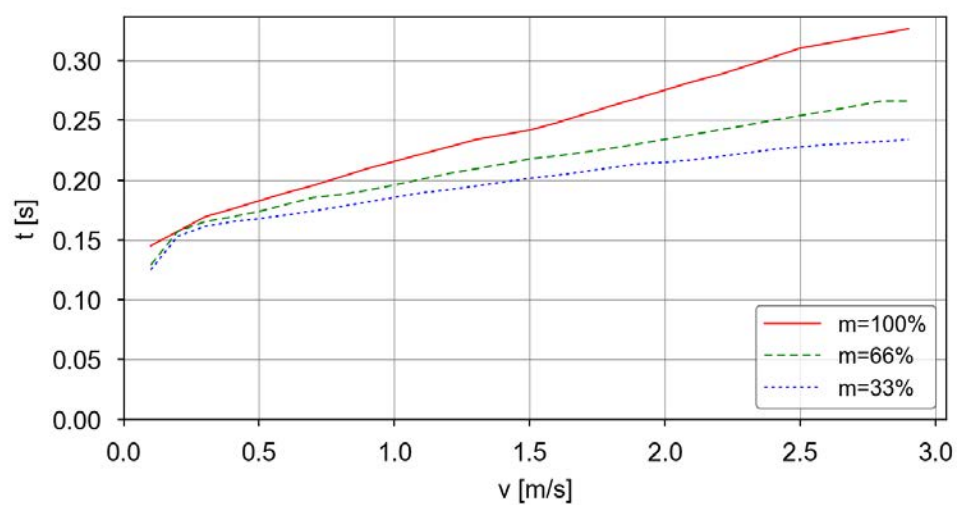
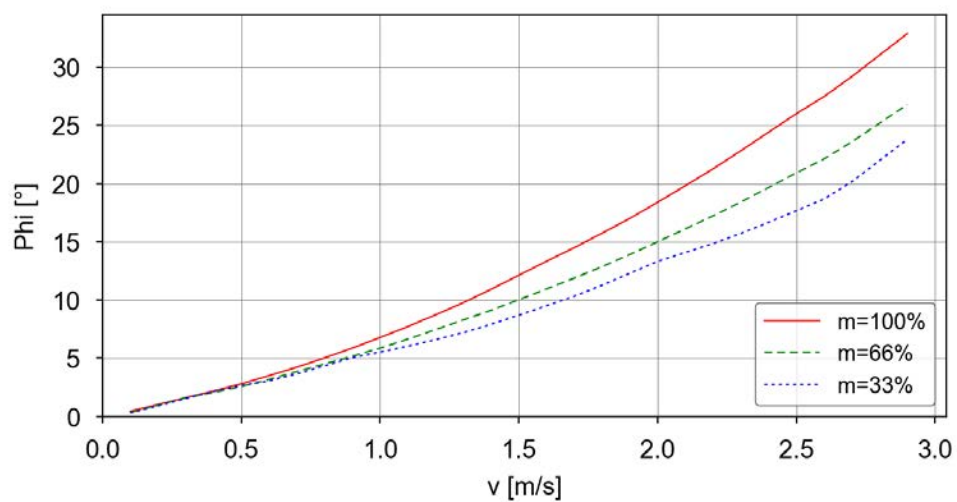
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



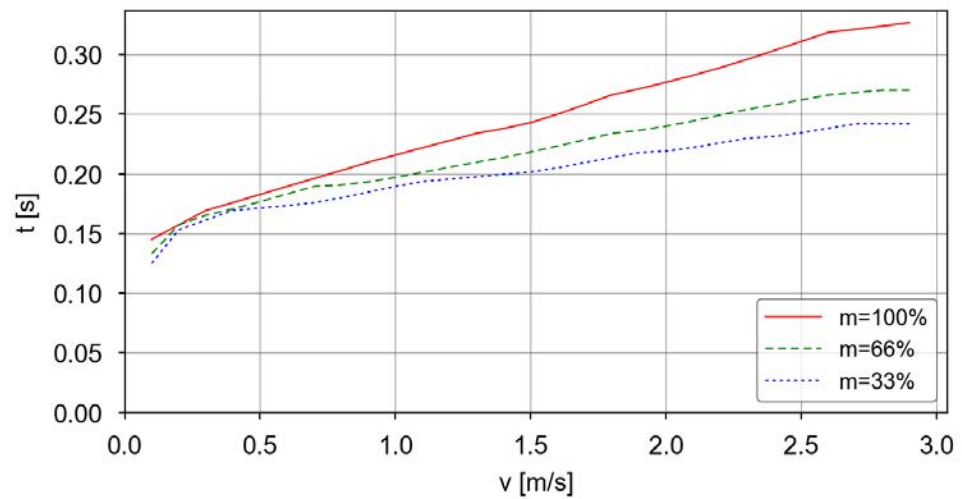
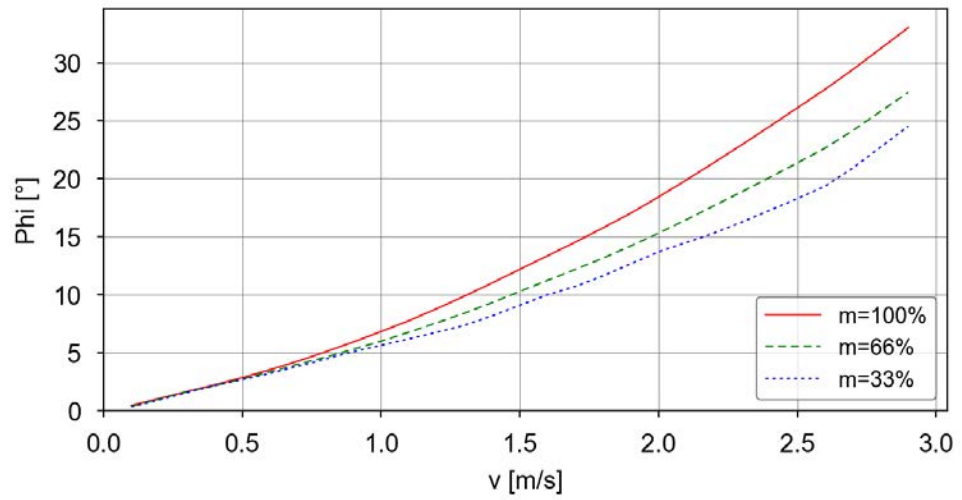
Continues on next page

8 IRB 2600

8.4 IRB 2600ID 1.85 m 15 kg

Continued

Extension zone 2, stopping distance and stopping time



8.5 IRB 2600ID 2.00 m 8 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	31.8	0.27
2	33.7	0.29
3	23.0	0.17

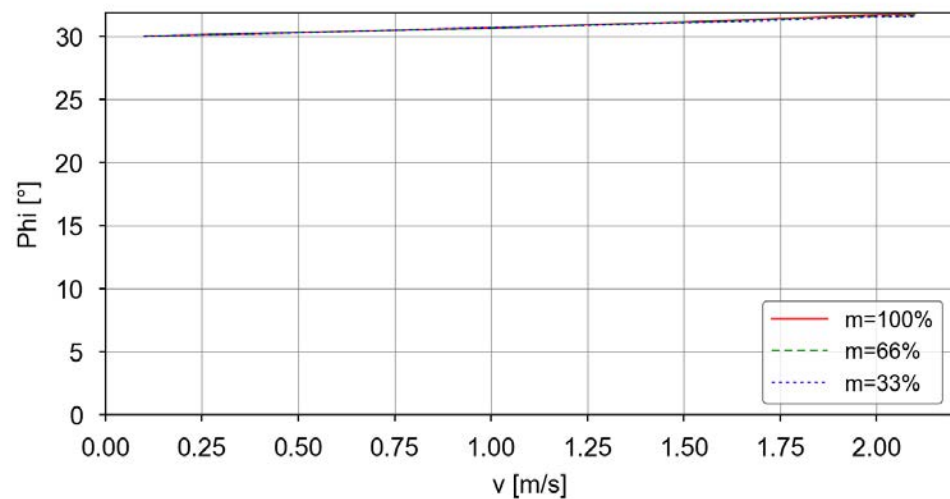
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.667
1	0.667	1.333
2	1.333	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

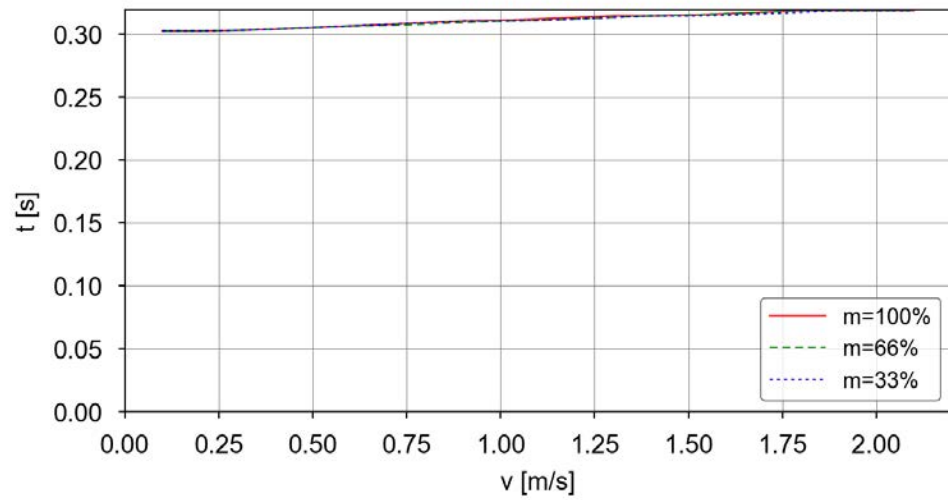


Continues on next page

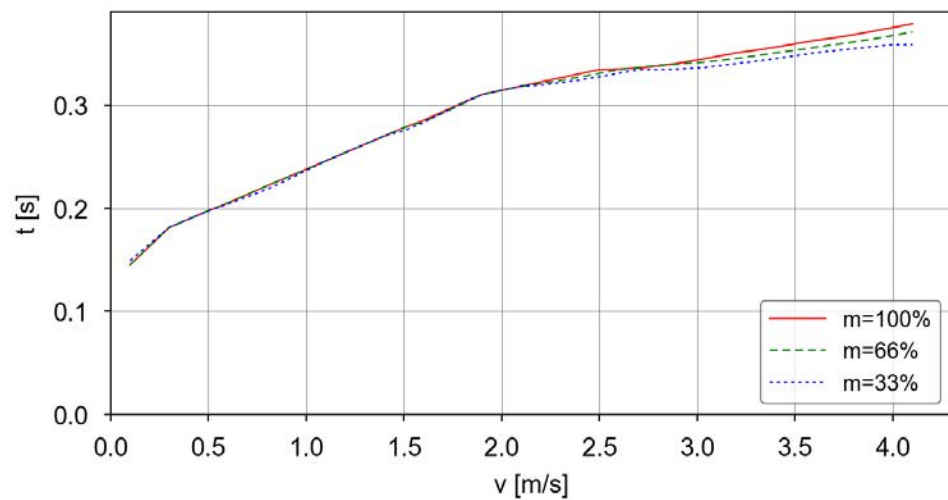
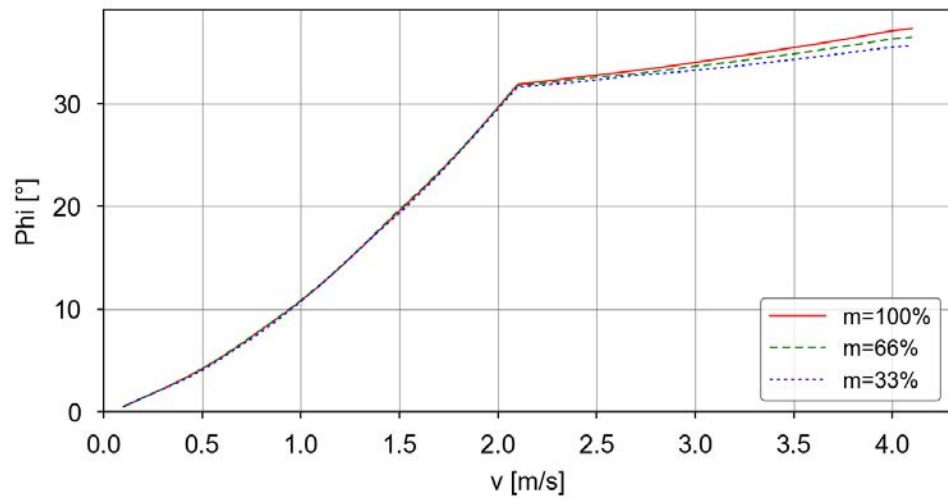
8 IRB 2600

8.5 IRB 2600ID 2.00 m 8 kg

Continued

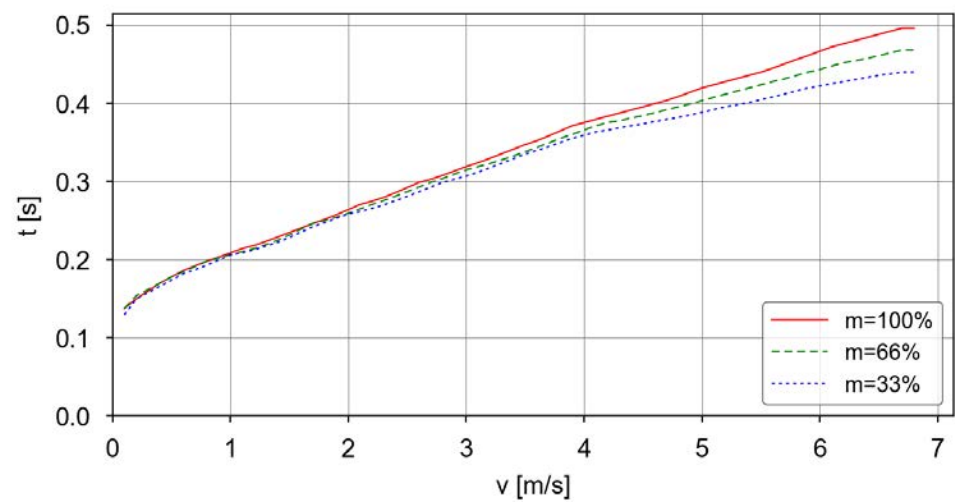
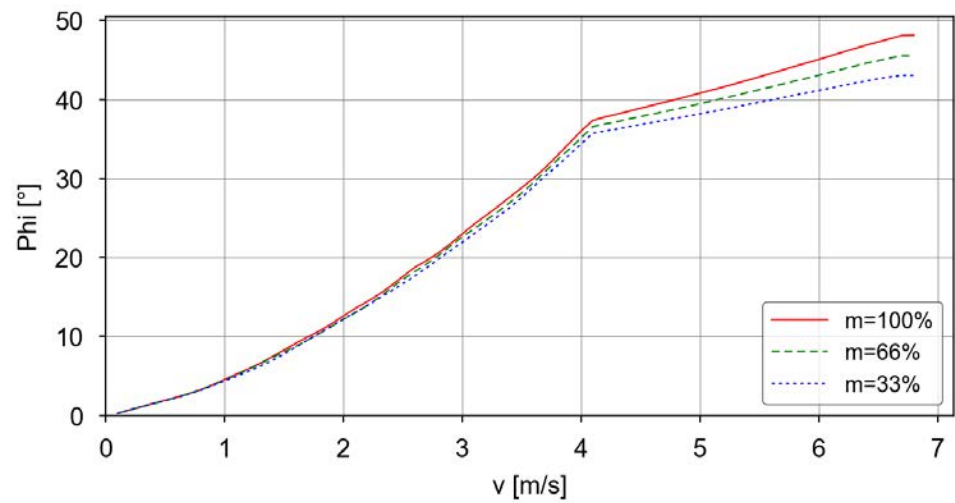


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

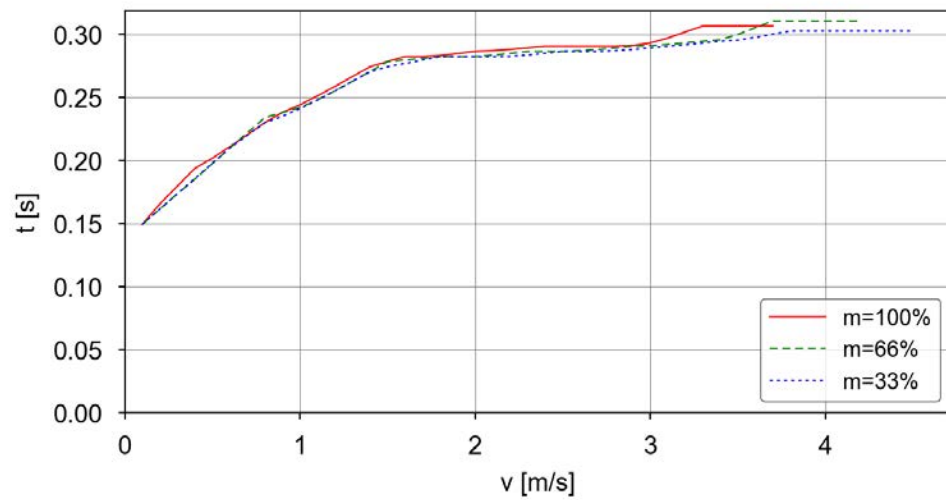
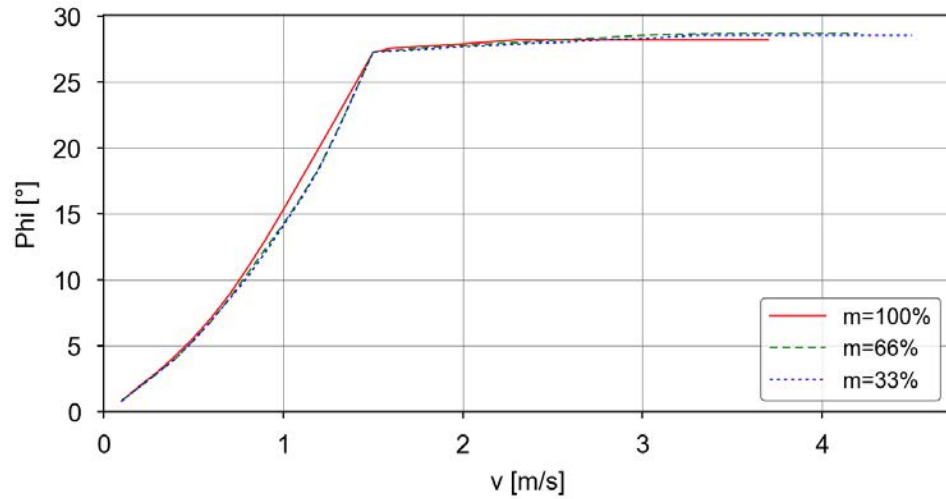
8 IRB 2600

8.5 IRB 2600ID 2.00 m 8 kg

Continued

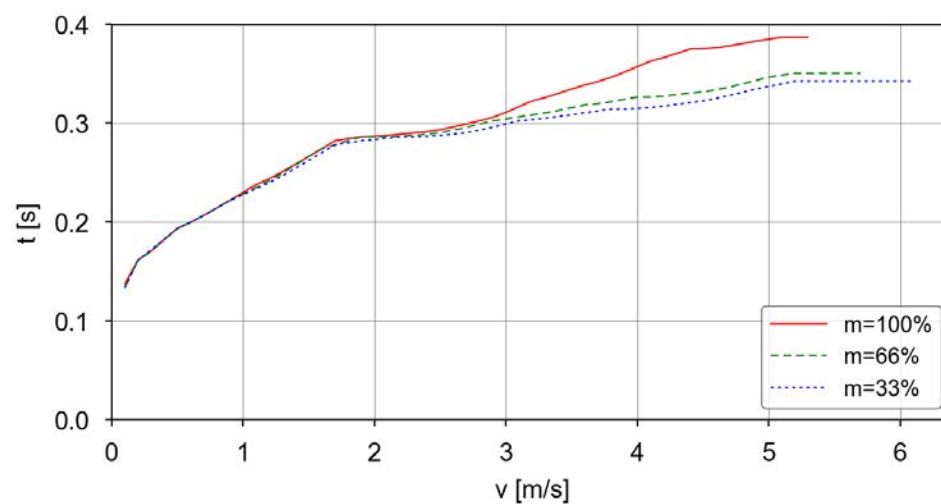
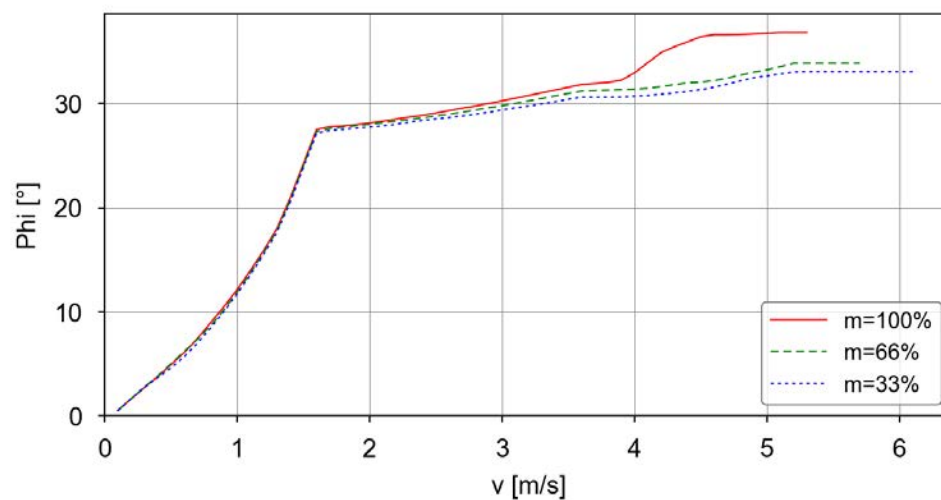
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

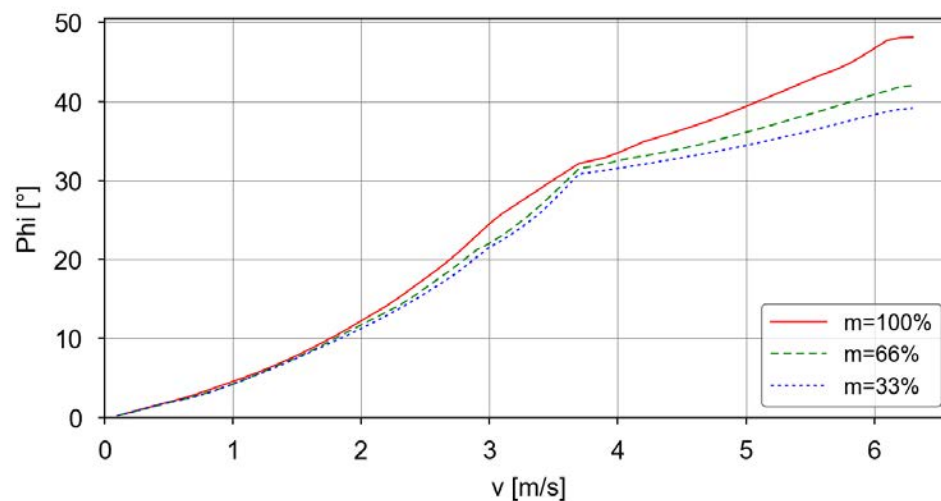


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

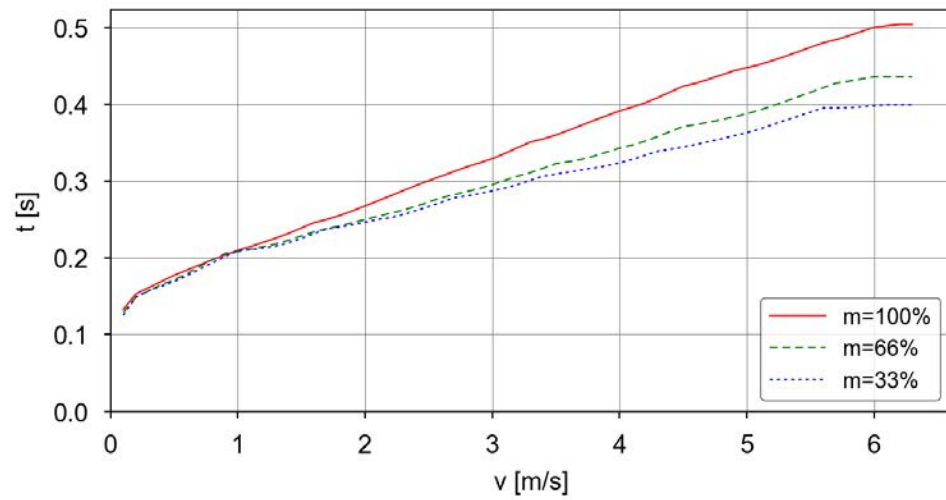


Continues on next page

8 IRB 2600

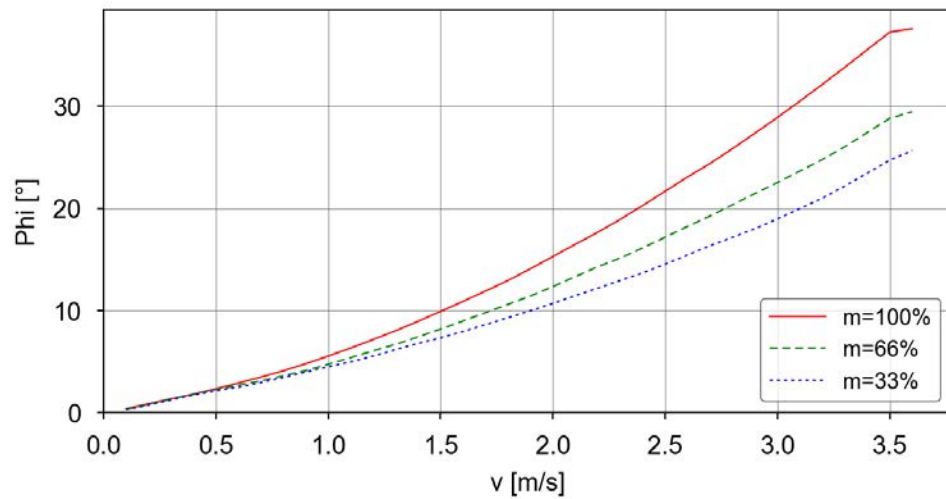
8.5 IRB 2600ID 2.00 m 8 kg

Continued

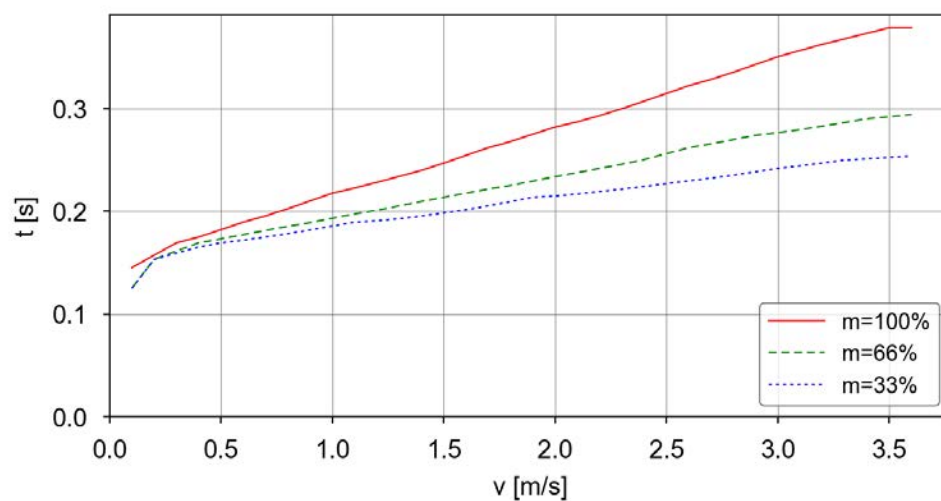


Category 1, Axis 3

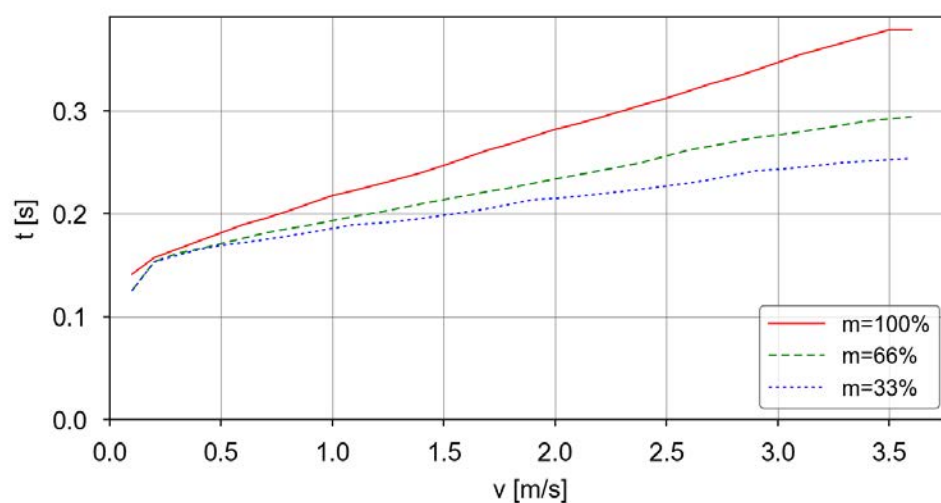
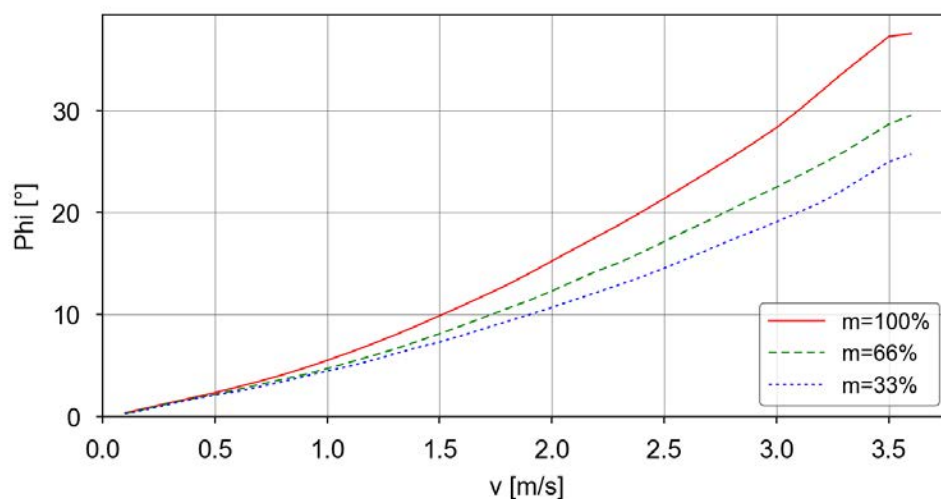
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



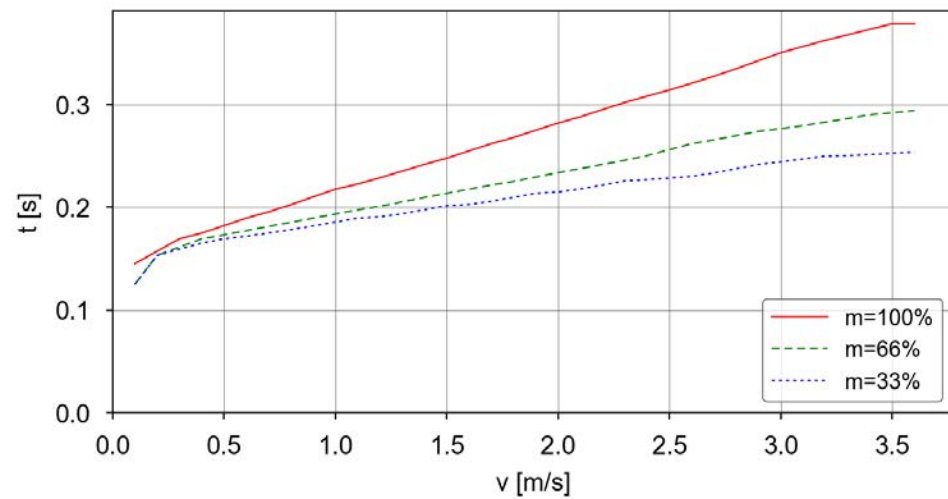
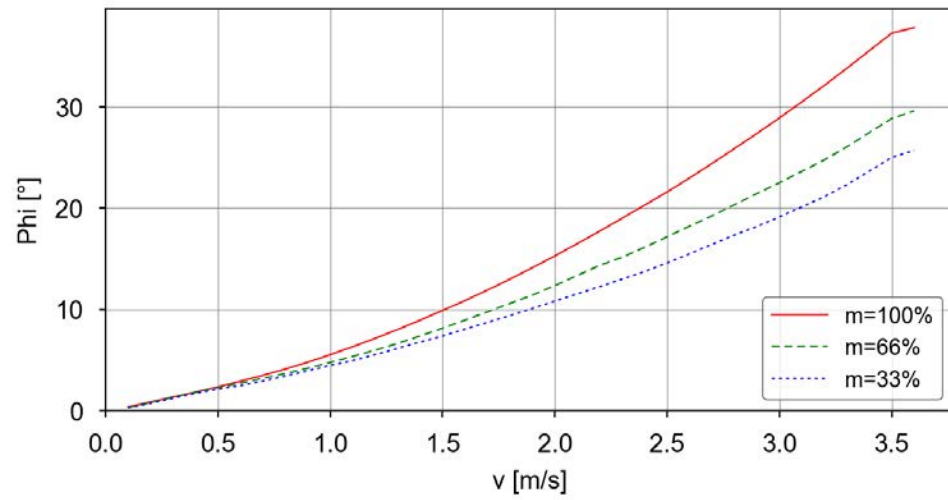
Continues on next page

8 IRB 2600

8.5 IRB 2600ID 2.00 m 8 kg

Continued

Extension zone 2, stopping distance and stopping time



9 IRB 4400

9.1 IRB 4400 1.95 m 45 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	67.8	0.8
2	18.8	0.22
3	18.2	0.22

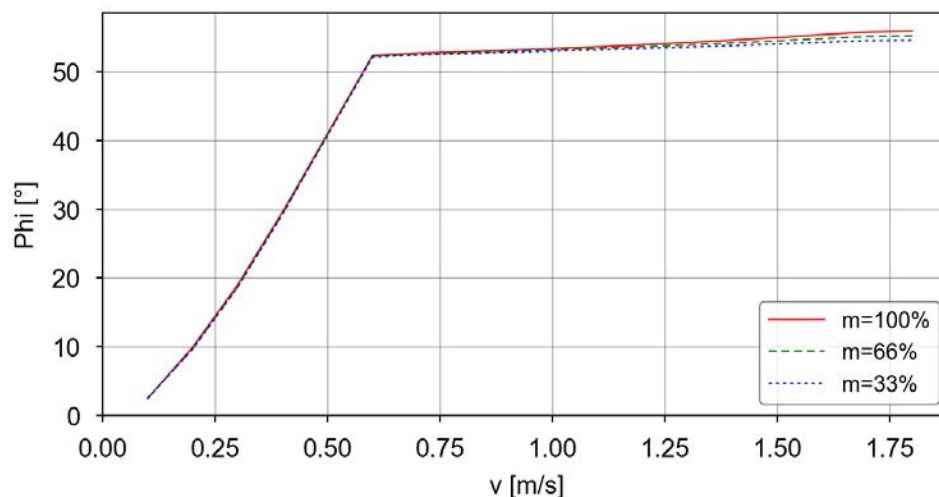
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.661
1	0.661	1.322
2	1.322	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

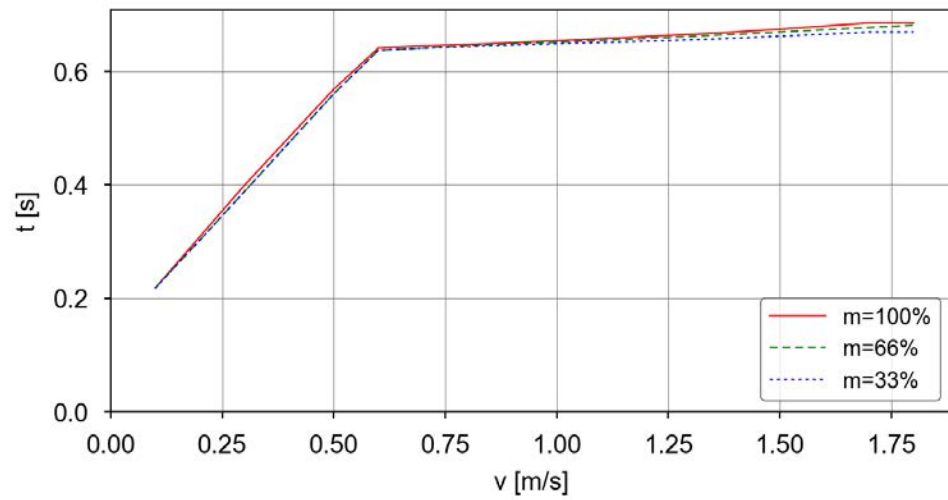


Continues on next page

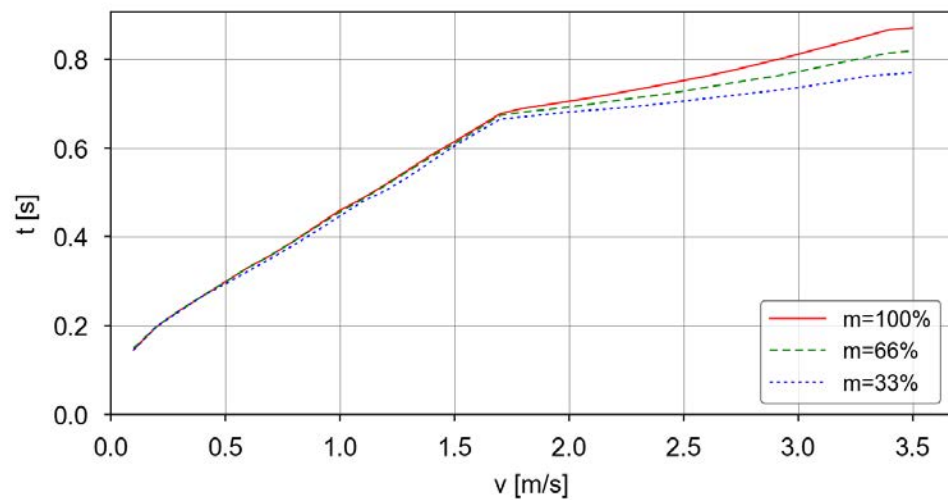
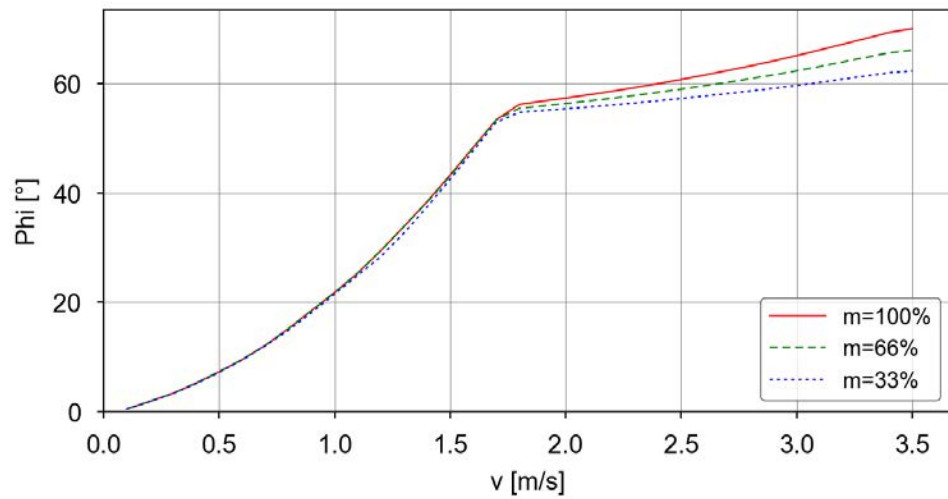
9 IRB 4400

9.1 IRB 4400 1.95 m 45 kg

Continued

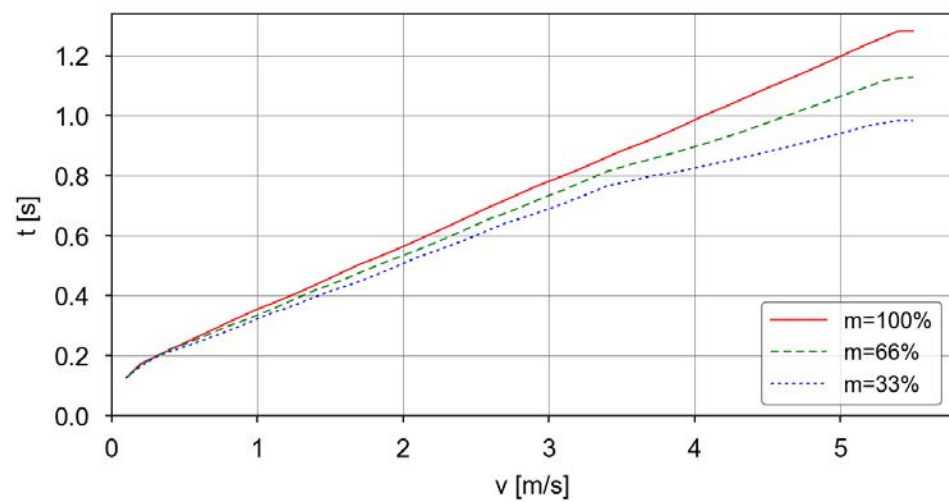
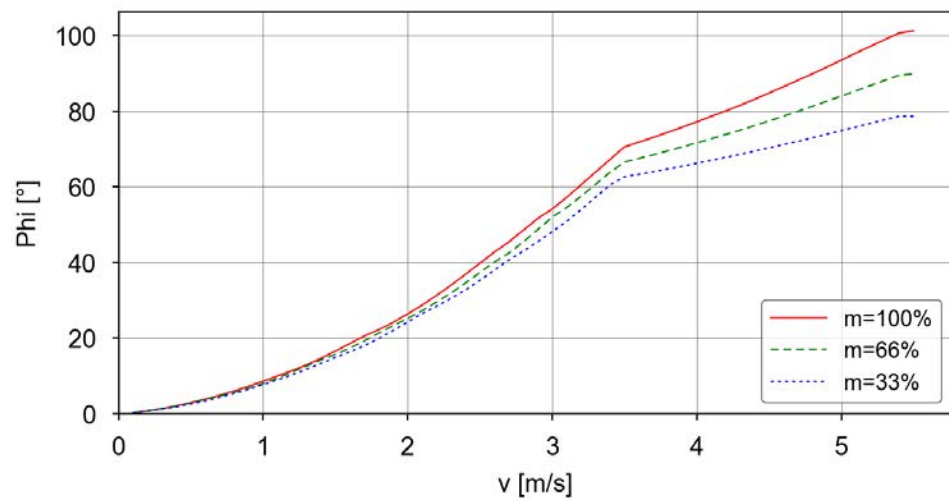


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

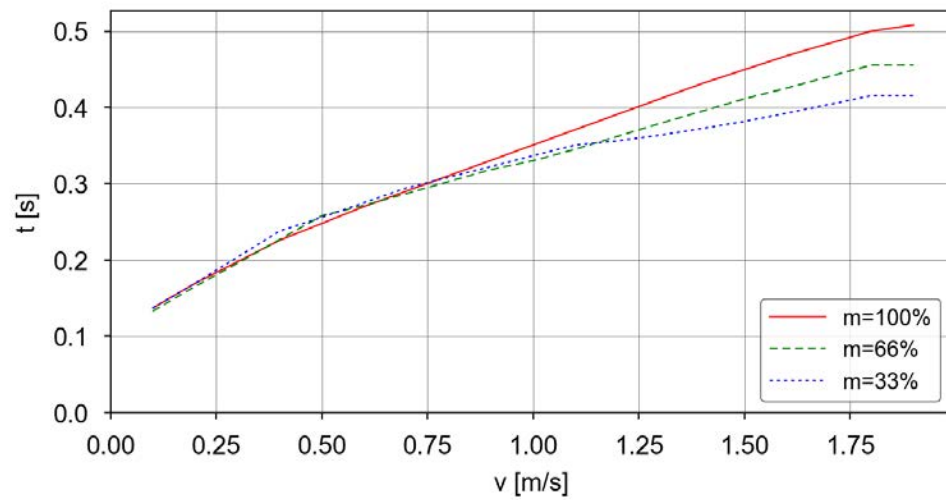
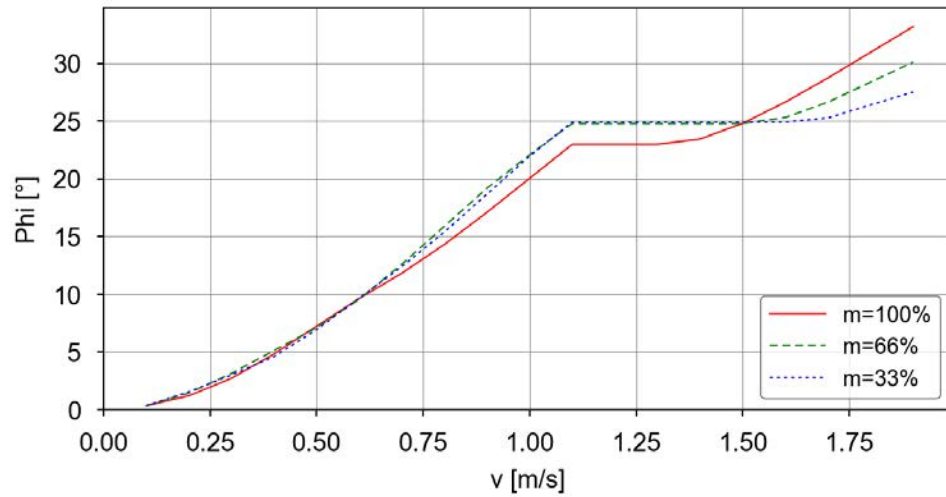
9 IRB 4400

9.1 IRB 4400 1.95 m 45 kg

Continued

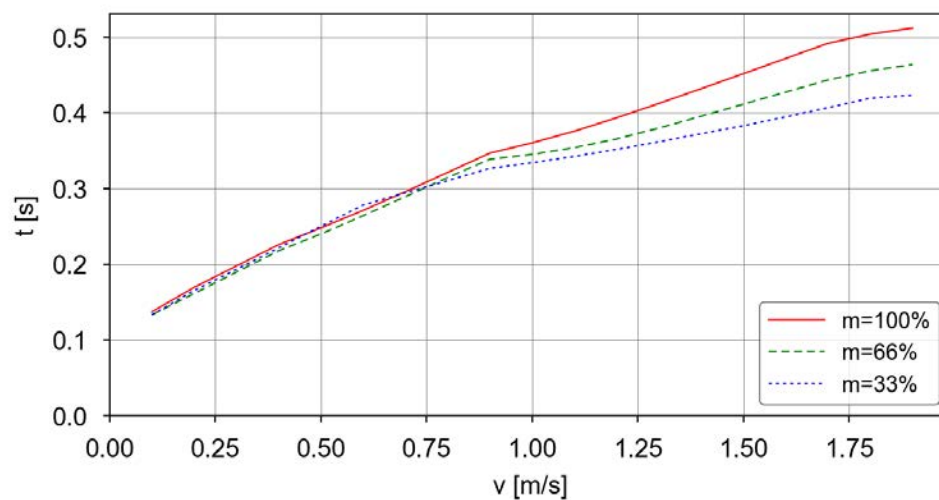
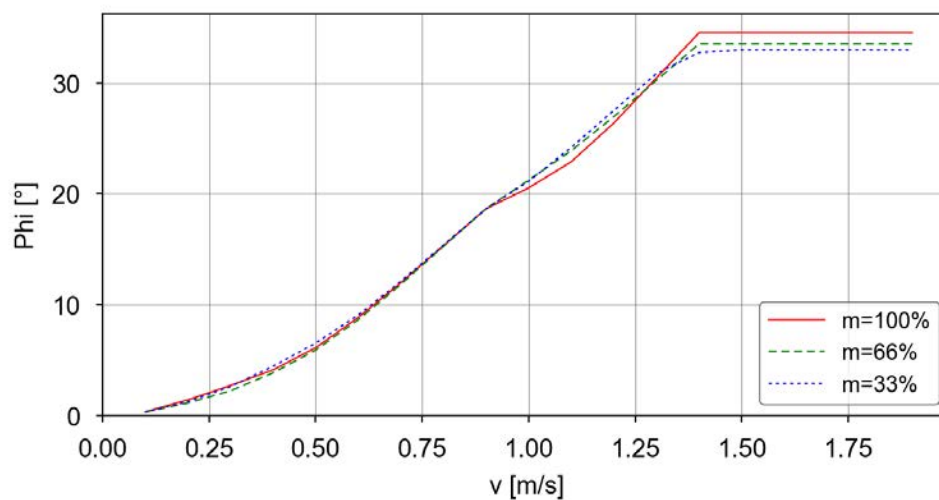
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

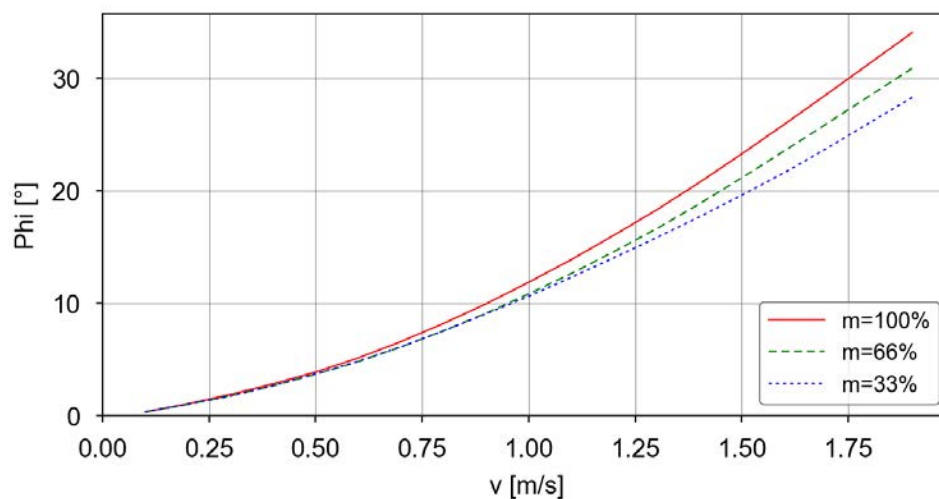


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

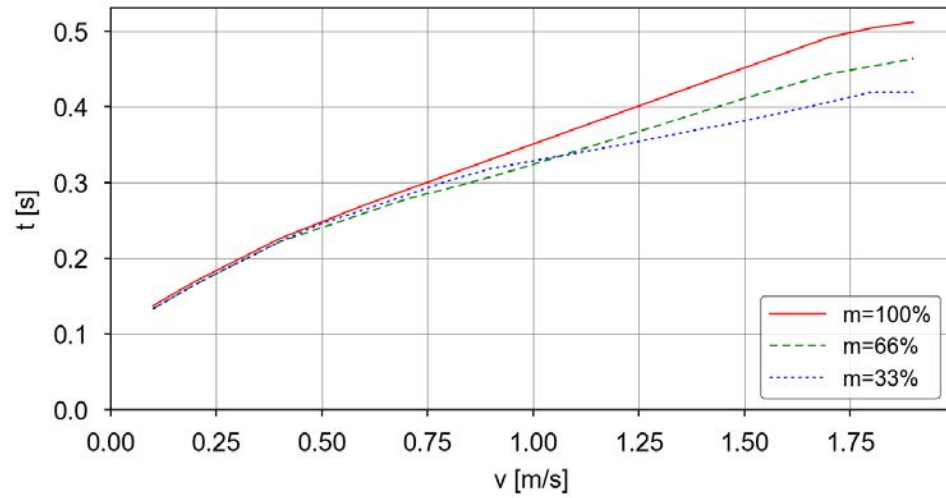


Continues on next page

9 IRB 4400

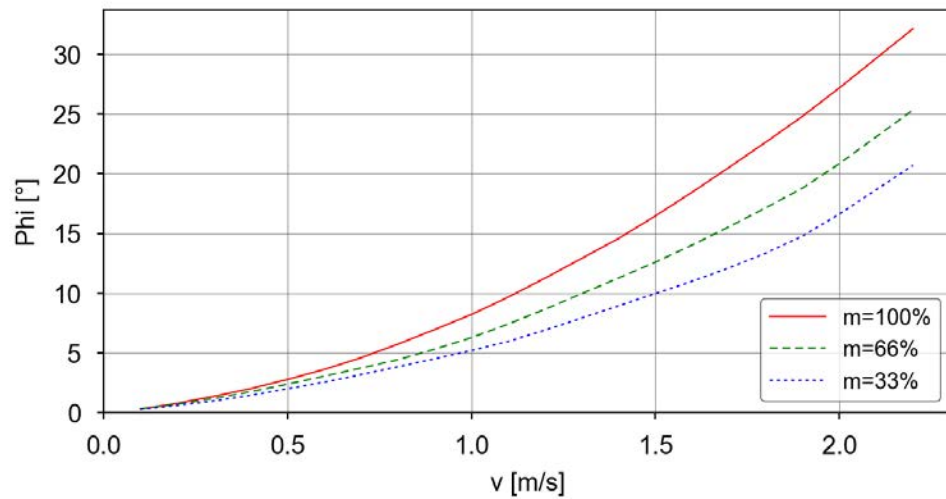
9.1 IRB 4400 1.95 m 45 kg

Continued

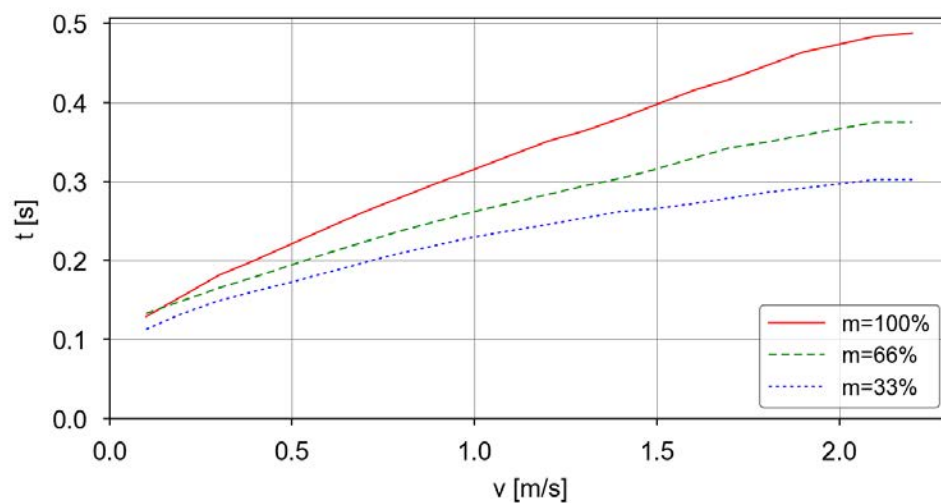


Category 1, Axis 3

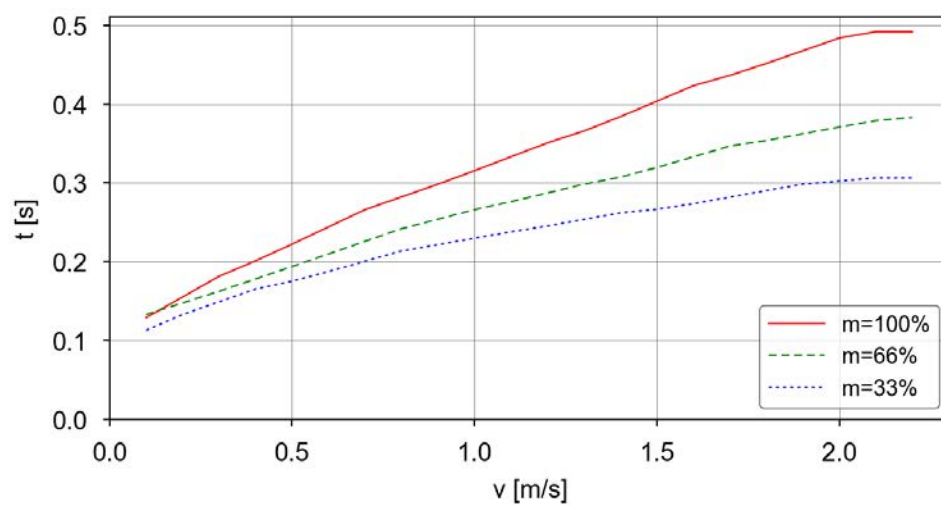
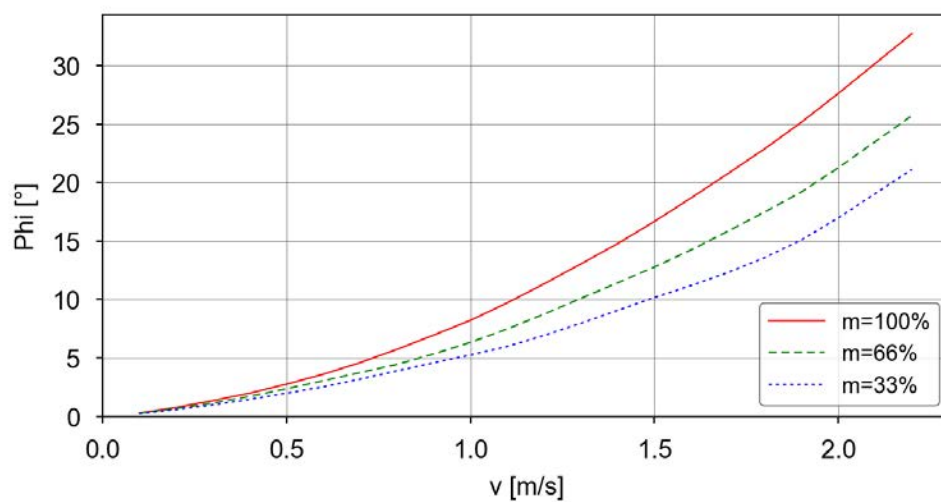
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



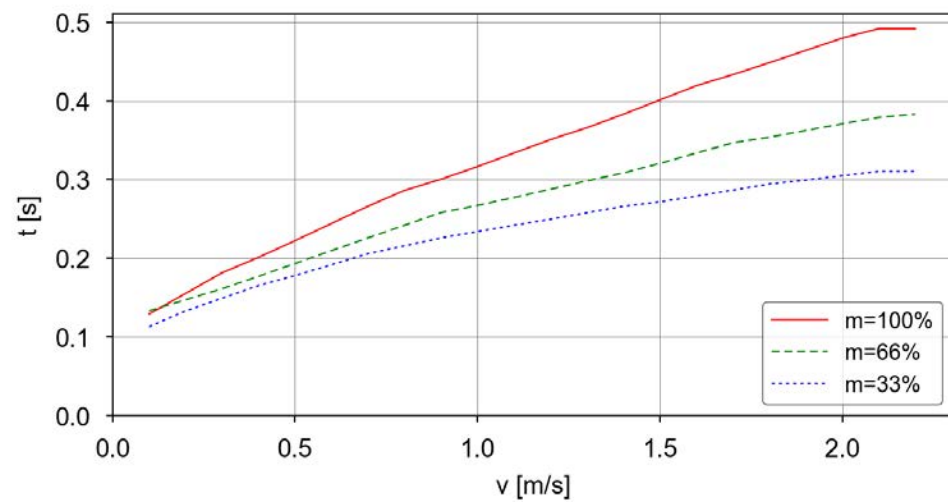
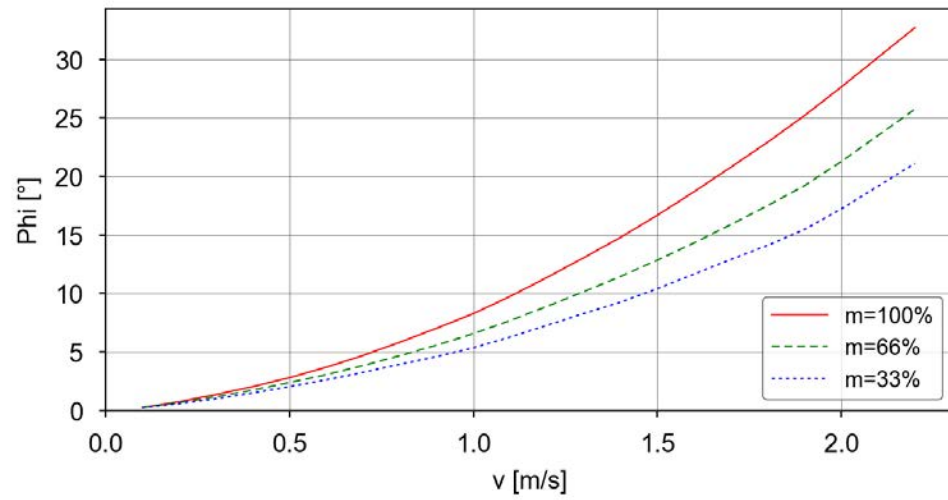
Continues on next page

9 IRB 4400

9.1 IRB 4400 1.95 m 45 kg

Continued

Extension zone 2, stopping distance and stopping time



9.2 IRB 4400 1.95 m 60 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	75.1	0.9
2	20.2	0.25
3	20.6	0.27

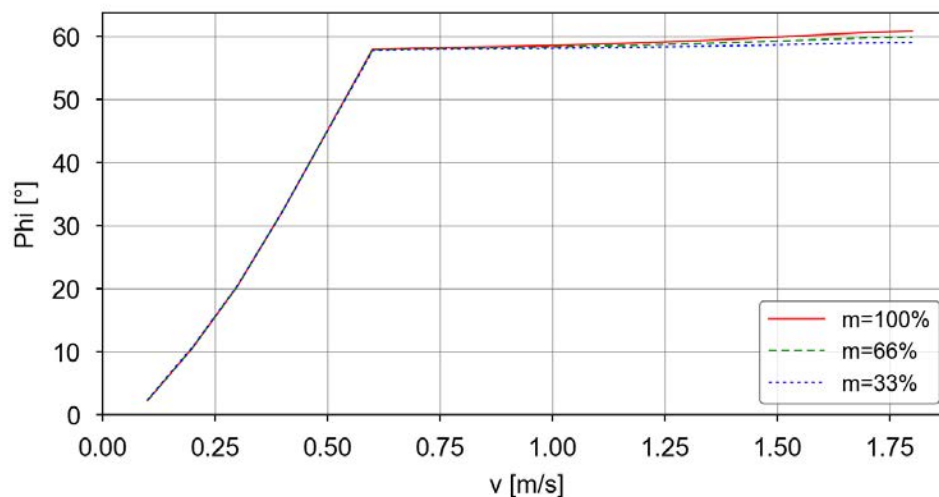
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.661
1	0.661	1.322
2	1.322	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

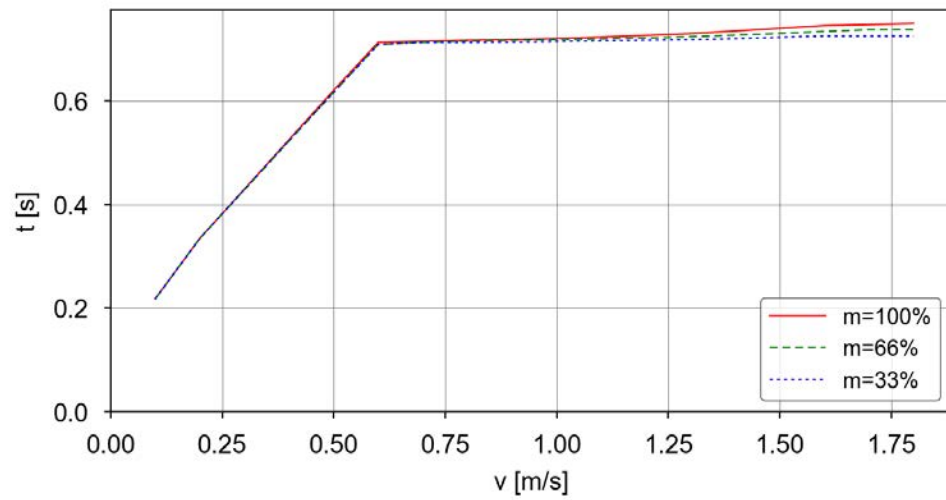


Continues on next page

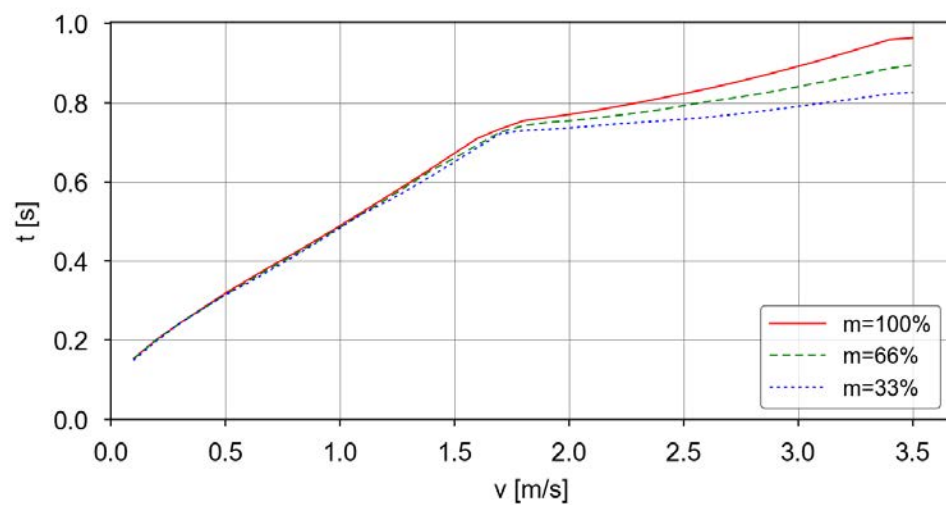
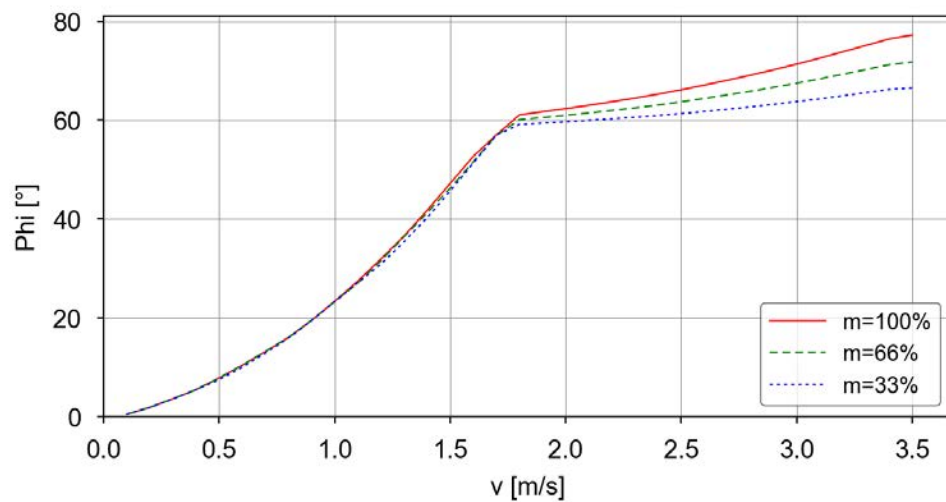
9 IRB 4400

9.2 IRB 4400 1.95 m 60 kg

Continued

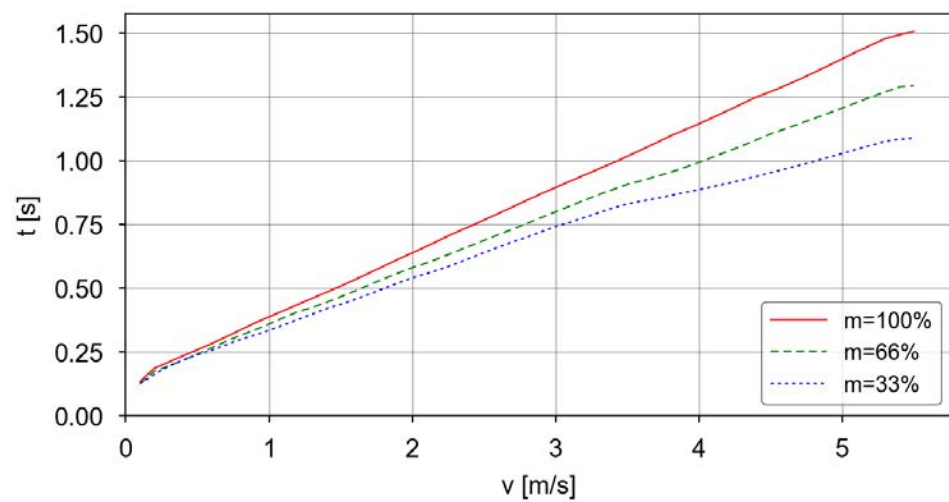
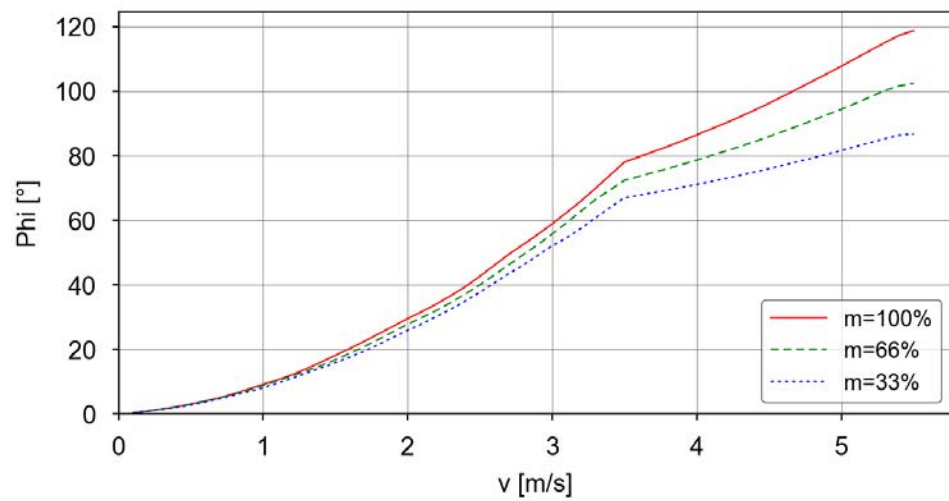


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

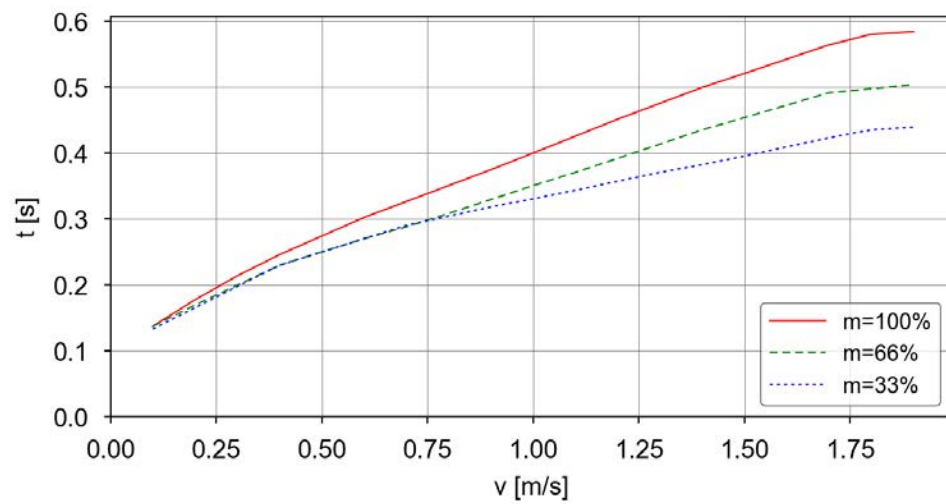
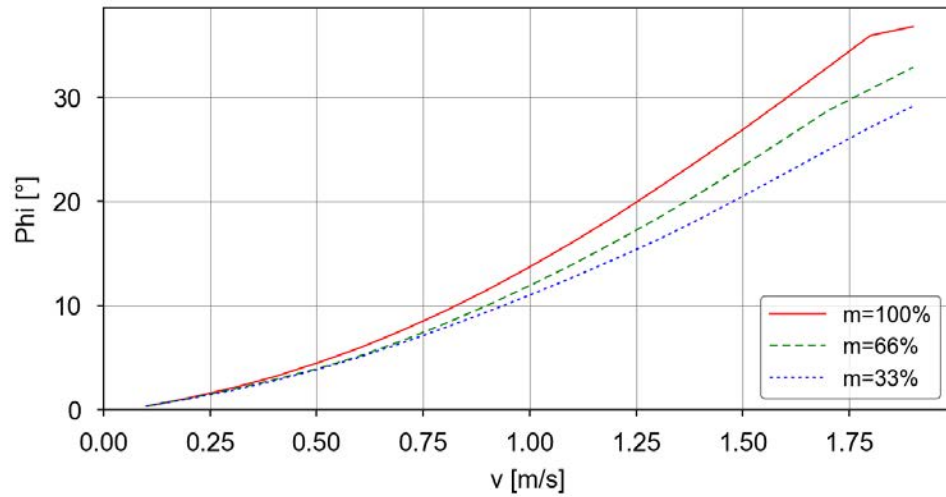
9 IRB 4400

9.2 IRB 4400 1.95 m 60 kg

Continued

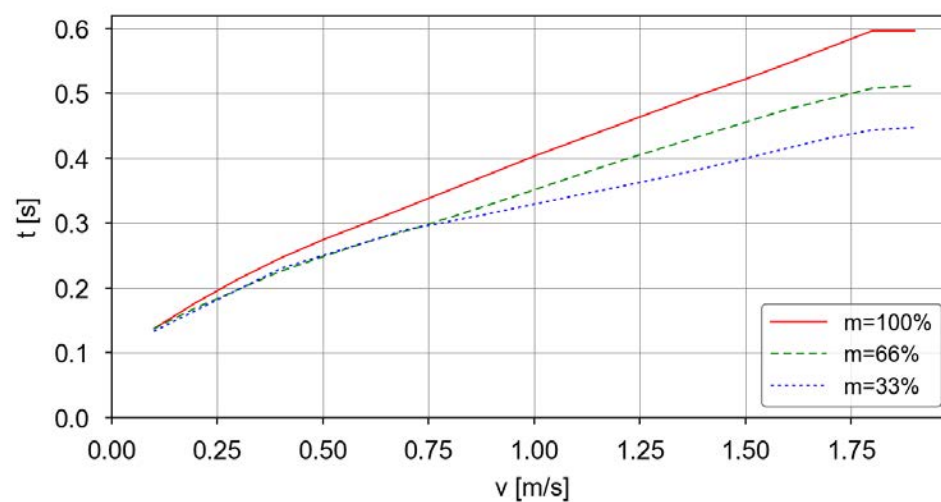
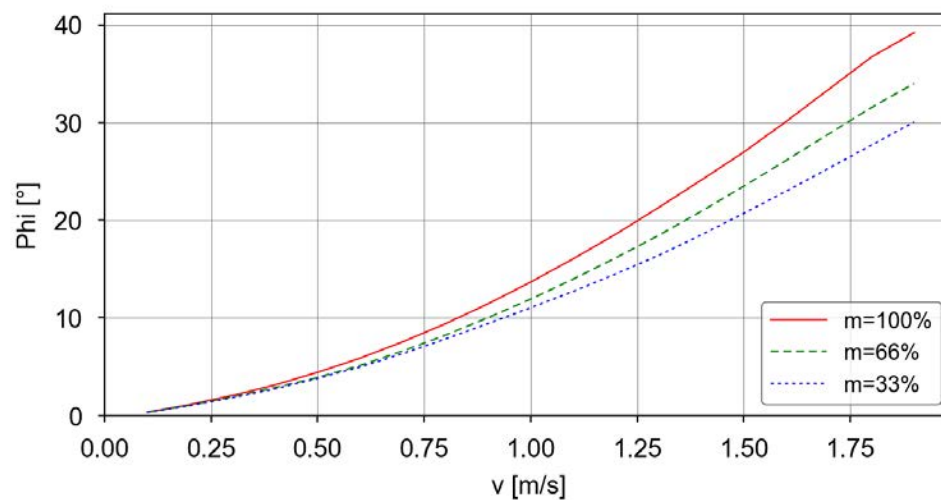
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

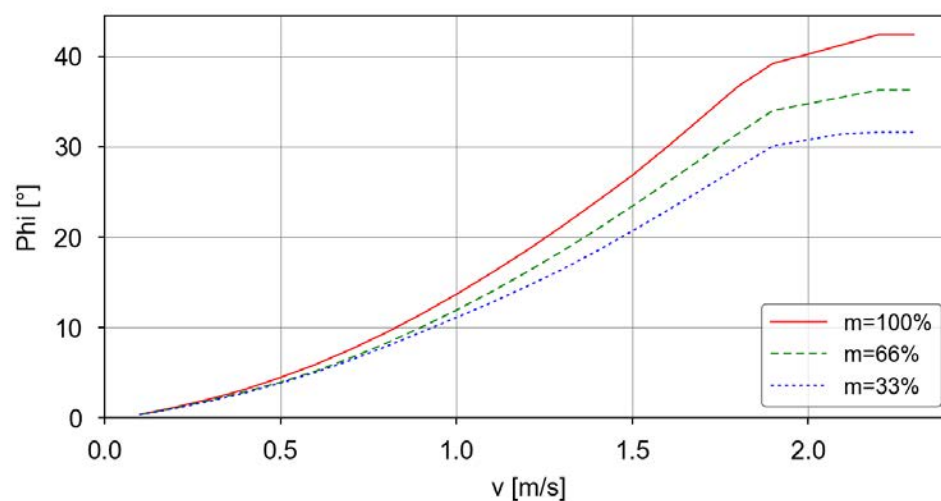


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

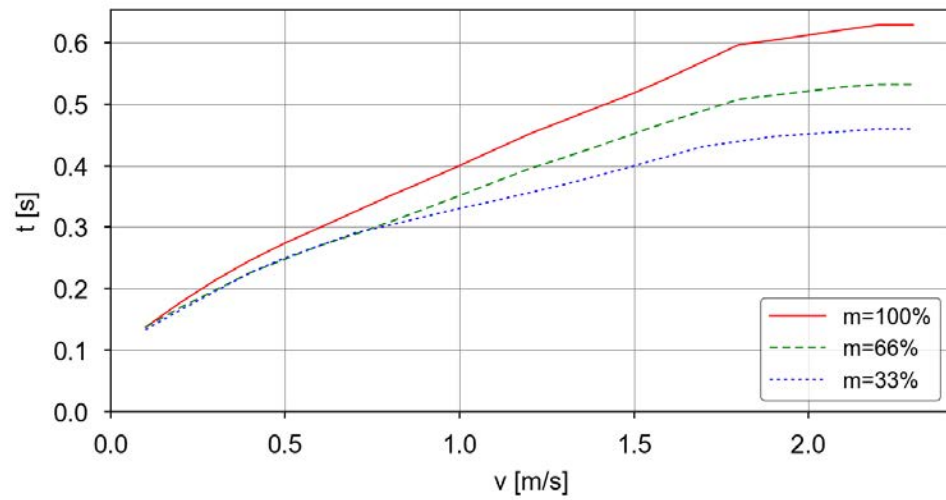


Continues on next page

9 IRB 4400

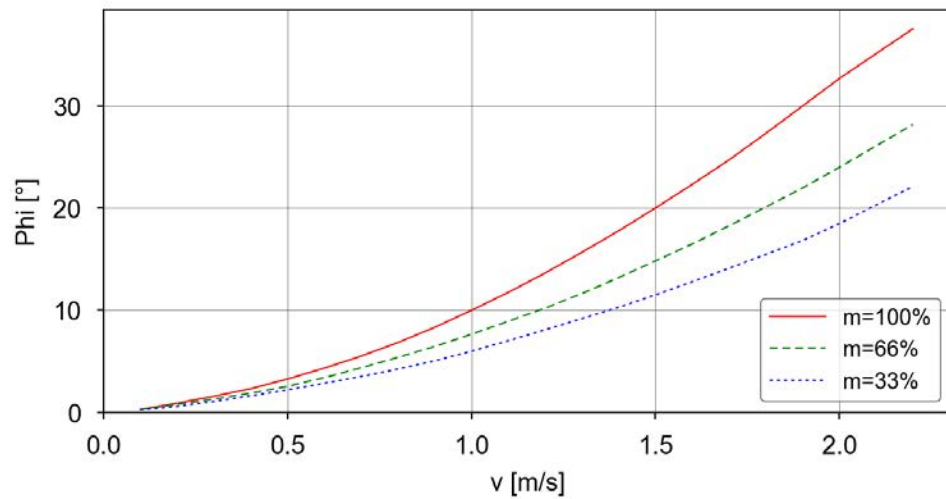
9.2 IRB 4400 1.95 m 60 kg

Continued

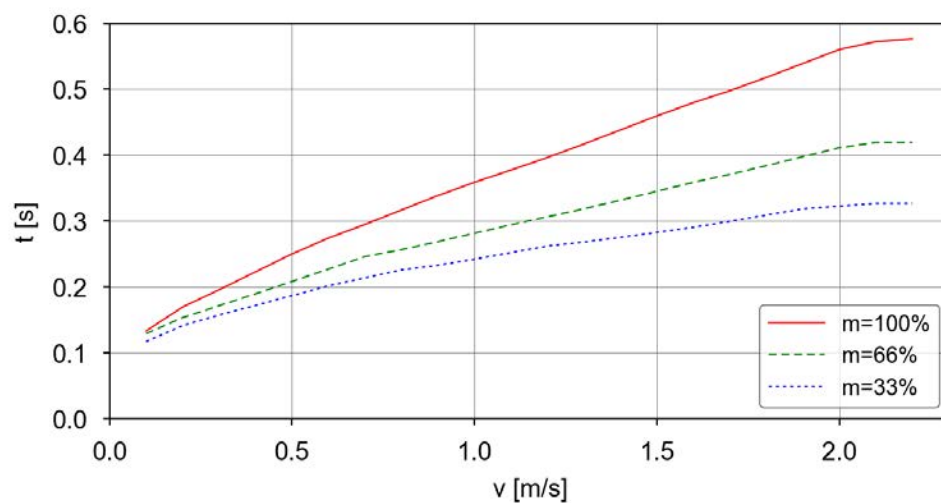


Category 1, Axis 3

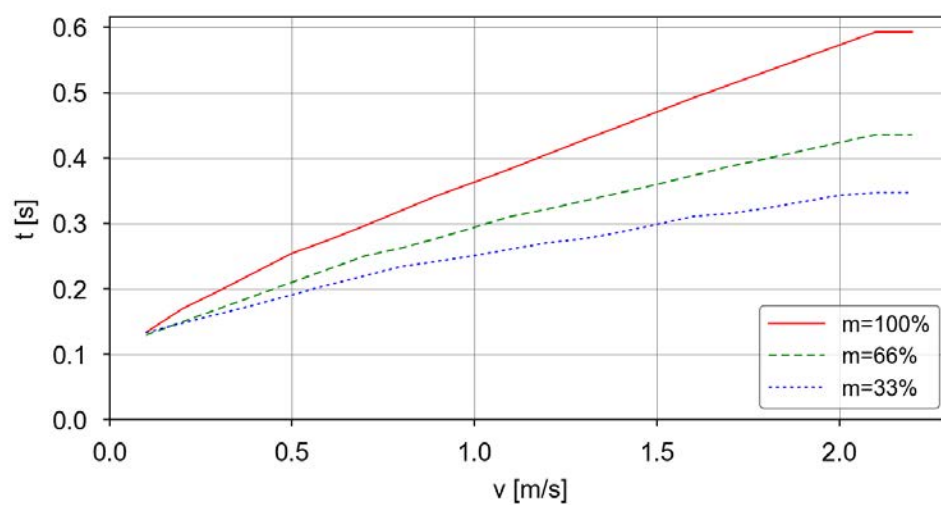
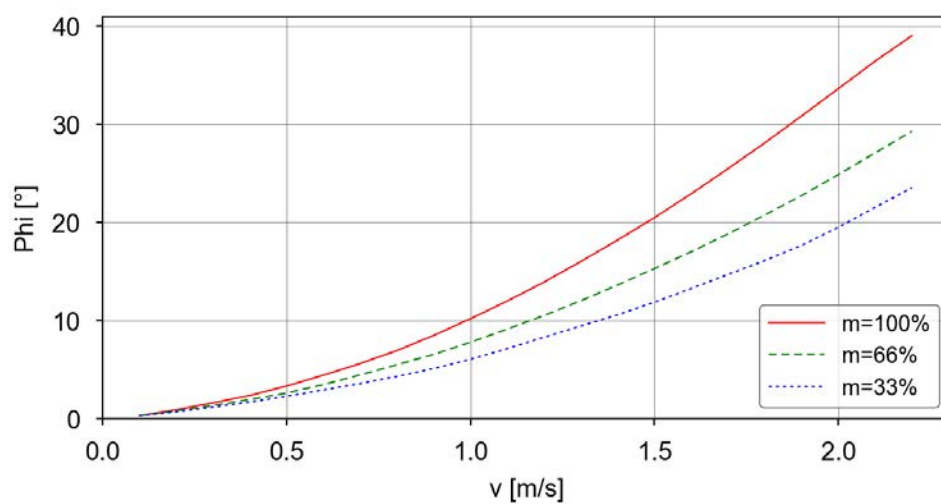
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



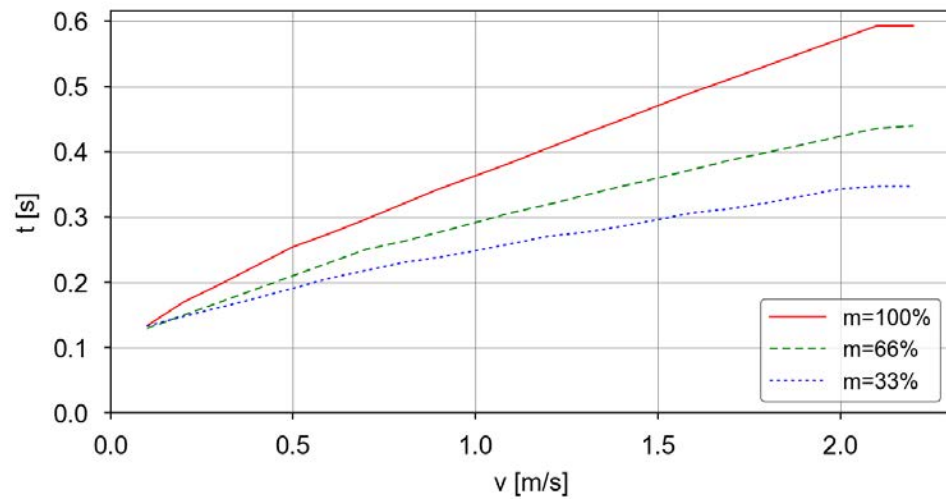
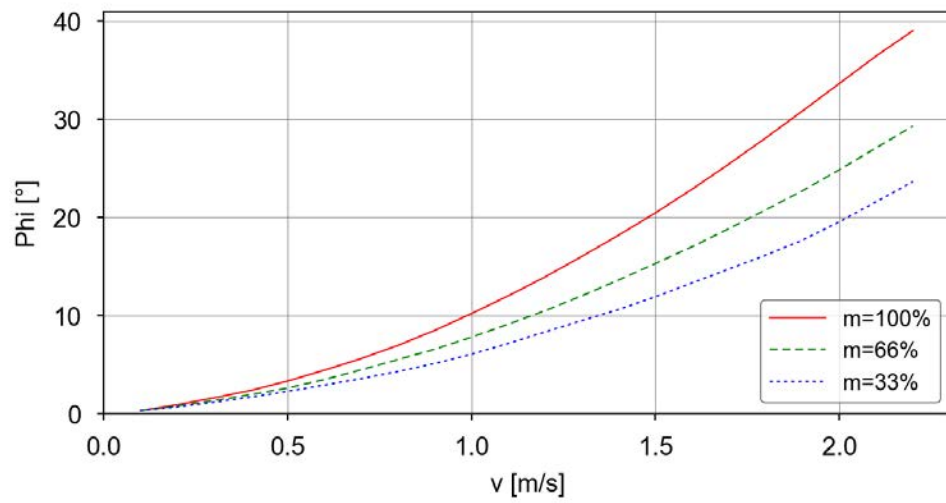
Continues on next page

9 IRB 4400

9.2 IRB 4400 1.95 m 60 kg

Continued

Extension zone 2, stopping distance and stopping time



9.3 IRB 4400 2.6 m 10 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	51.3	0.58
2	21.1	0.2
3	19.0	0.17

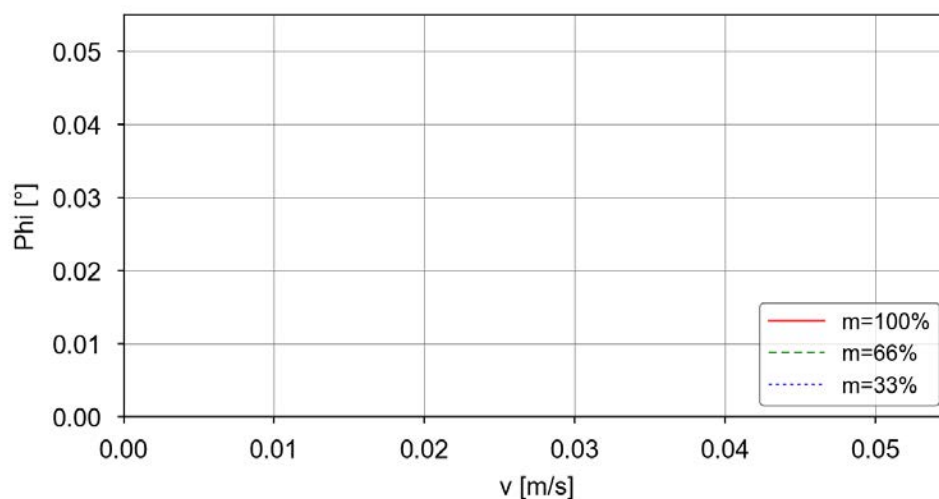
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.0
1	0.0	0.0
2	0.0	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

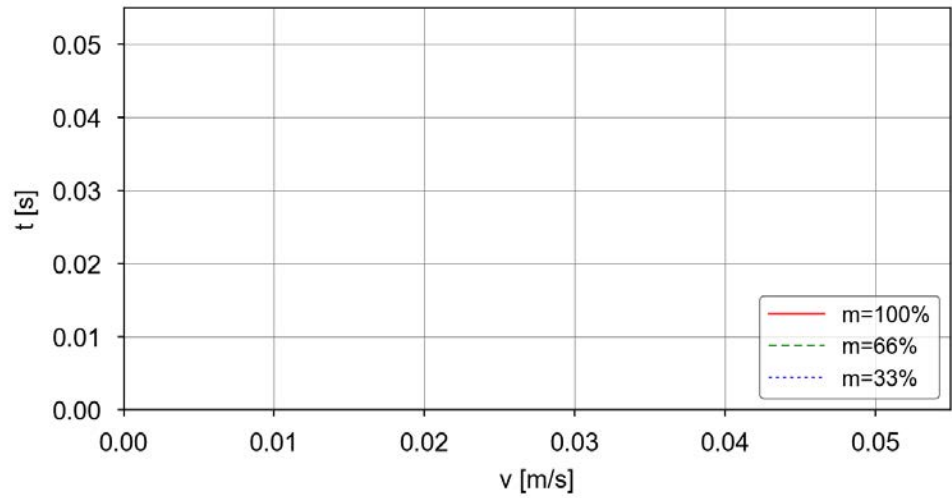


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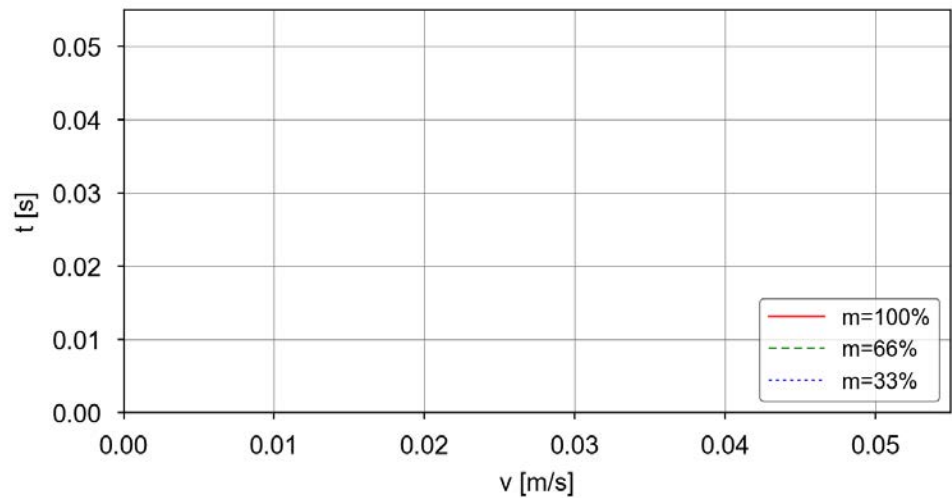
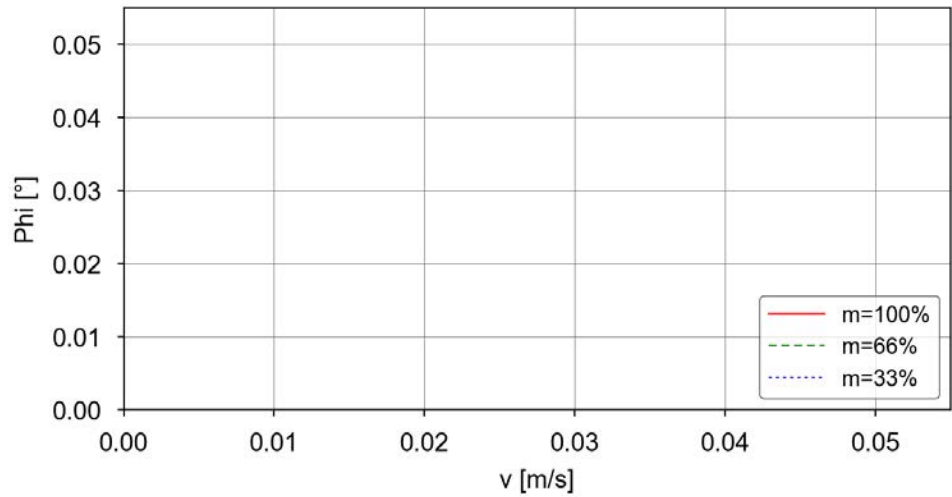
9 IRB 4400

9.3 IRB 4400 2.6 m 10 kg

Continued

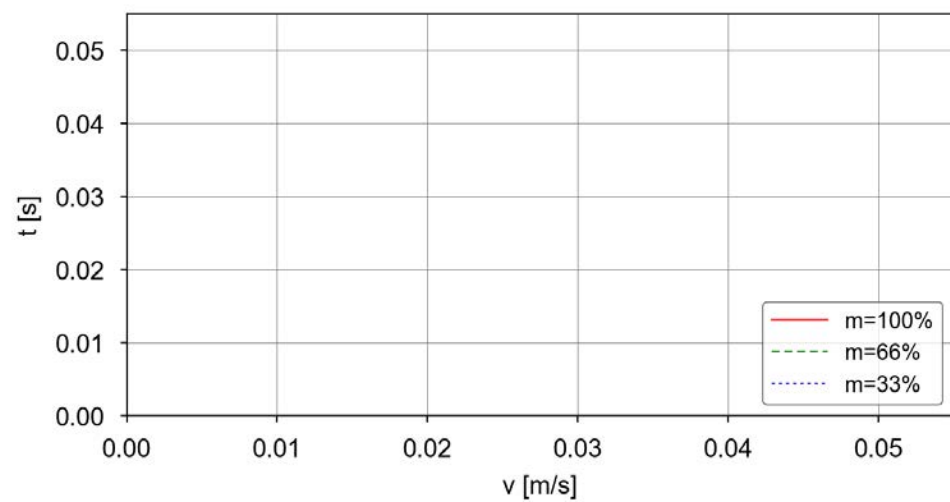
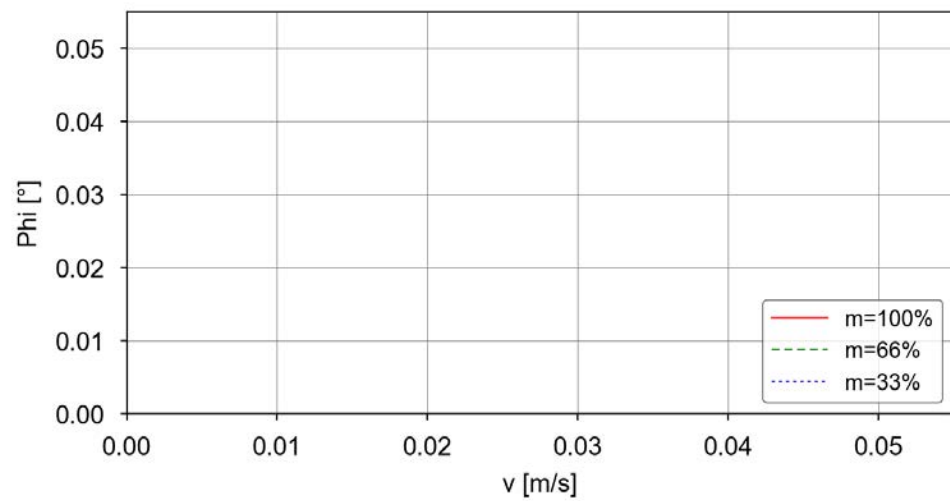


Extension zone 1, stopping distance and stopping time



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Extension zone 2, stopping distance and stopping time



Continues on next page

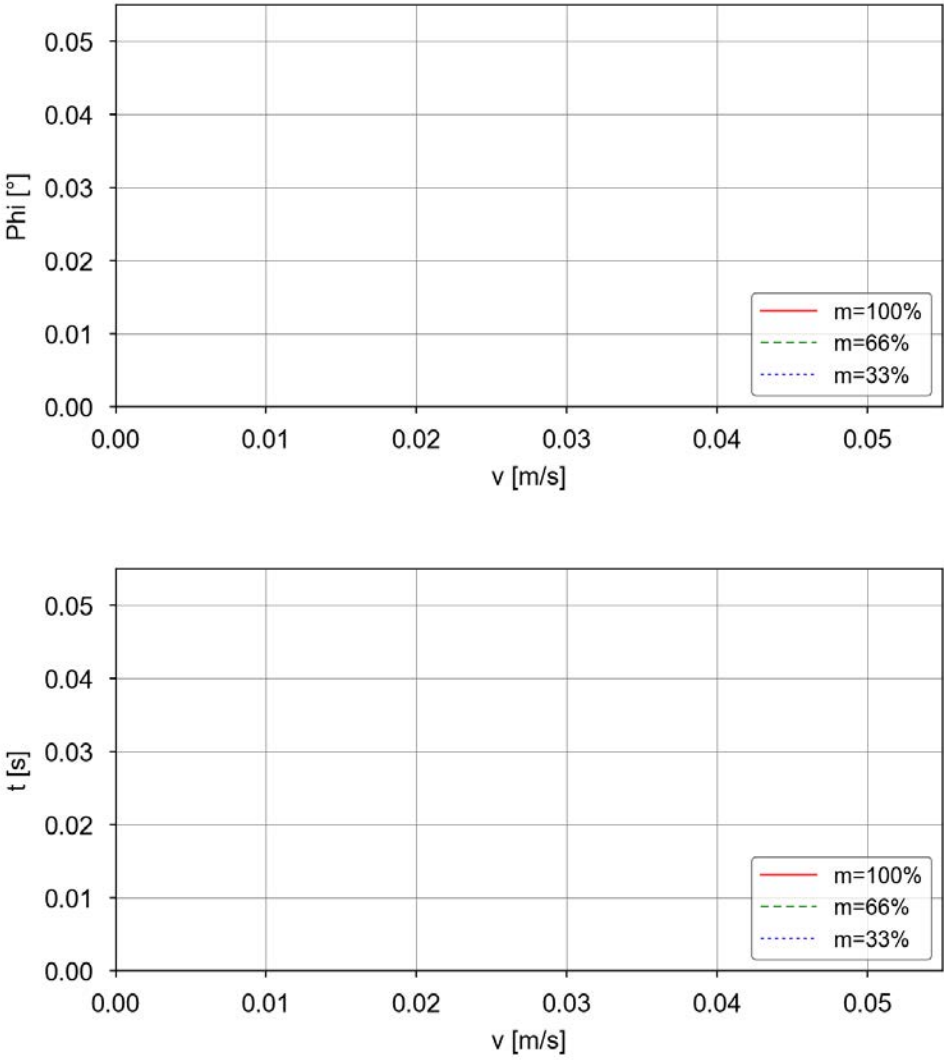
9 IRB 4400

9.3 IRB 4400 2.6 m 10 kg

Continued

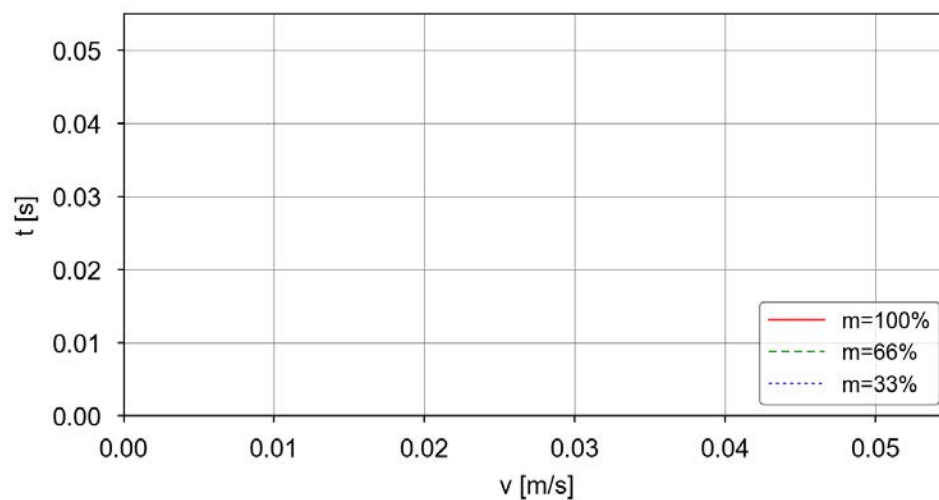
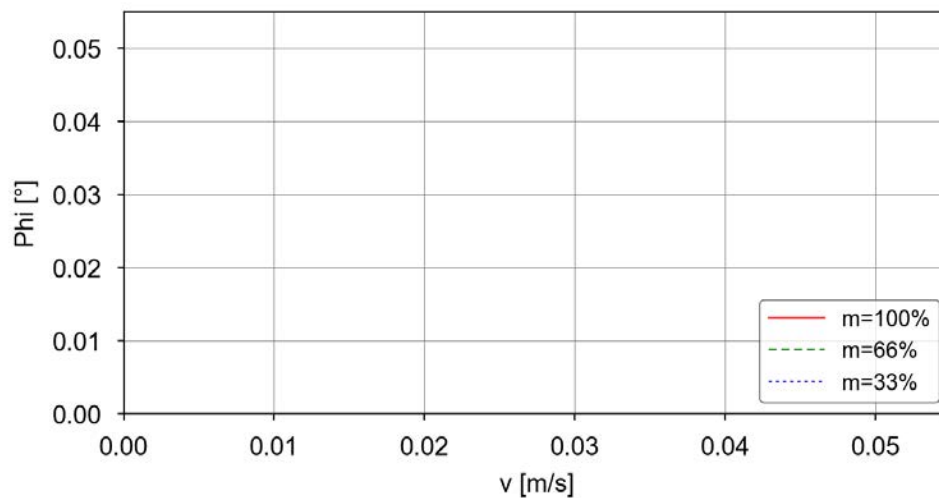
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

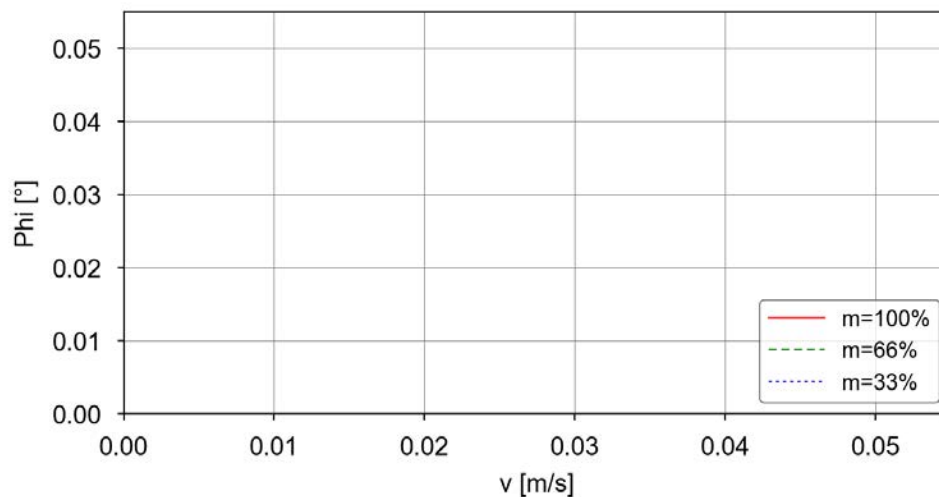


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

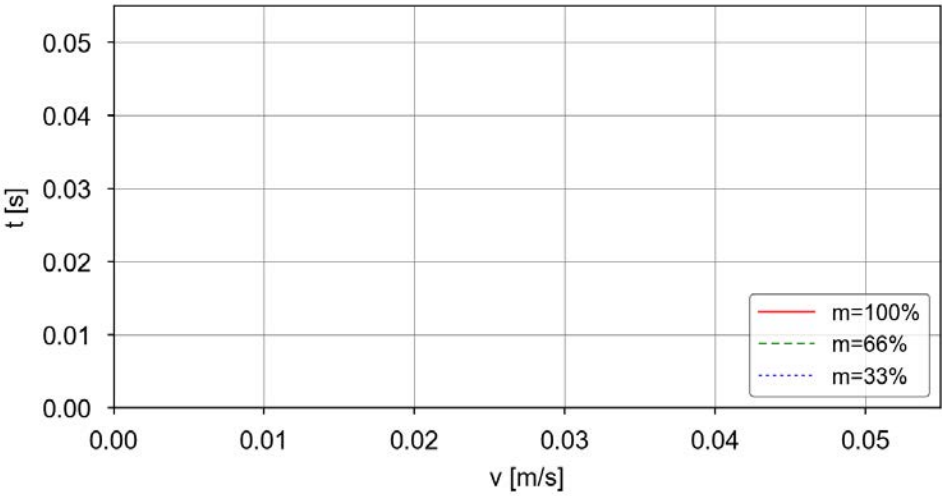


Continues on next page

9 IRB 4400

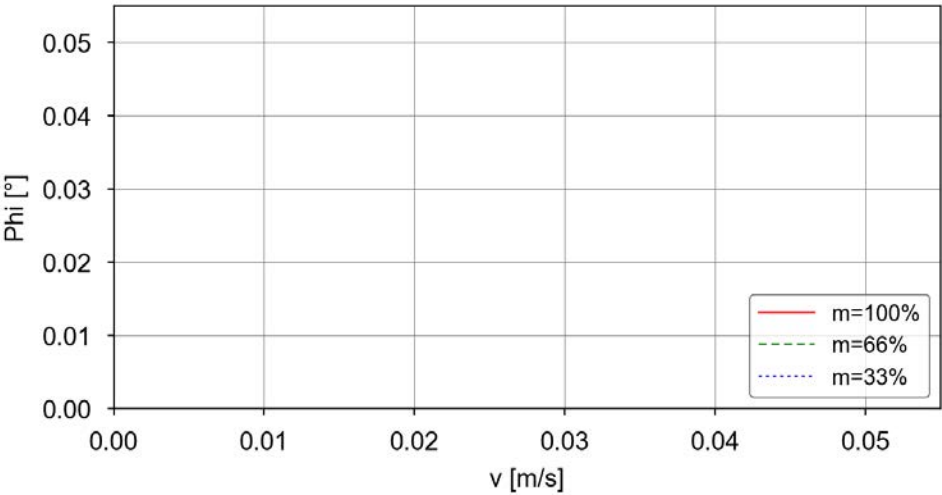
9.3 IRB 4400 2.6 m 10 kg

Continued

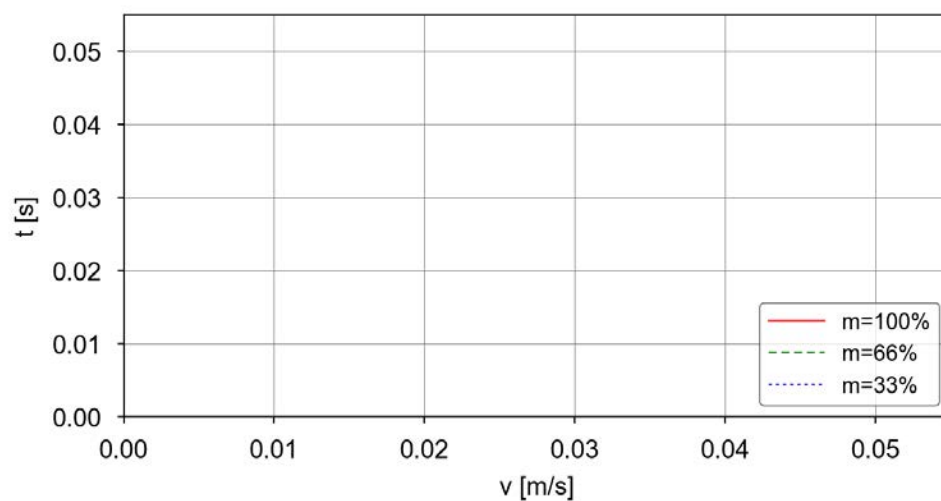


Category 1, Axis 3

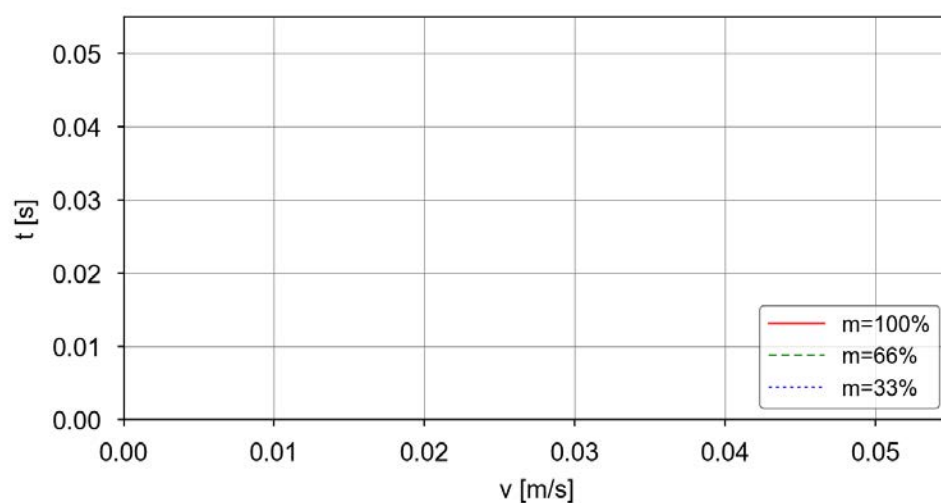
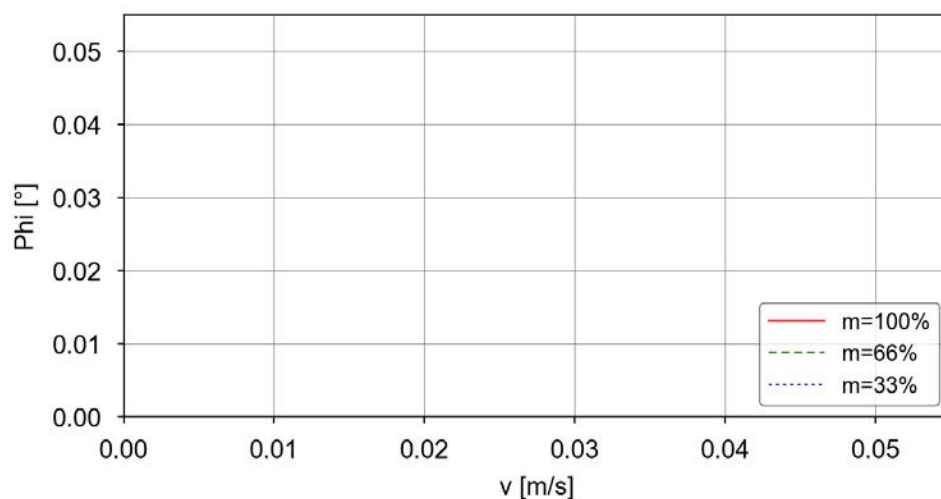
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



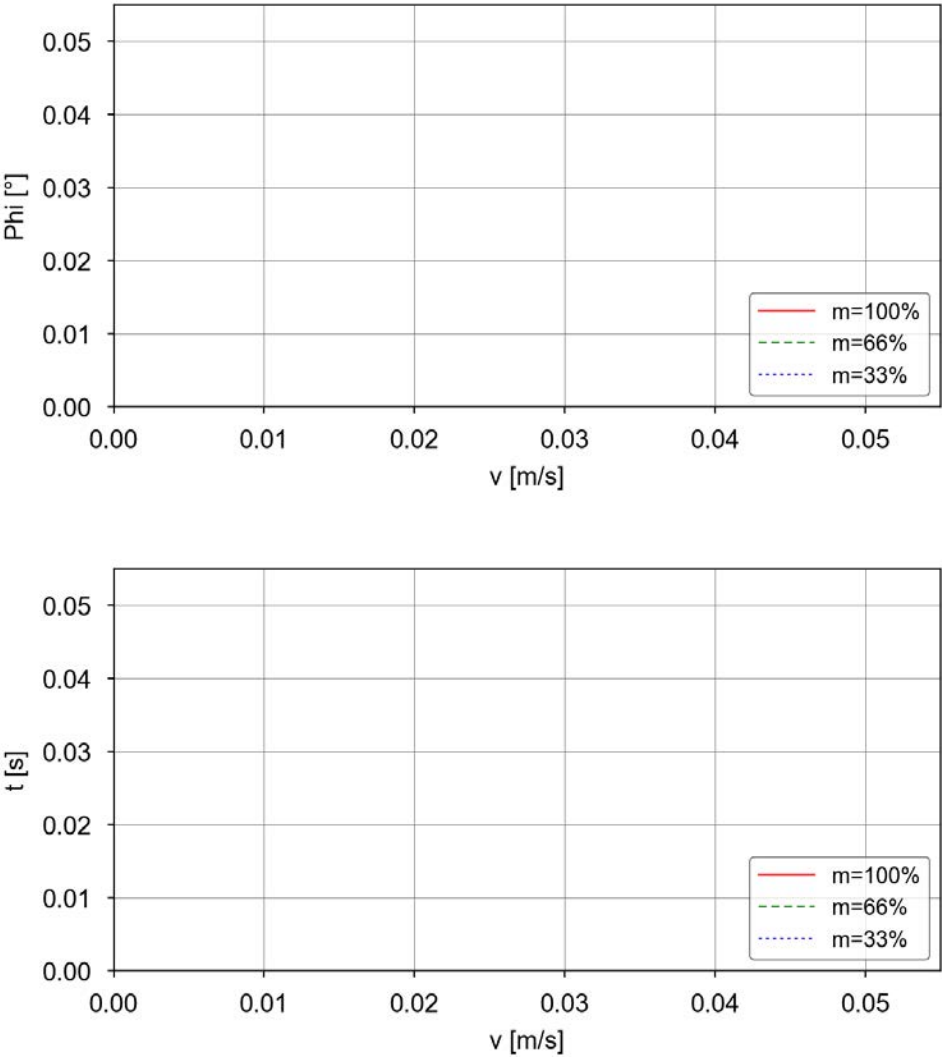
Continues on next page

9 IRB 4400

9.3 IRB 4400 2.6 m 10 kg

Continued

Extension zone 2, stopping distance and stopping time



10 IRB 4600

10.1 IRB 4600 2.05 m 45 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	60.5	0.58
2	37.1	0.32
3	25.3	0.2

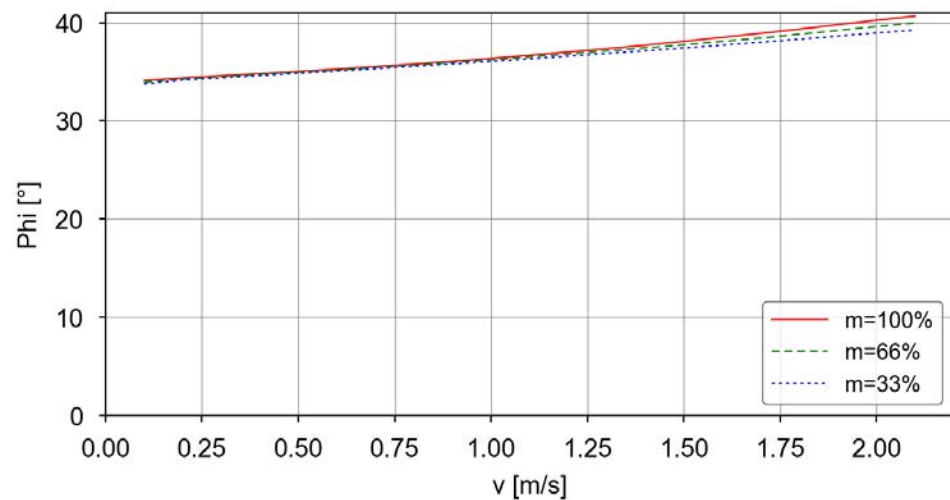
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.684
1	0.684	1.367
2	1.367	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

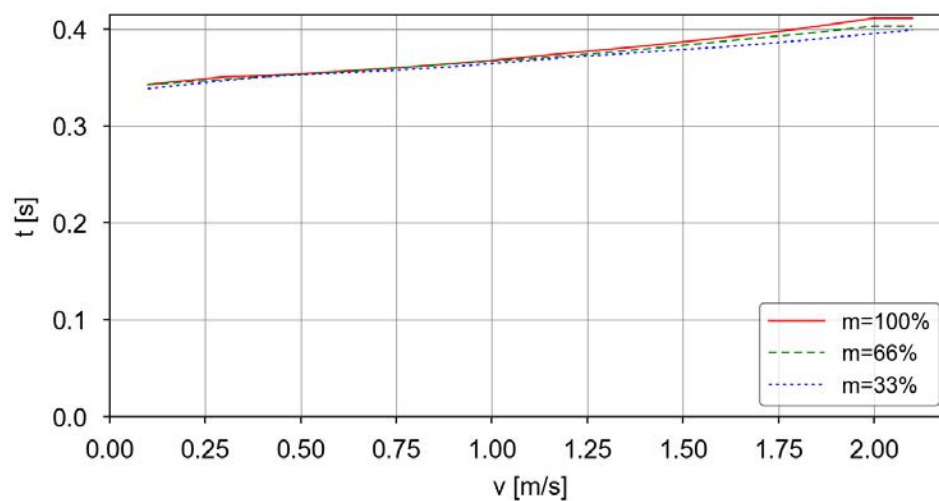


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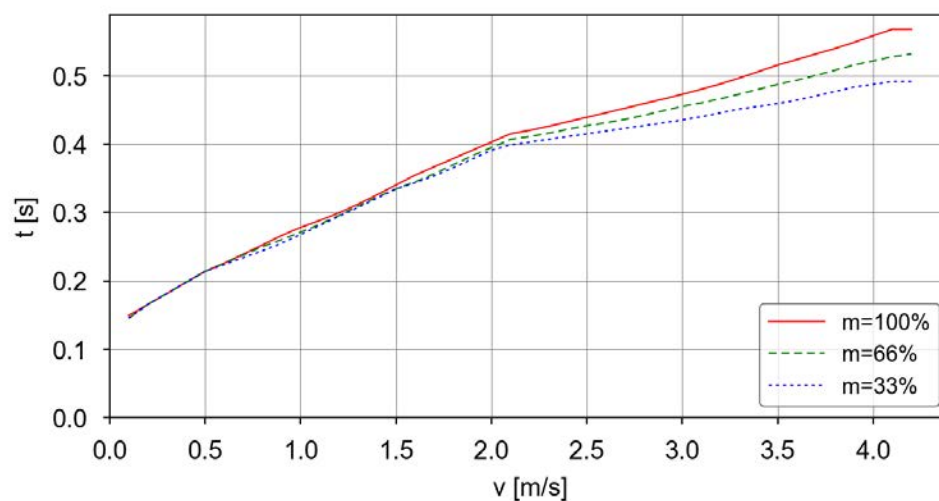
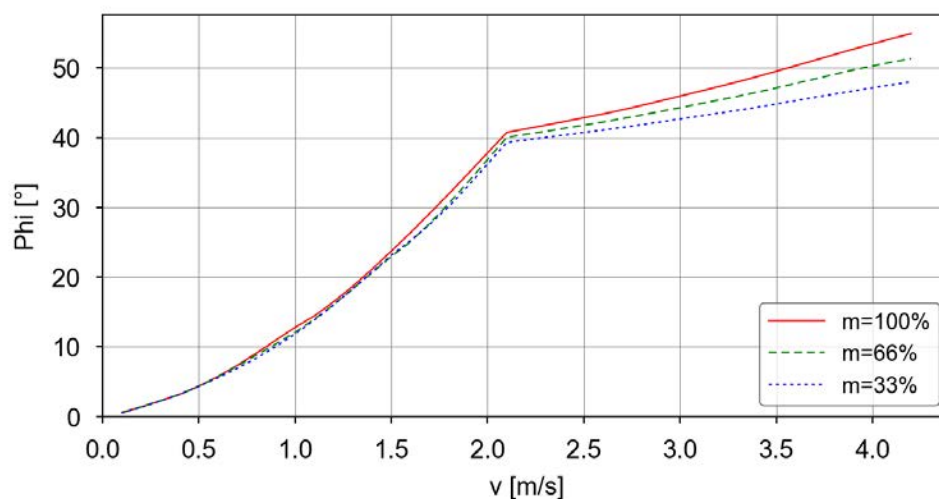
10 IRB 4600

10.1 IRB 4600 2.05 m 45 kg

Continued

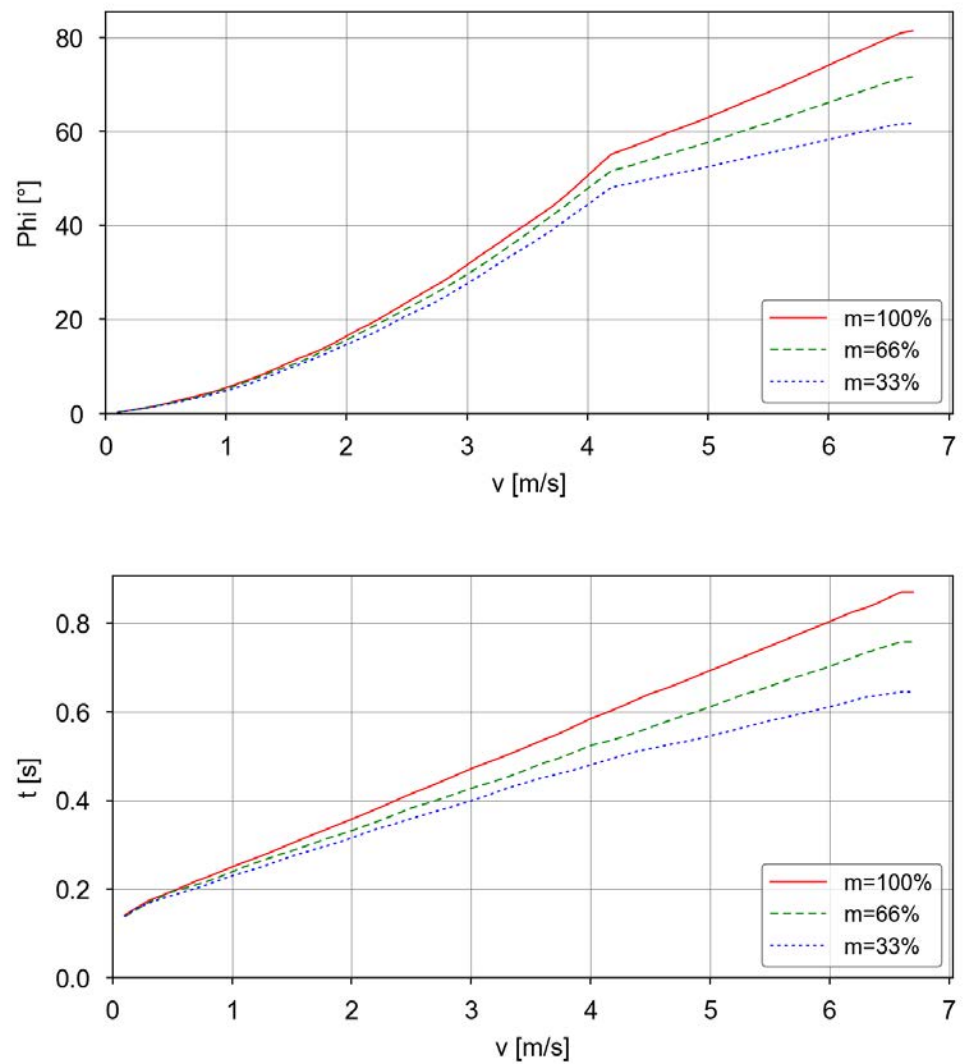


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

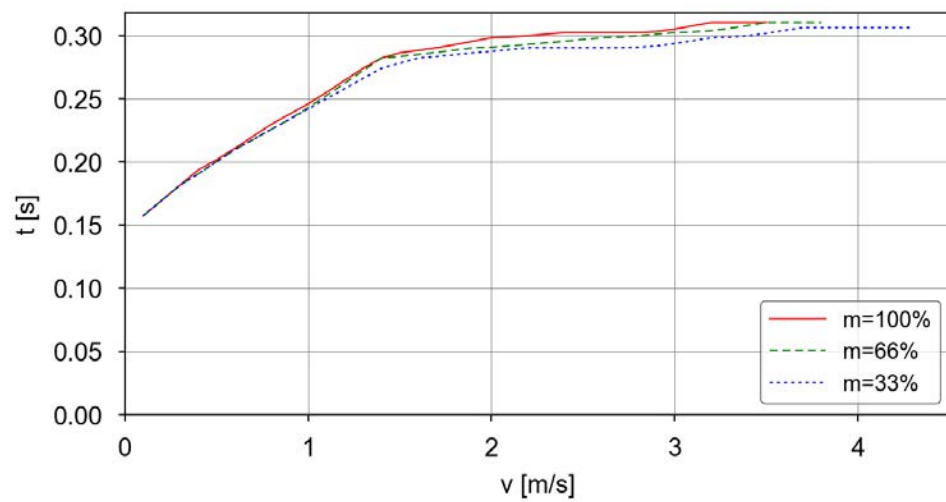
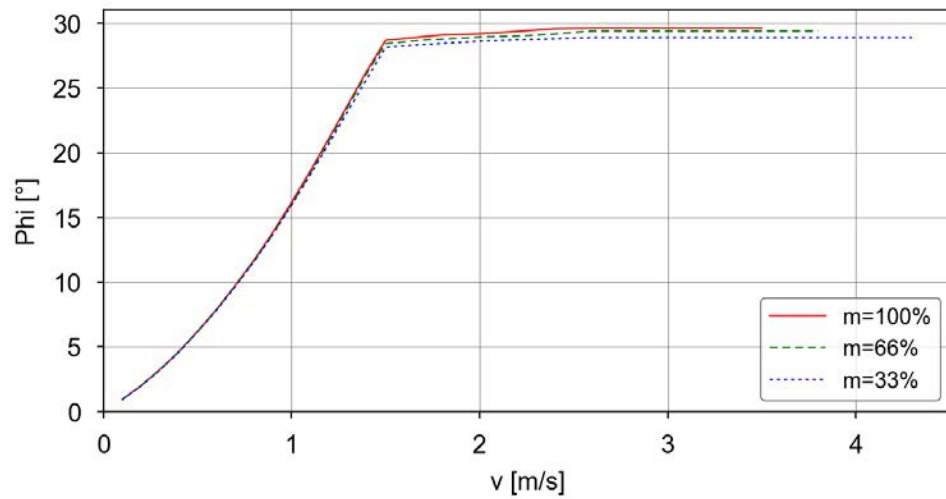
10 IRB 4600

10.1 IRB 4600 2.05 m 45 kg

Continued

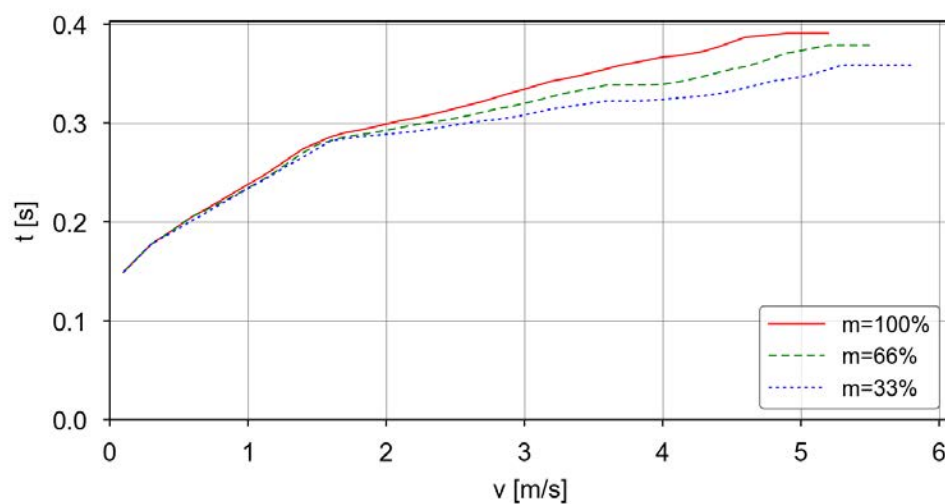
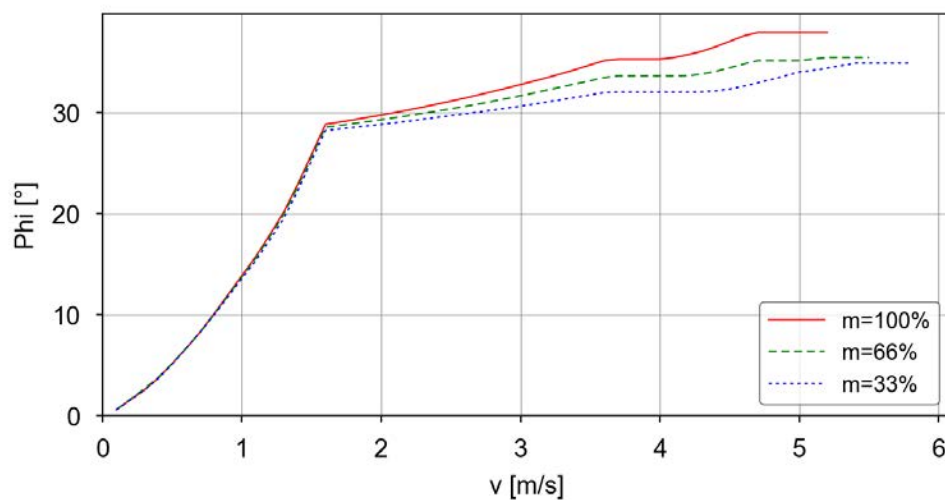
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

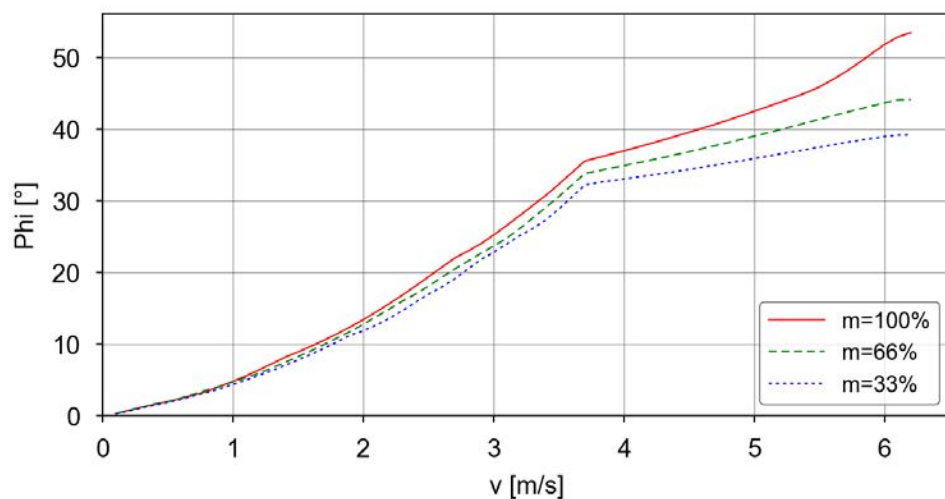


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

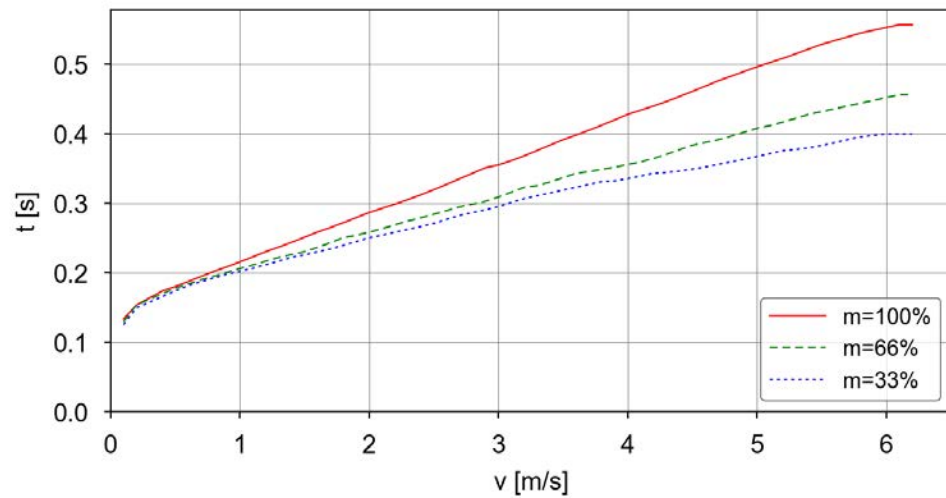


Continues on next page

10 IRB 4600

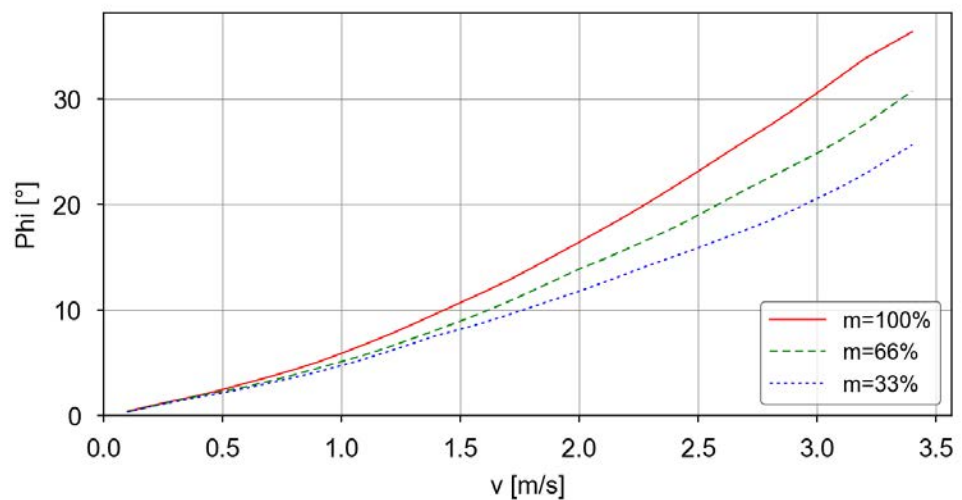
10.1 IRB 4600 2.05 m 45 kg

Continued

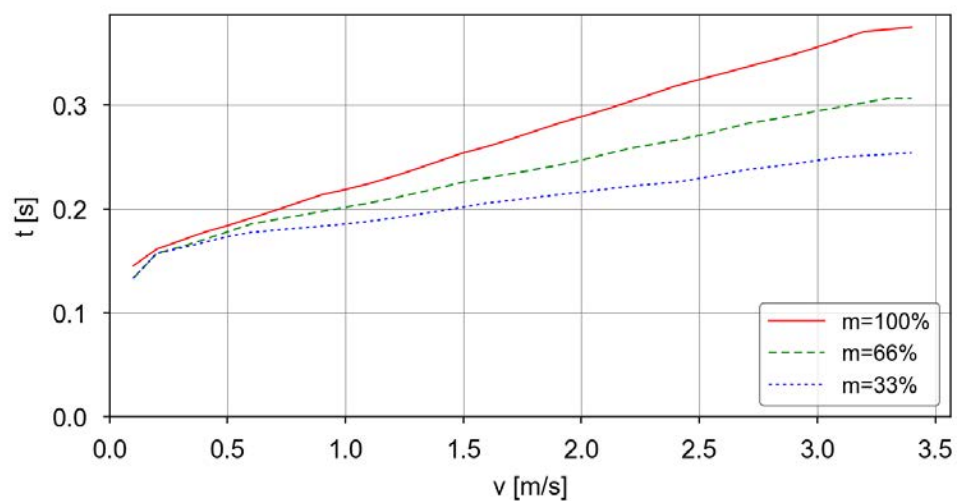


Category 1, Axis 3

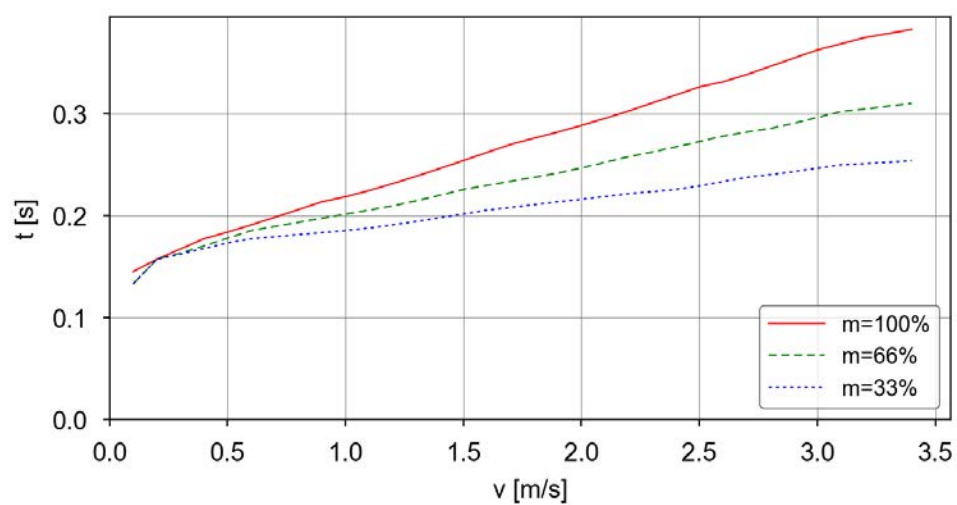
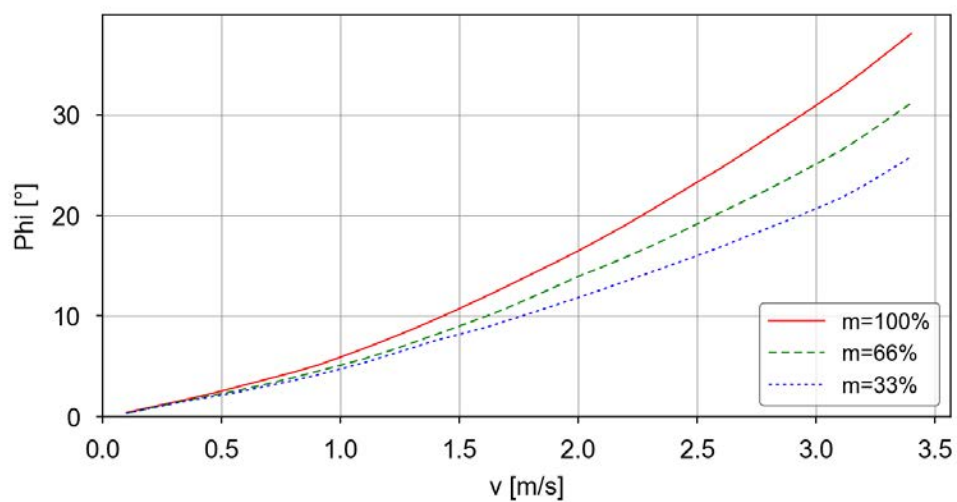
Extension zone 0, stopping distance and stopping time



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Extension zone 1, stopping distance and stopping time



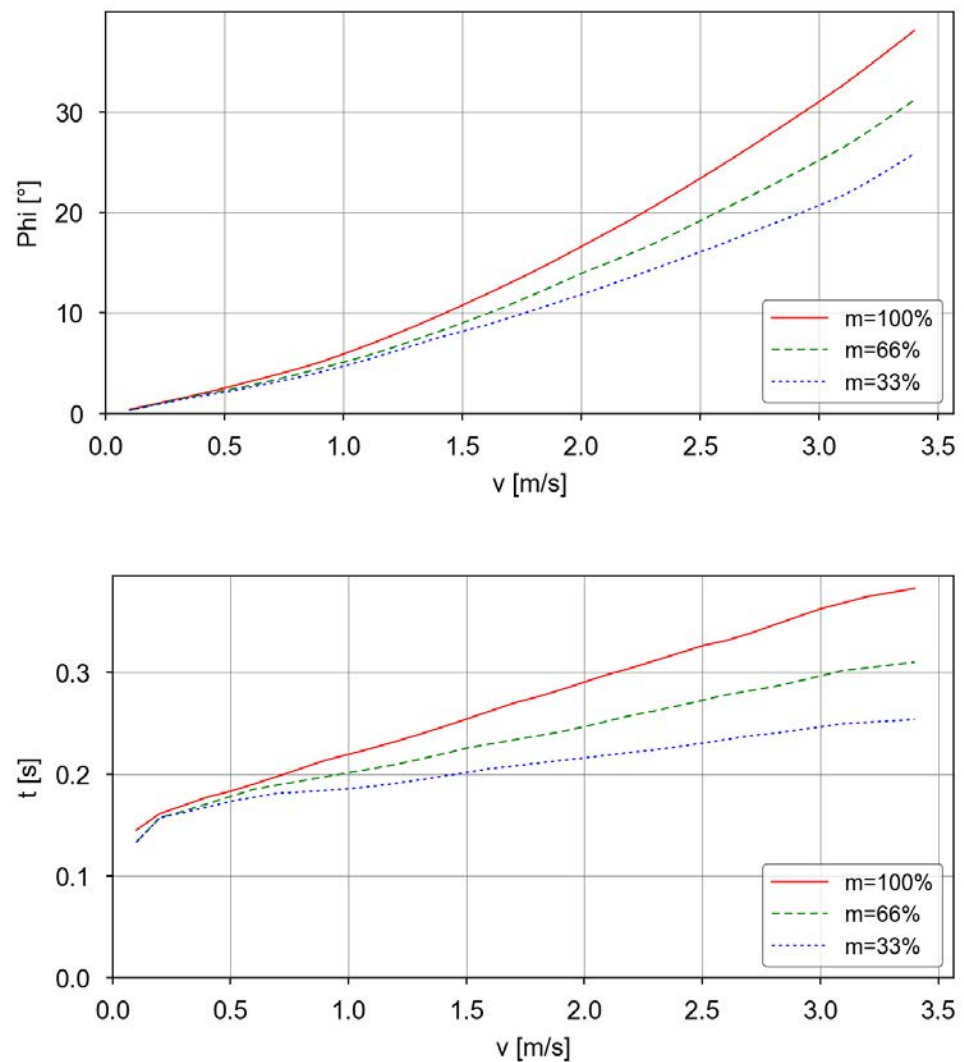
Continues on next page

10 IRB 4600

10.1 IRB 4600 2.05 m 45 kg

Continued

Extension zone 2, stopping distance and stopping time



10.2 IRB 4600 2.05 m 60 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	62.9	0.66
2	40.3	0.37
3	32.8	0.27

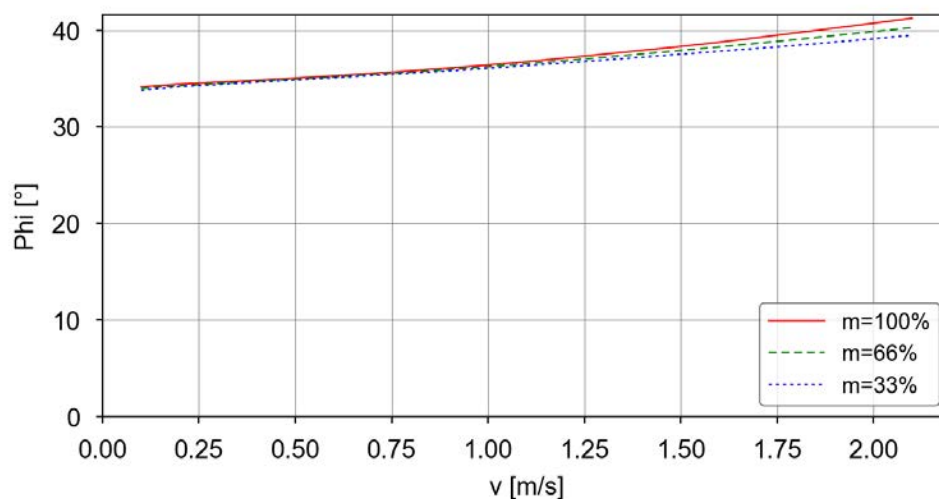
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.684
1	0.684	1.367
2	1.367	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

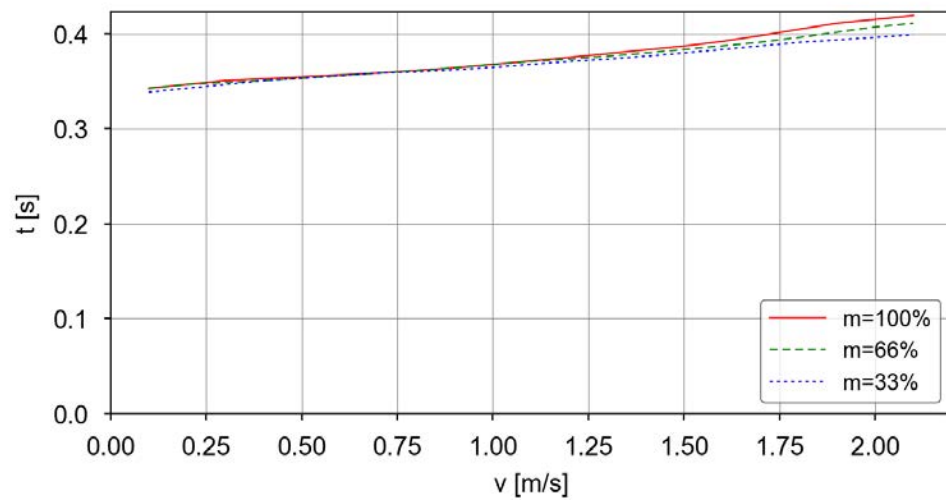


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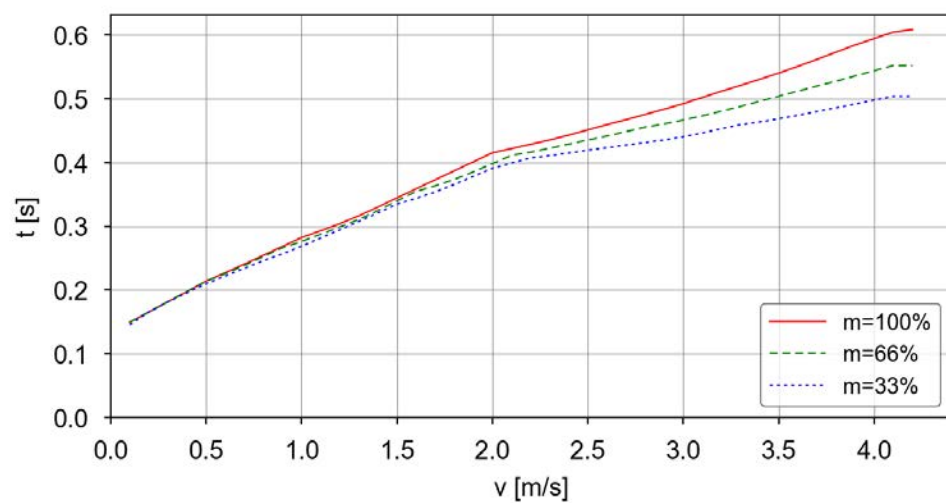
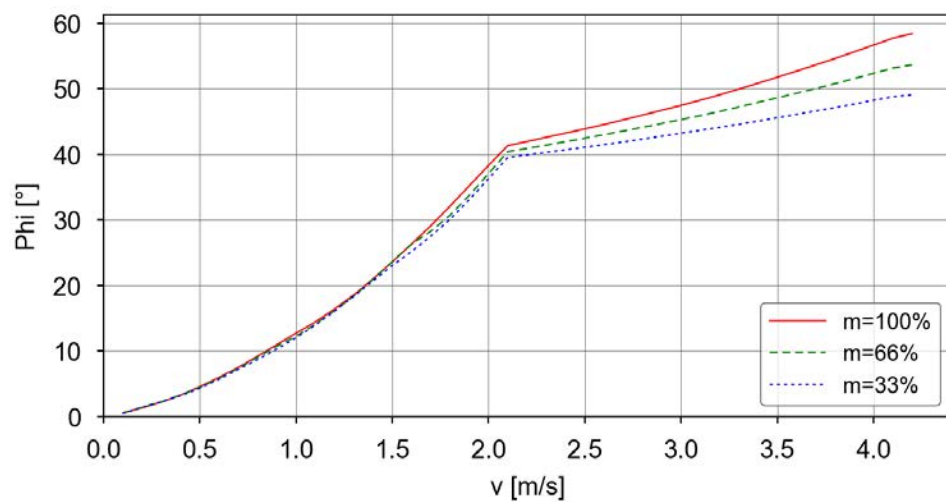
10 IRB 4600

10.2 IRB 4600 2.05 m 60 kg

Continued

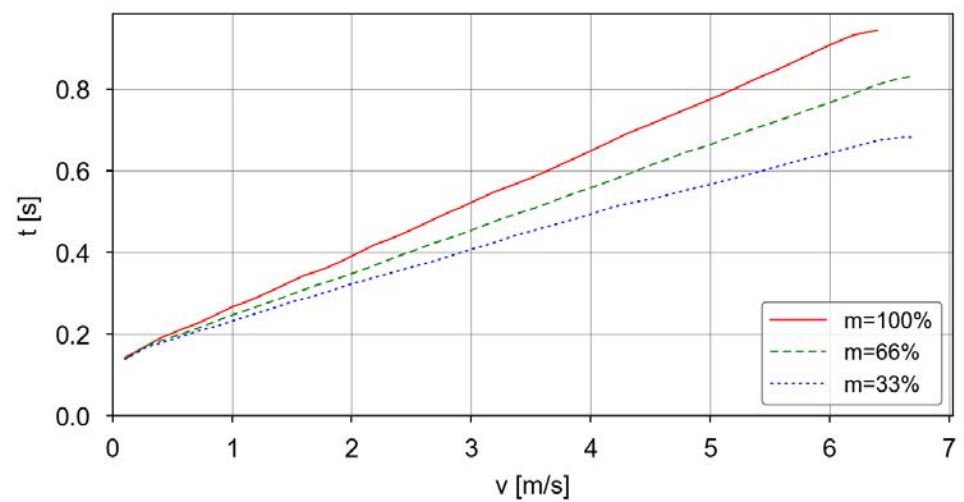
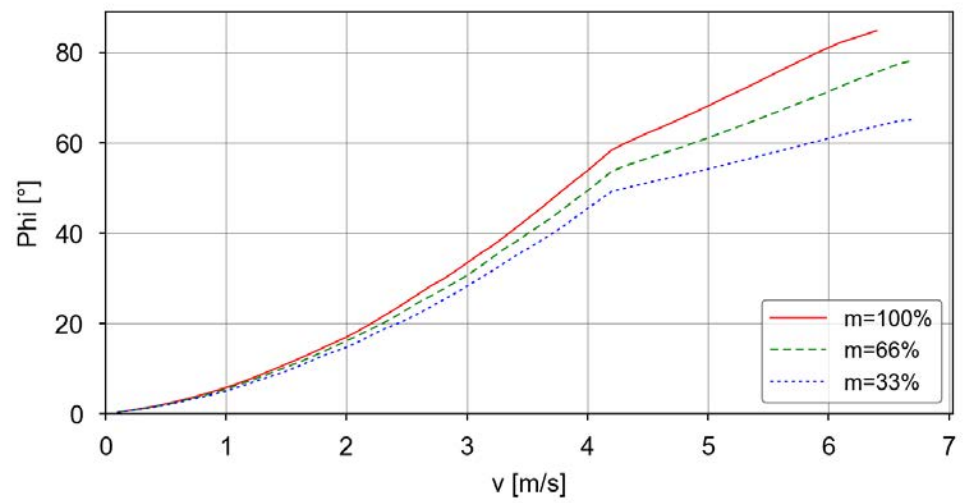


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

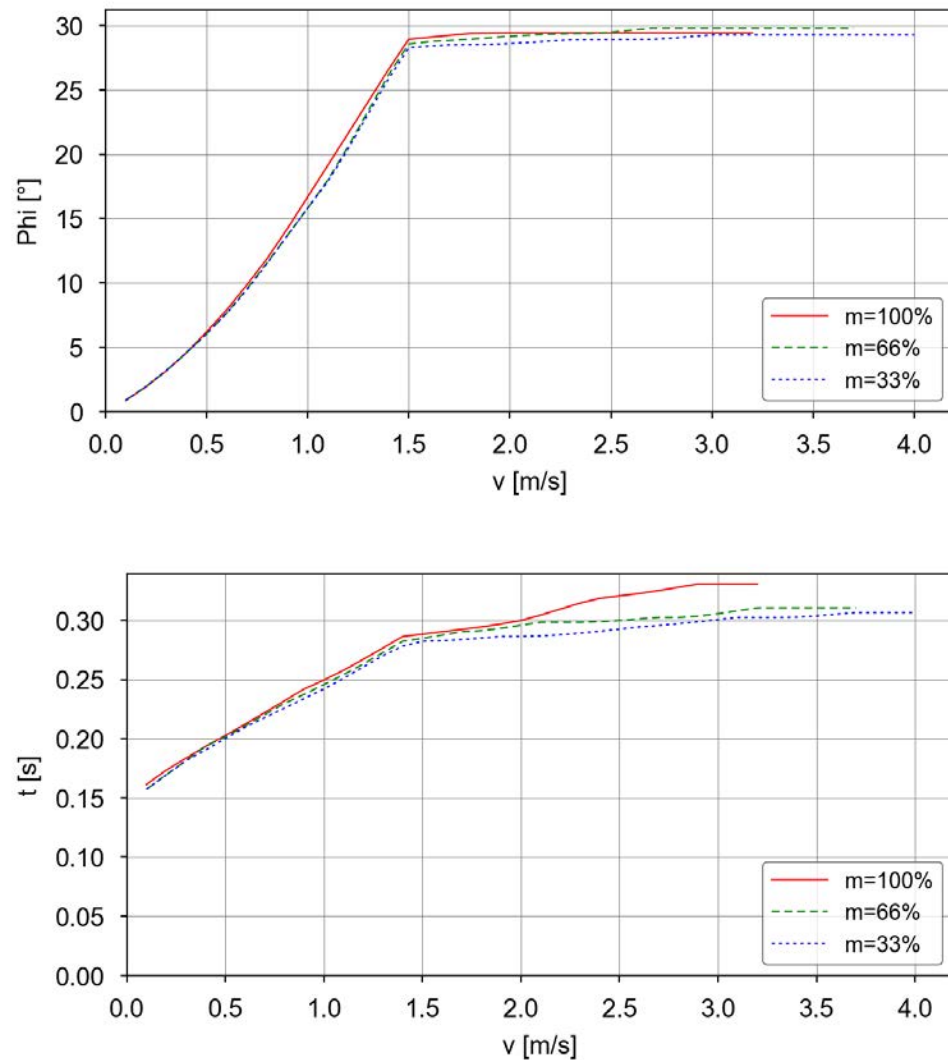
10 IRB 4600

10.2 IRB 4600 2.05 m 60 kg

Continued

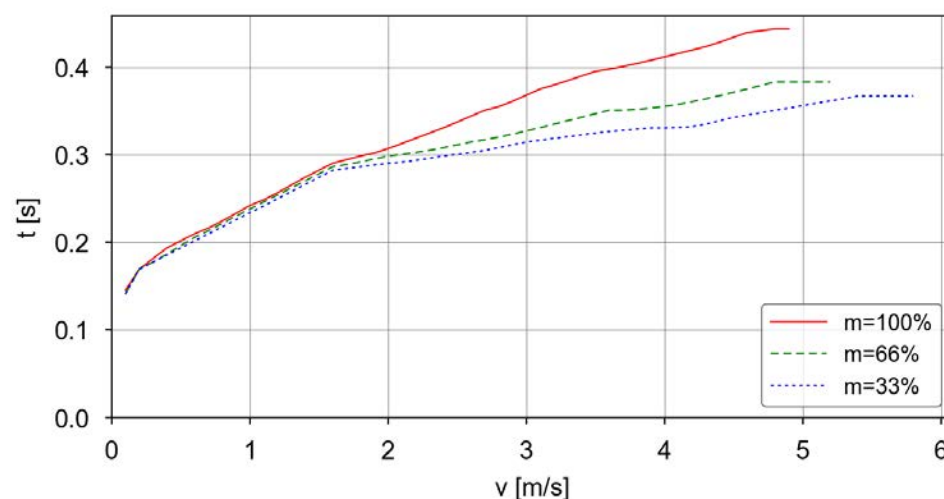
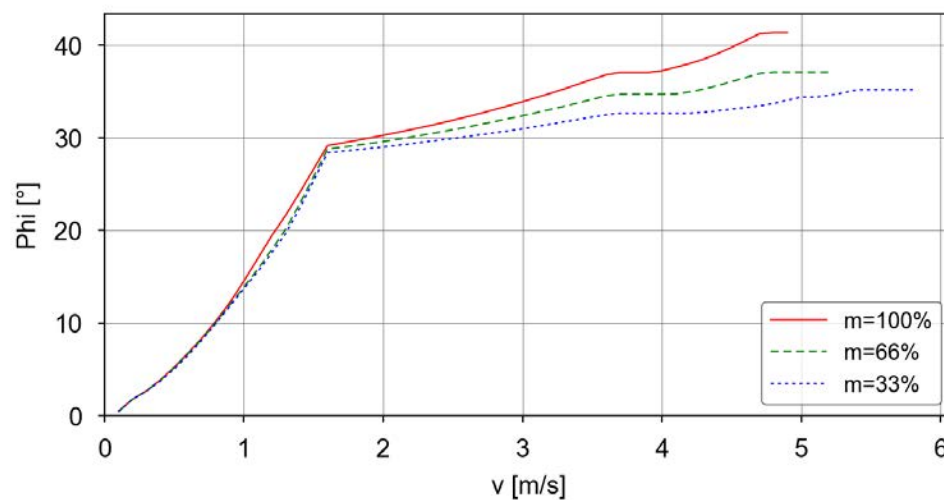
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

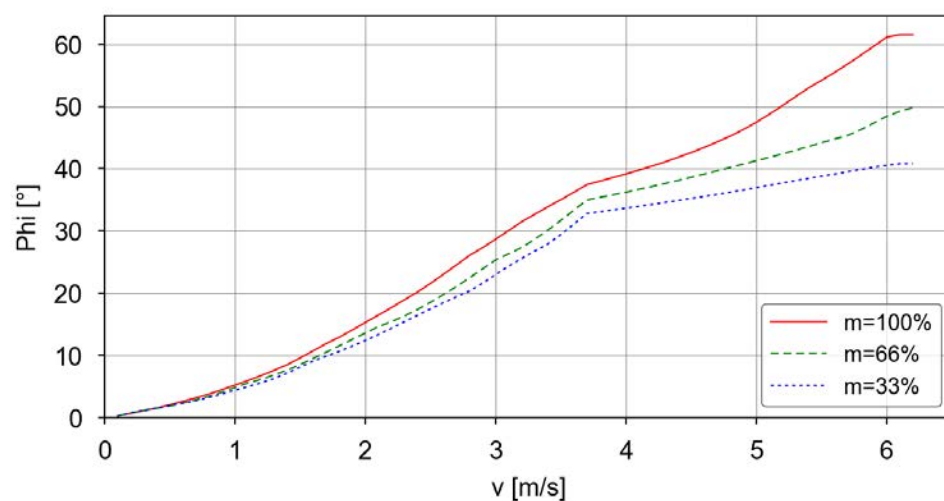


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

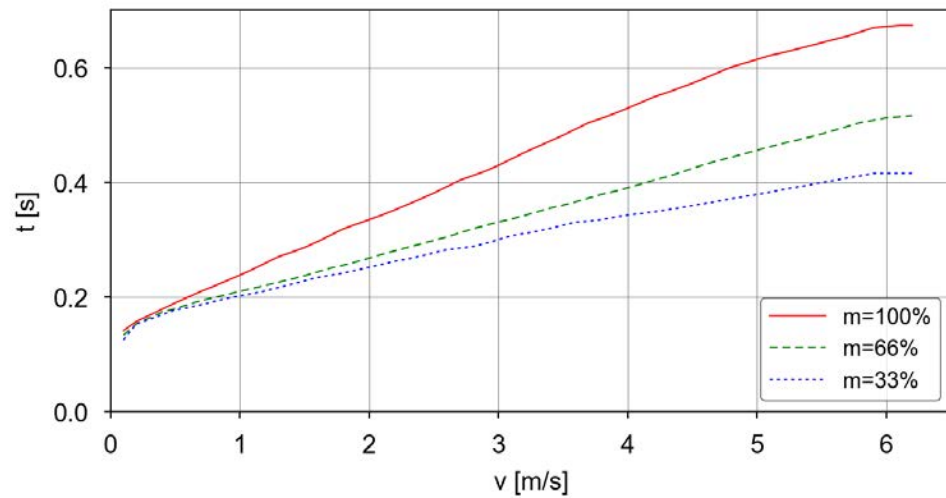


Continues on next page

10 IRB 4600

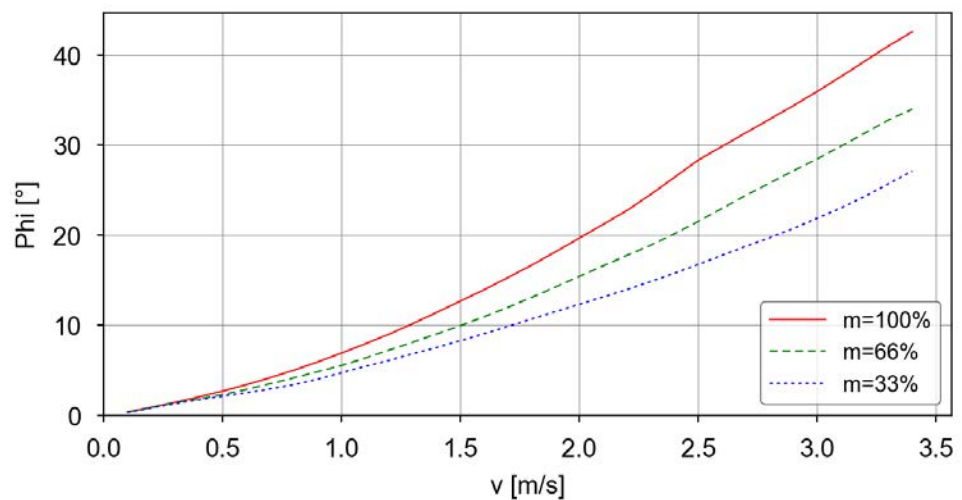
10.2 IRB 4600 2.05 m 60 kg

Continued

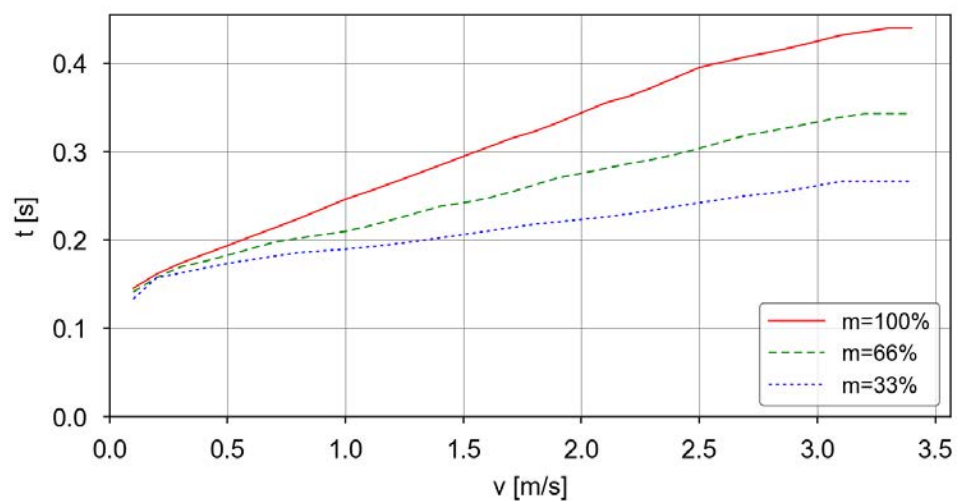


Category 1, Axis 3

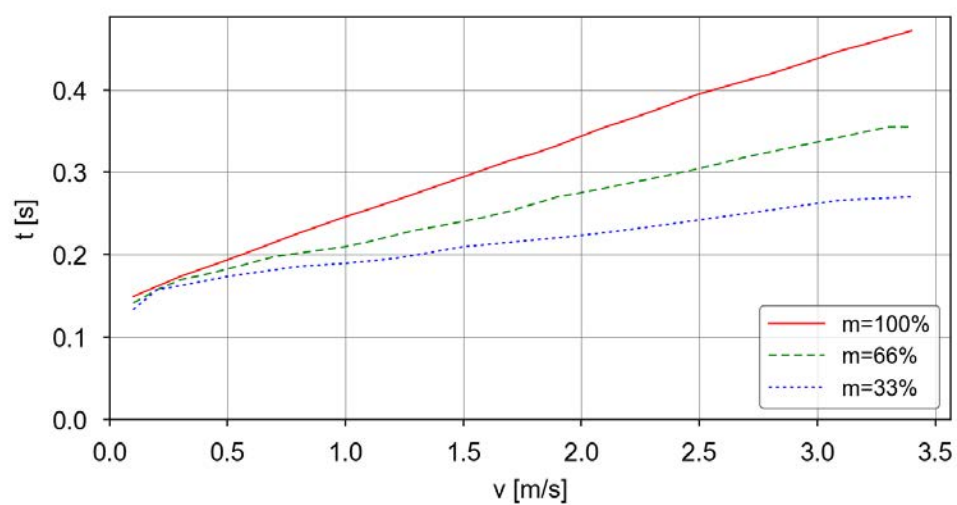
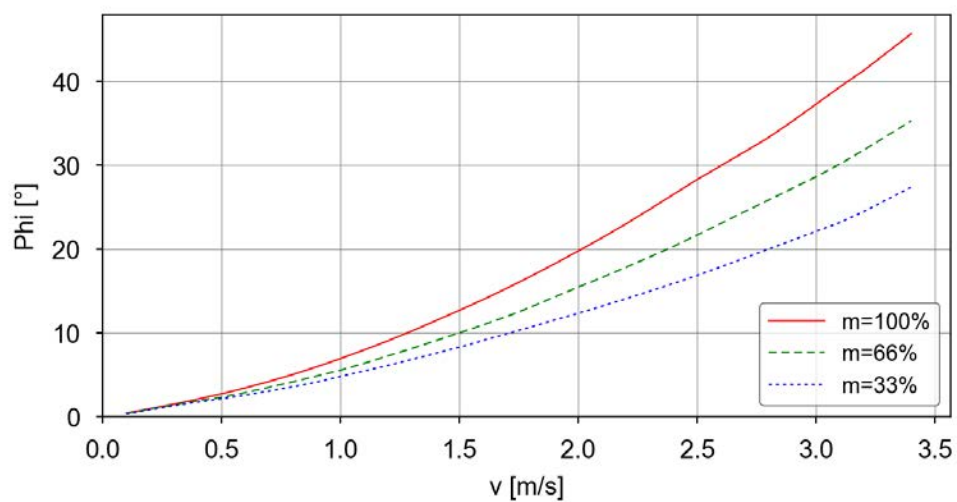
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



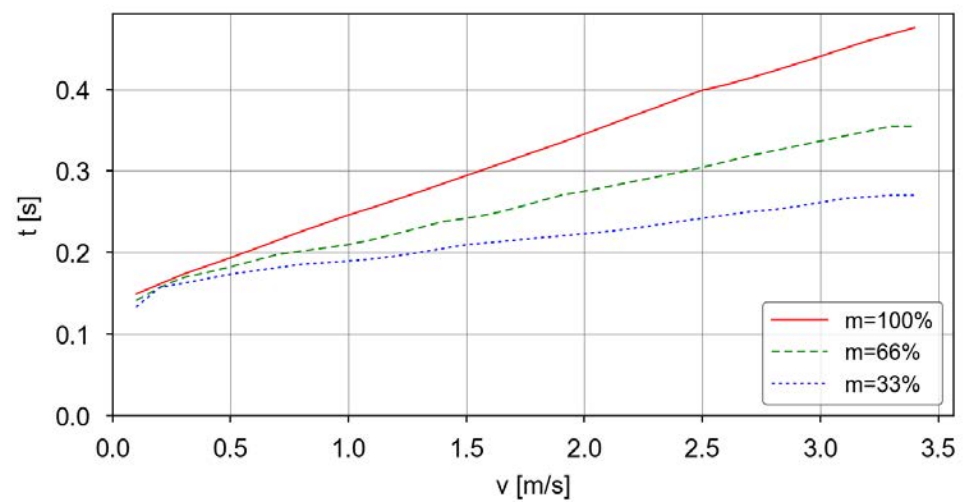
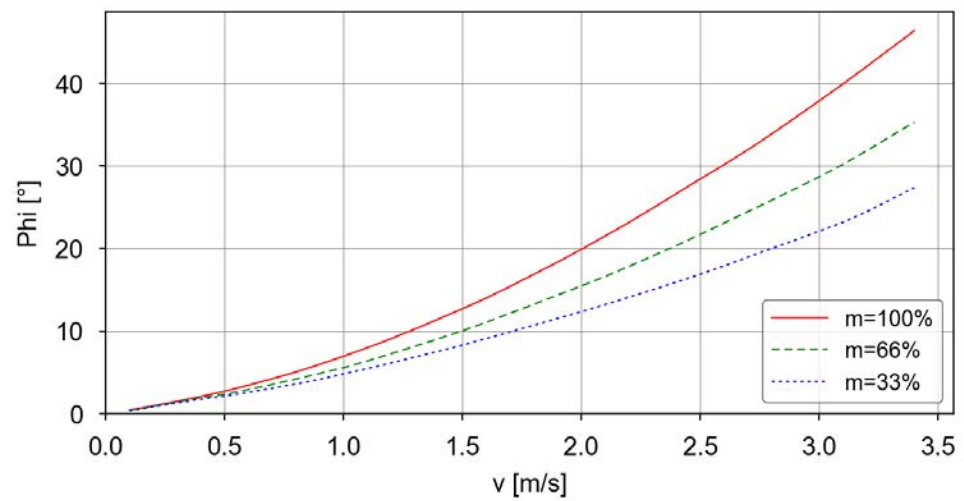
Continues on next page

10 IRB 4600

10.2 IRB 4600 2.05 m 60 kg

Continued

Extension zone 2, stopping distance and stopping time



10.3 IRB 4600 2.50 m 20 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	53.9	0.51
2	33.9	0.29
3	22.2	0.17

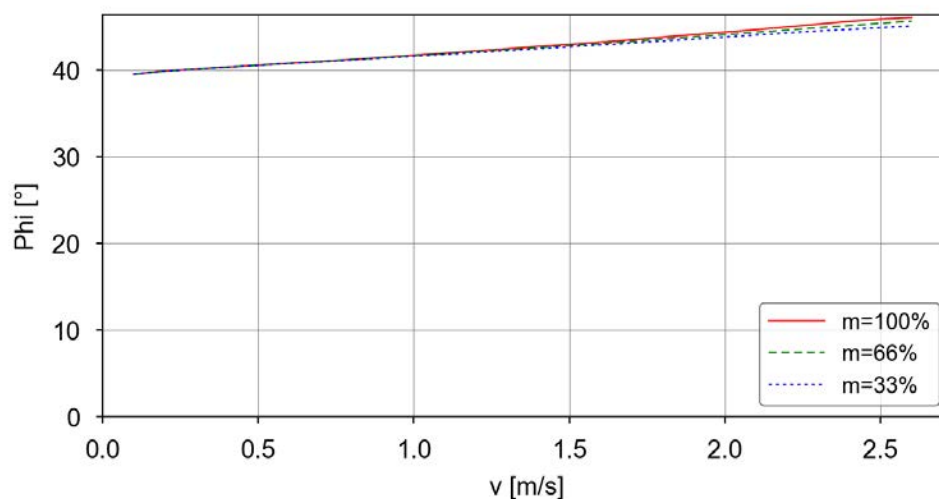
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.838
1	0.838	1.675
2	1.675	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

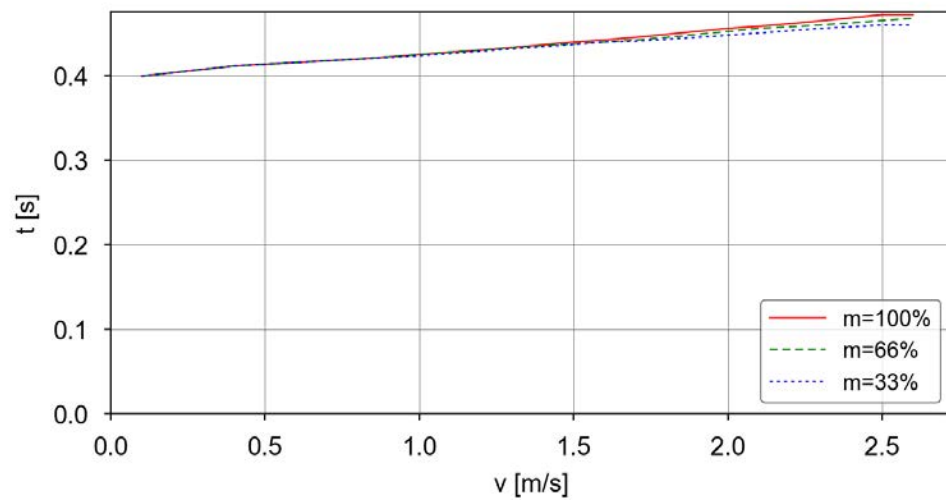


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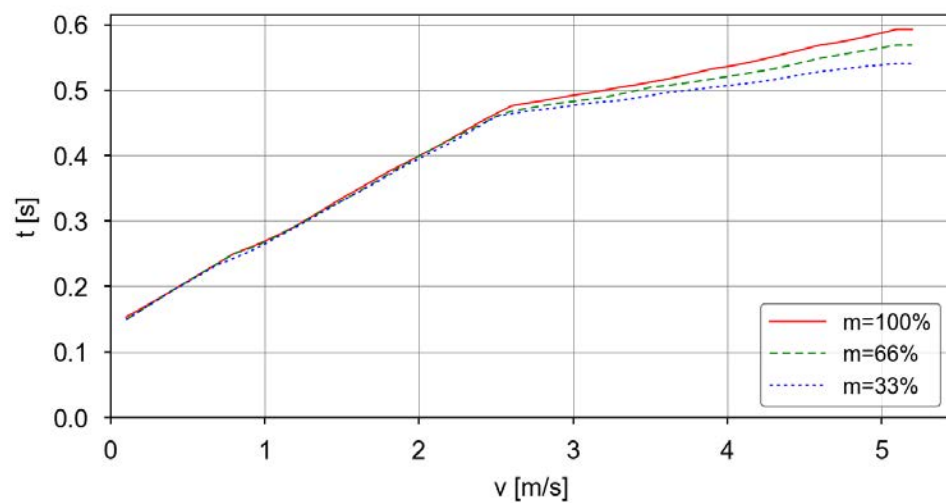
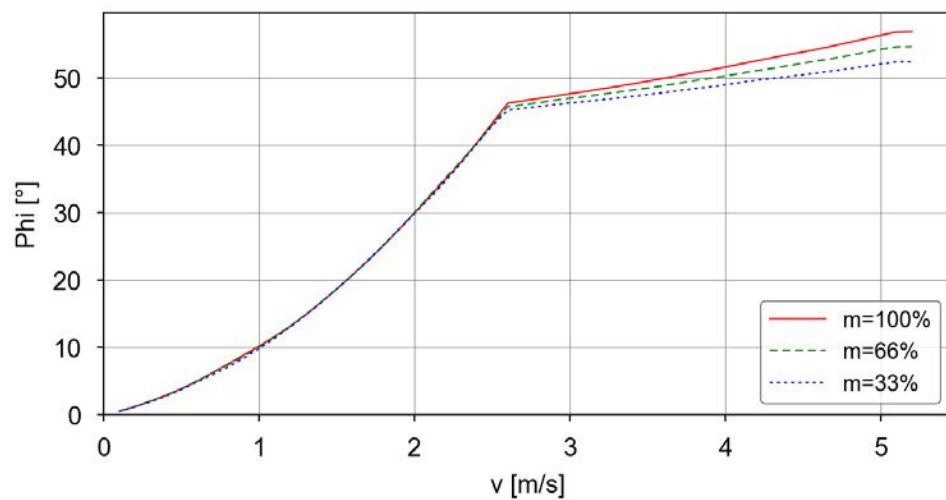
10 IRB 4600

10.3 IRB 4600 2.50 m 20 kg

Continued

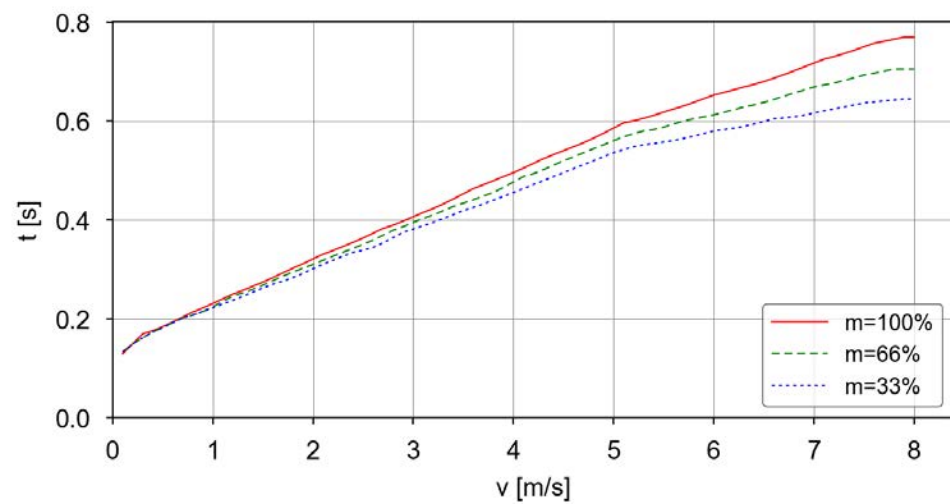
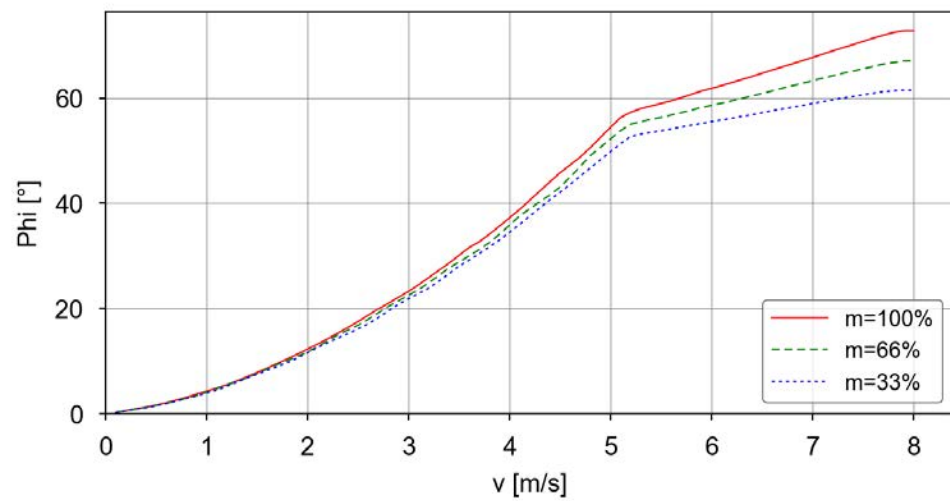


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

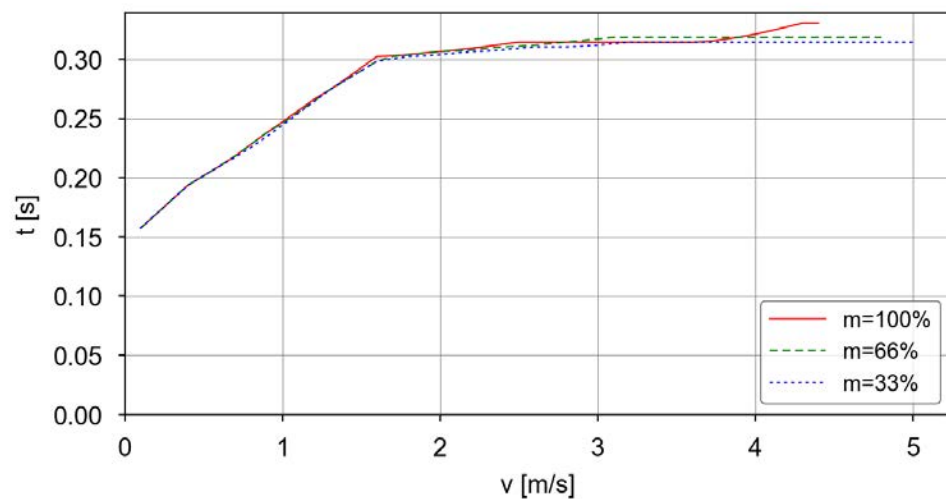
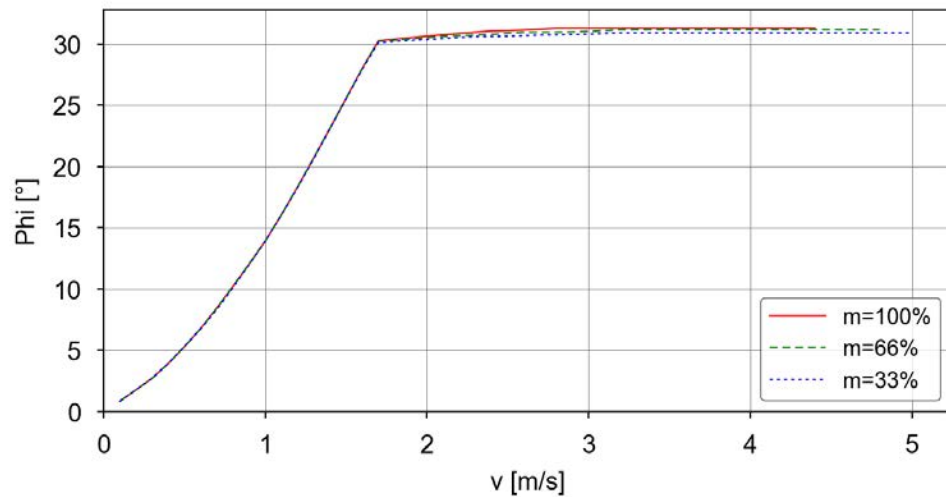
10 IRB 4600

10.3 IRB 4600 2.50 m 20 kg

Continued

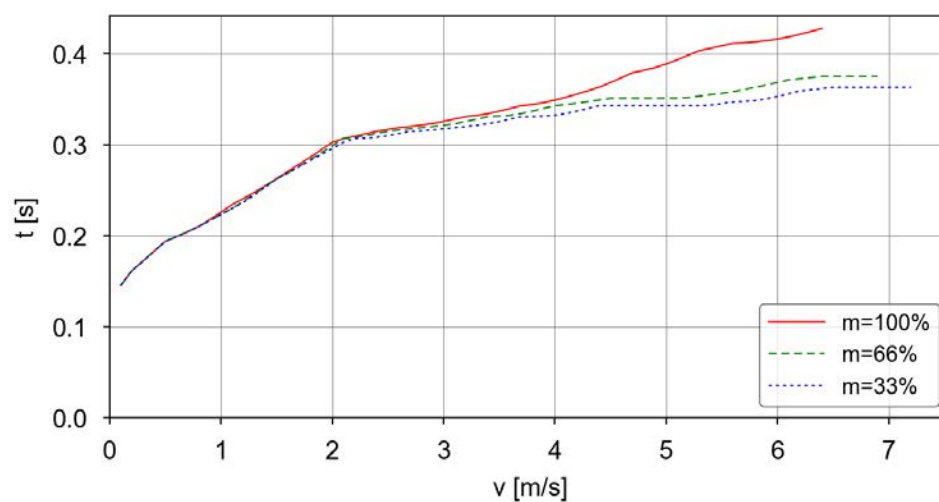
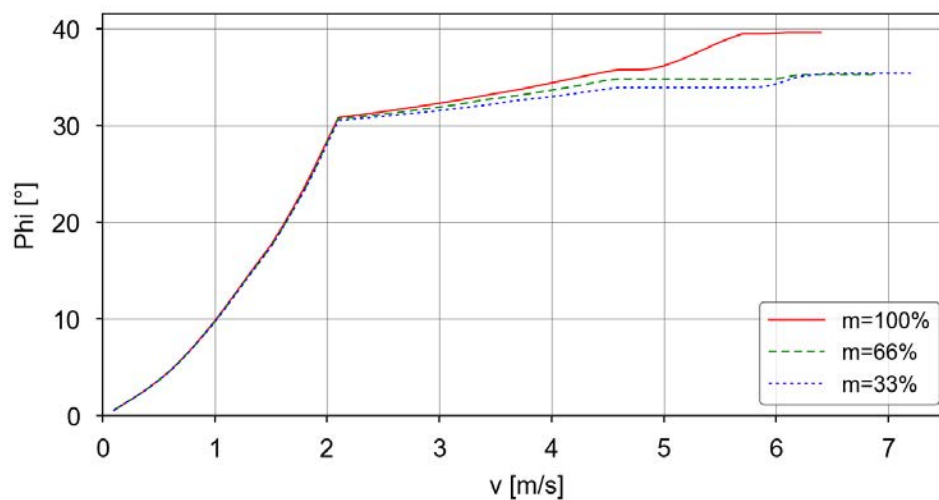
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

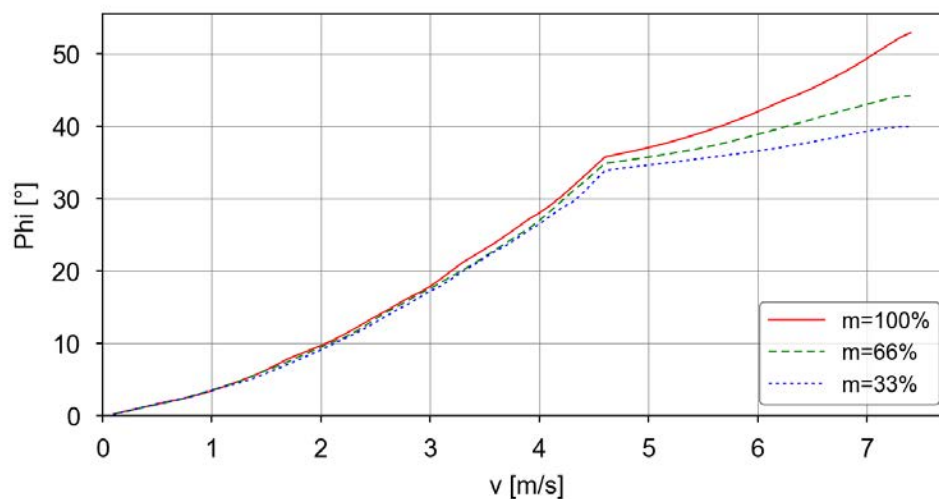


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

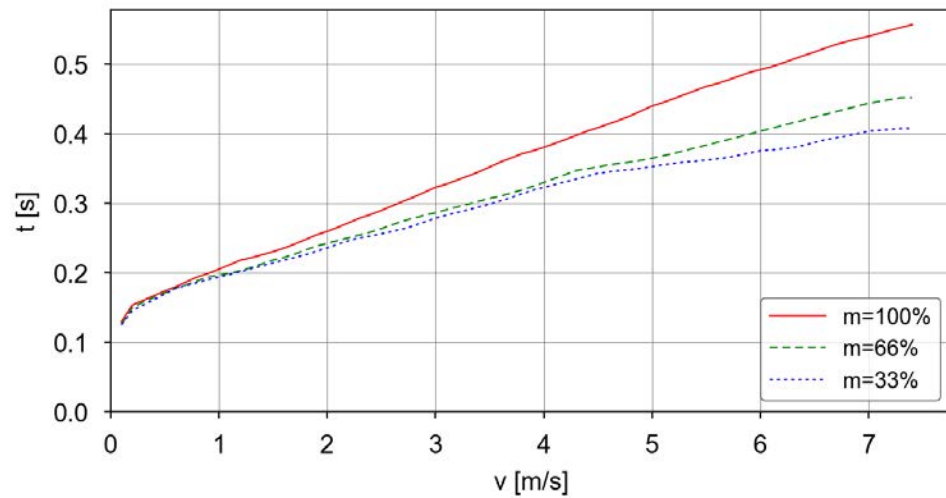


Continues on next page

10 IRB 4600

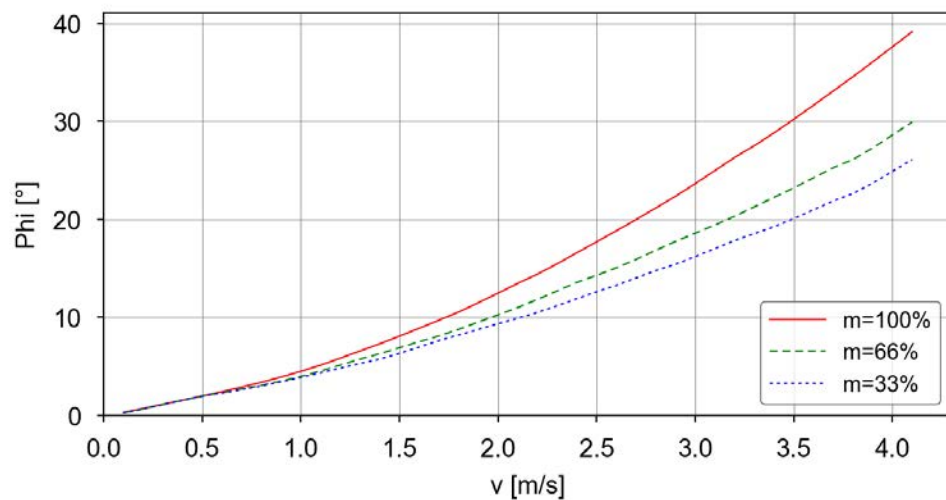
10.3 IRB 4600 2.50 m 20 kg

Continued

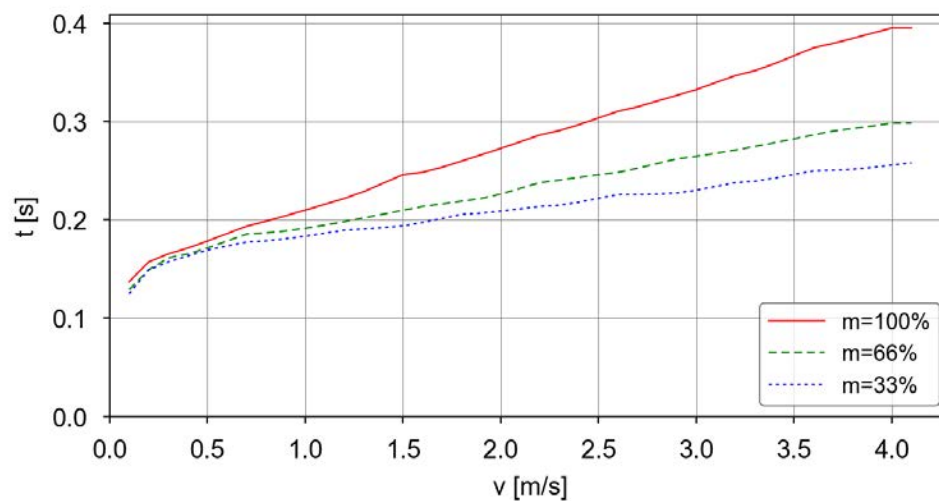


Category 1, Axis 3

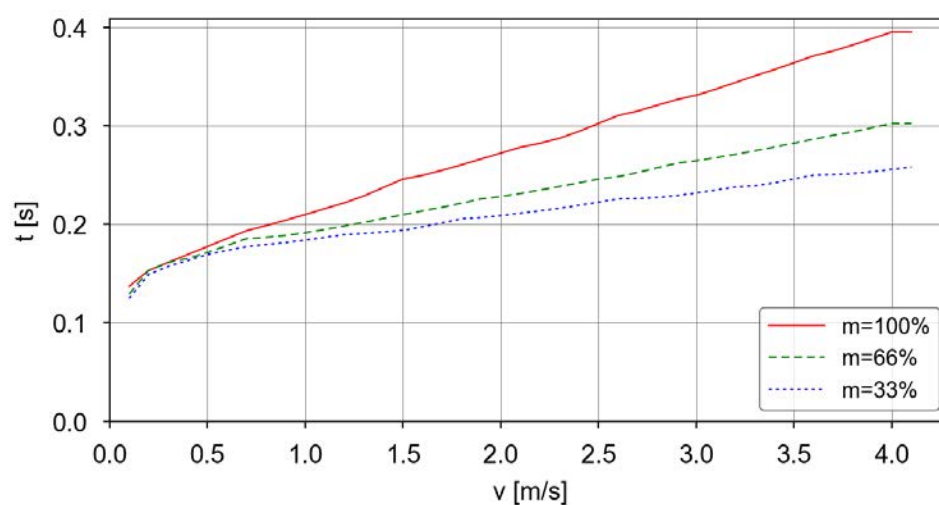
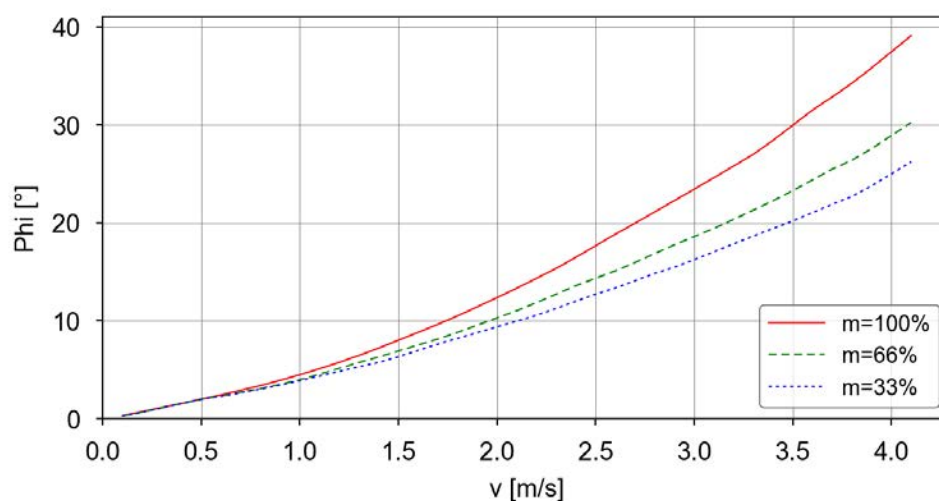
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



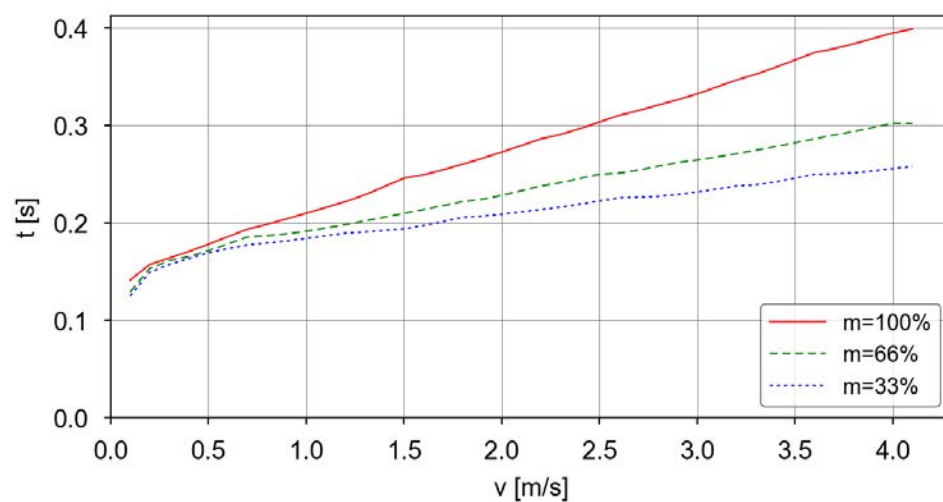
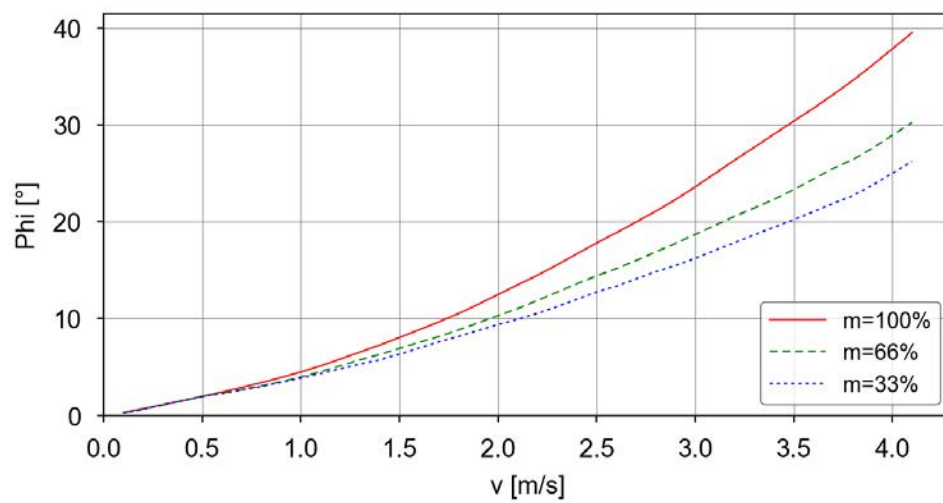
Continues on next page

10 IRB 4600

10.3 IRB 4600 2.50 m 20 kg

Continued

Extension zone 2, stopping distance and stopping time



10.4 IRB 4600 2.55 m 40 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	61.7	0.71
2	41.9	0.37
3	30.2	0.25

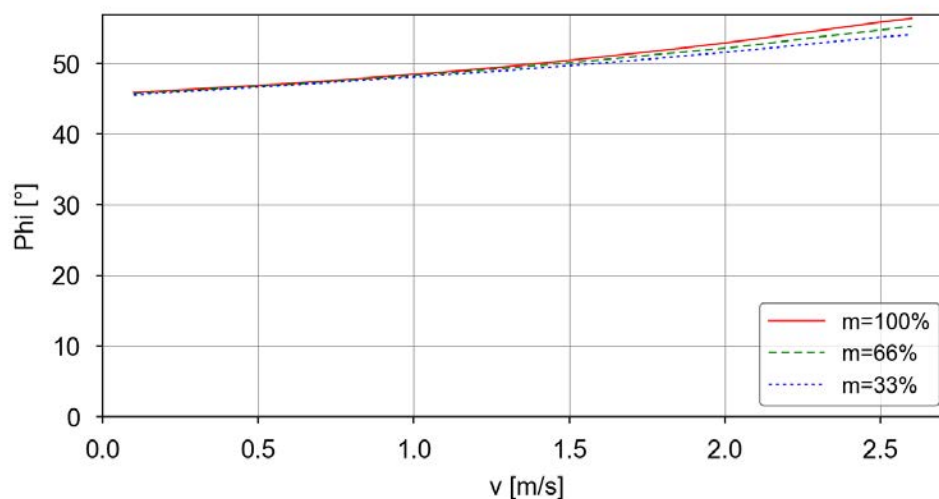
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.851
1	0.851	1.701
2	1.701	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

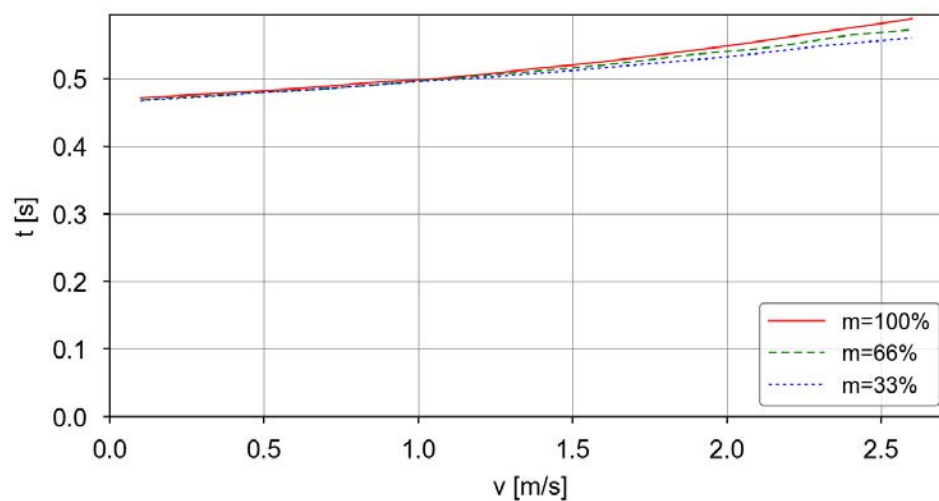


Continues on next page

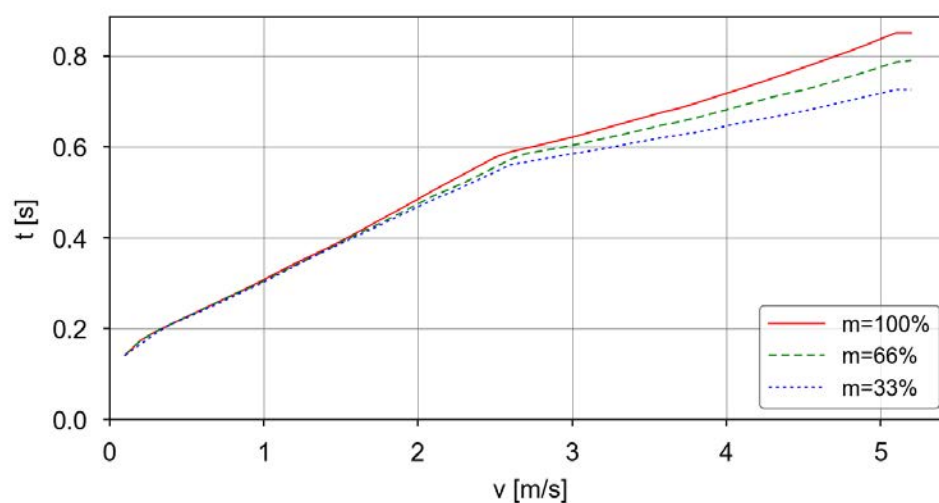
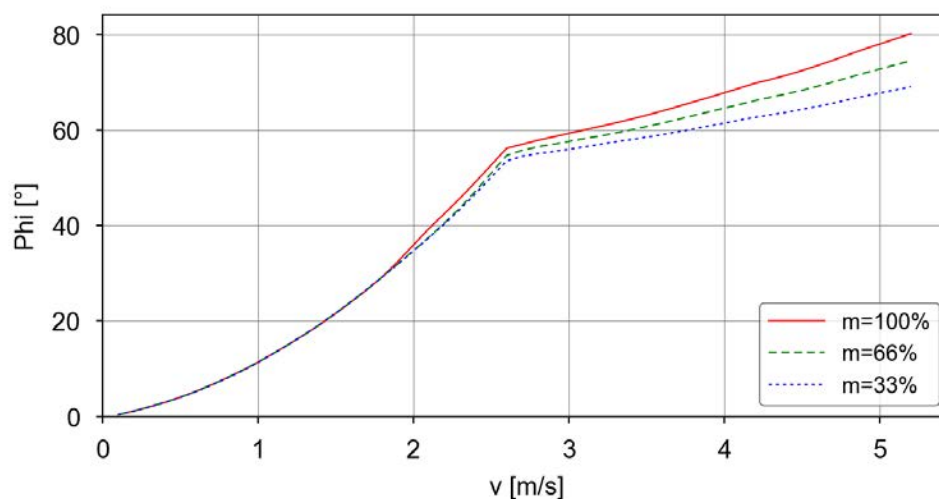
10 IRB 4600

10.4 IRB 4600 2.55 m 40 kg

Continued

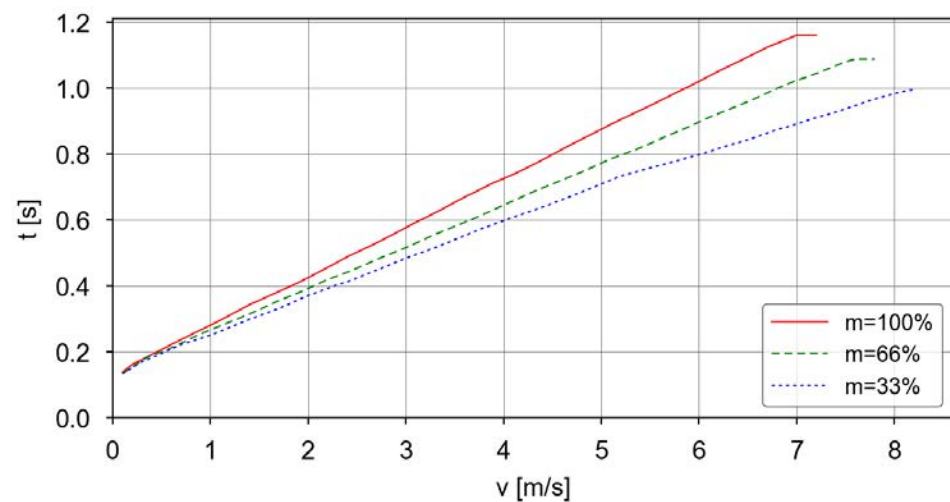
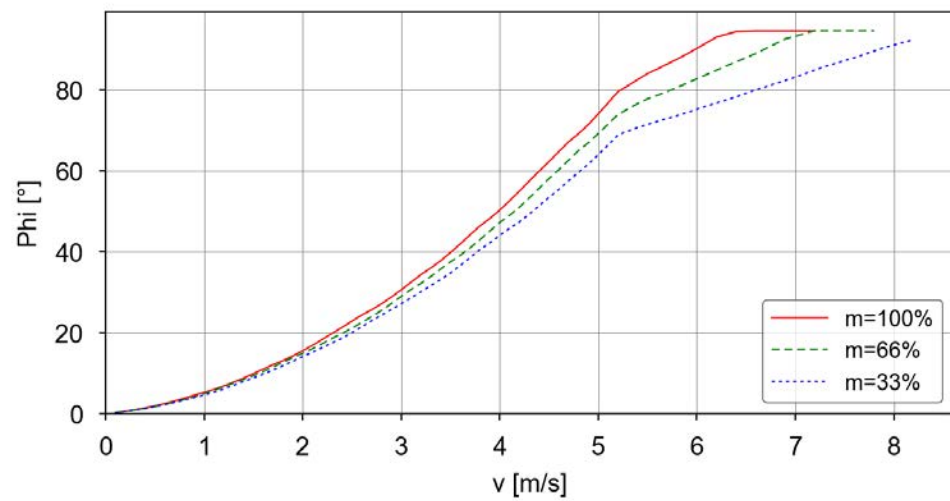


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

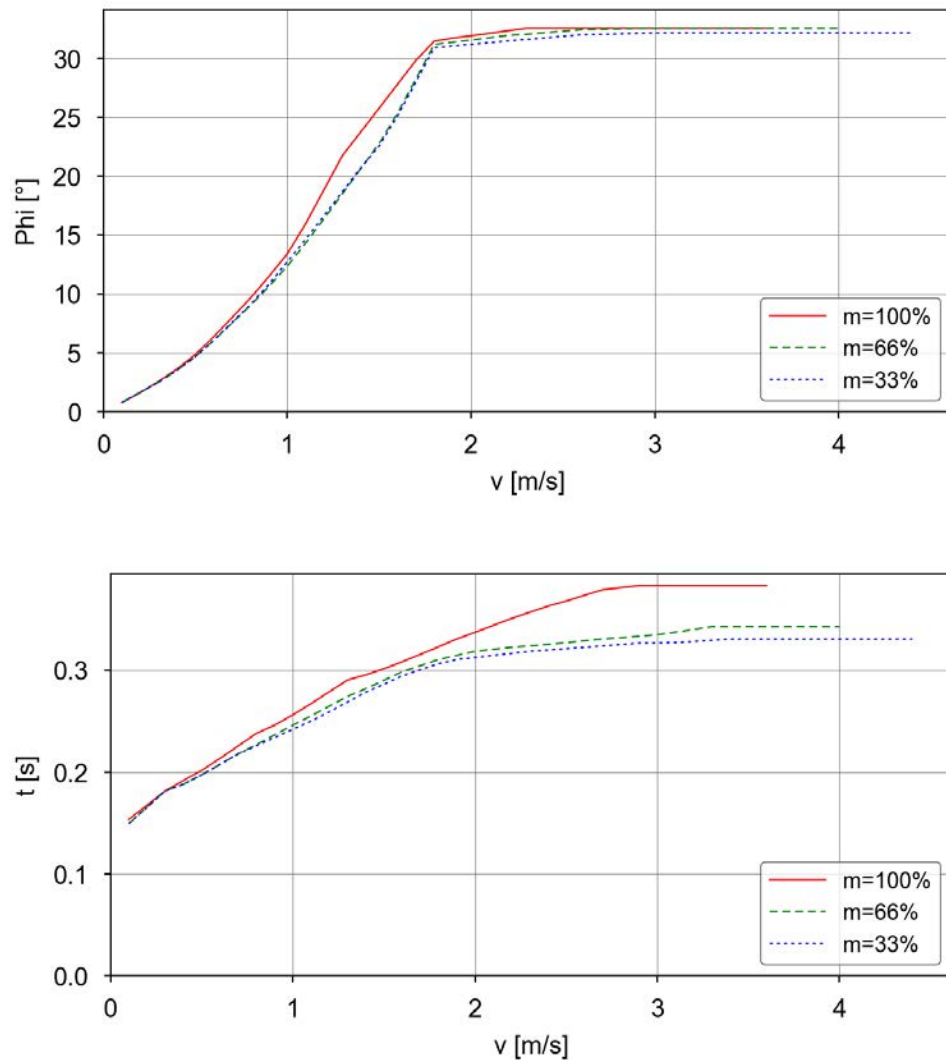
10 IRB 4600

10.4 IRB 4600 2.55 m 40 kg

Continued

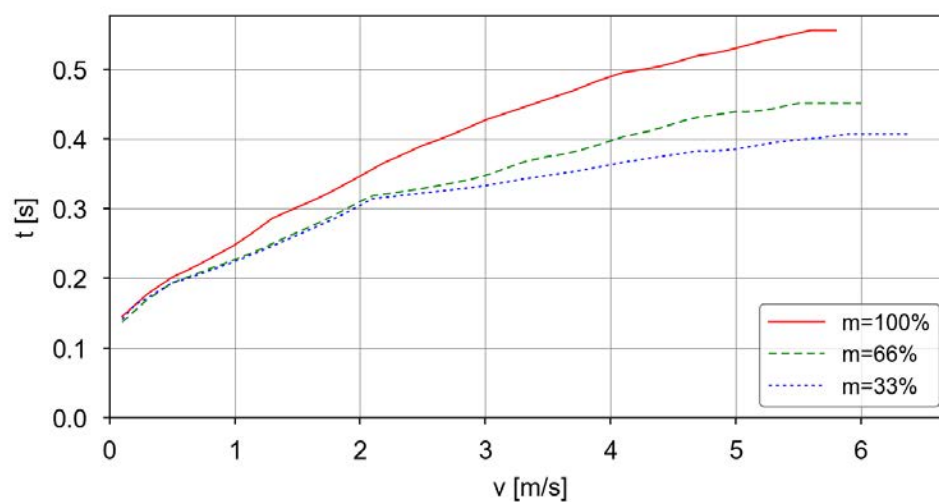
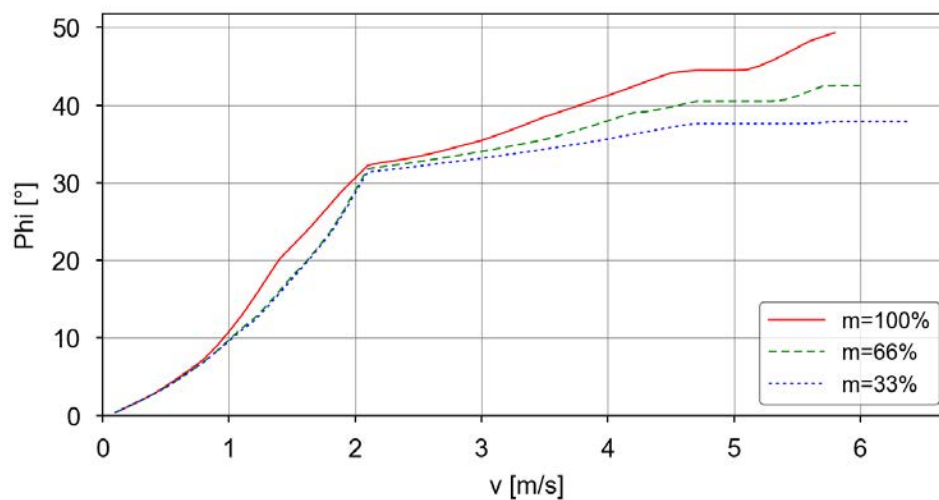
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

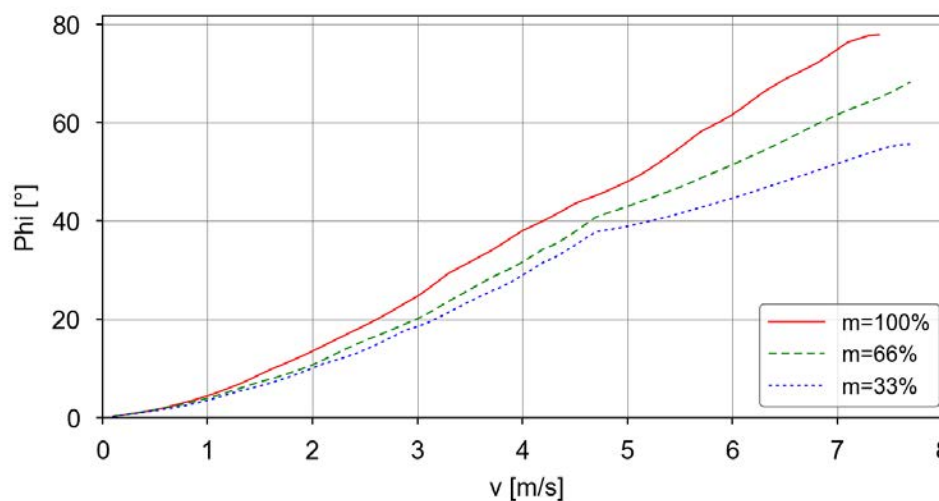


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

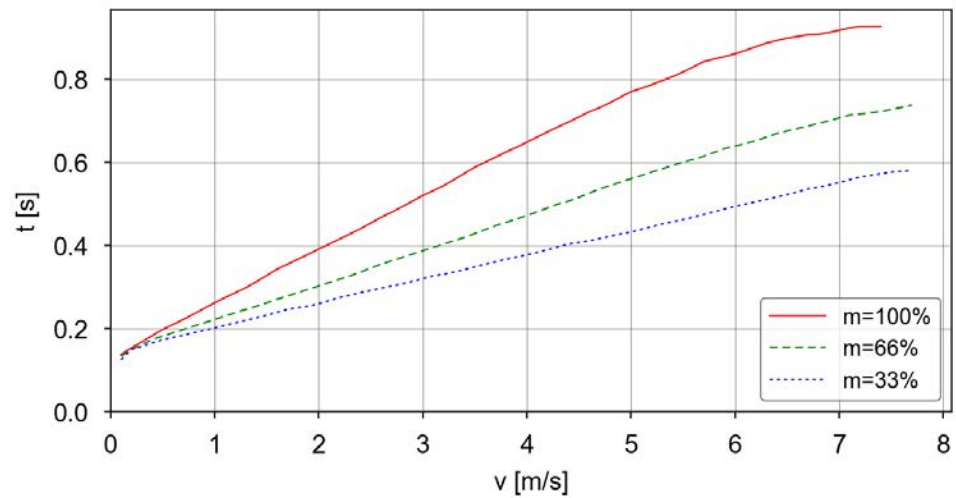


Continues on next page

10 IRB 4600

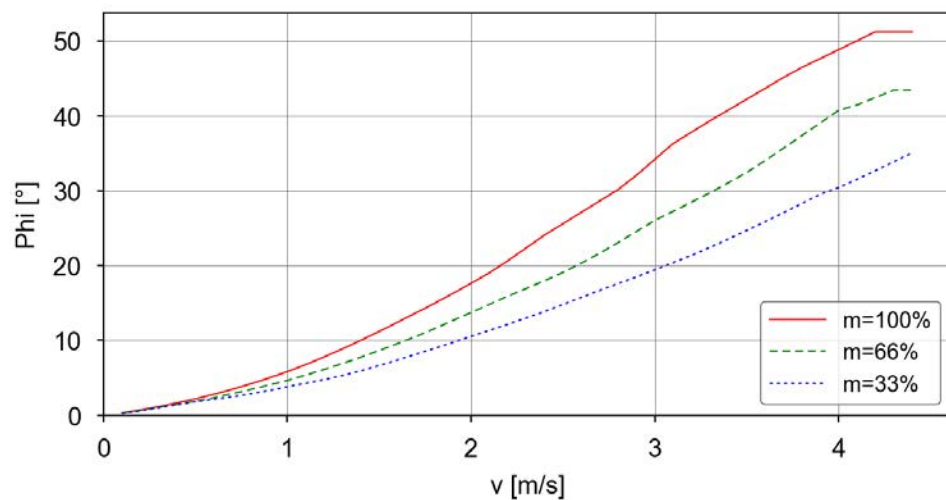
10.4 IRB 4600 2.55 m 40 kg

Continued

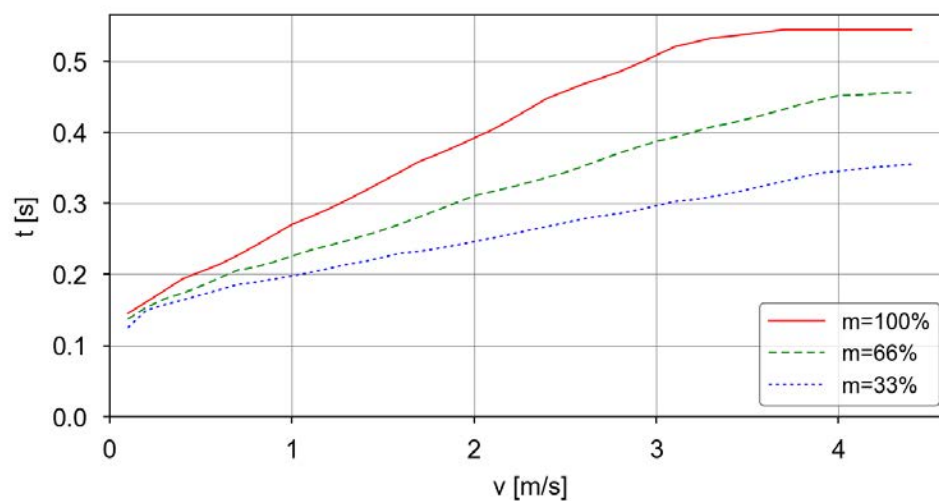


Category 1, Axis 3

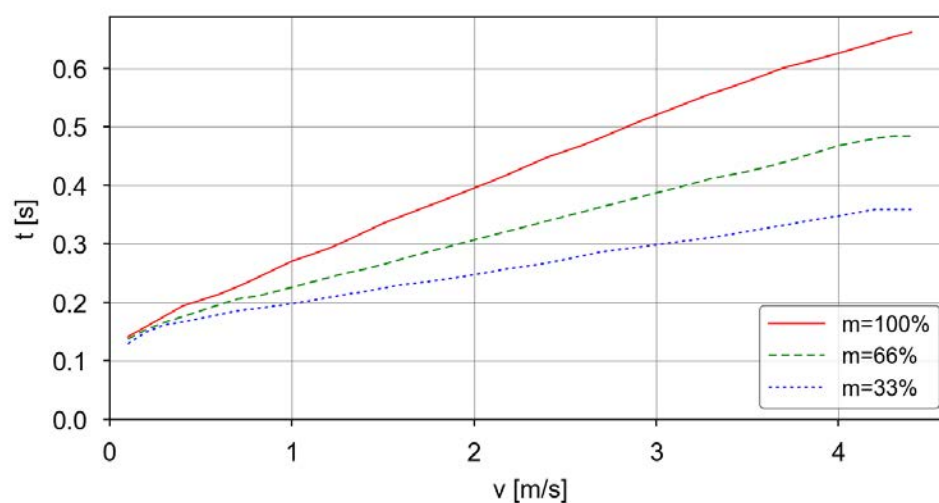
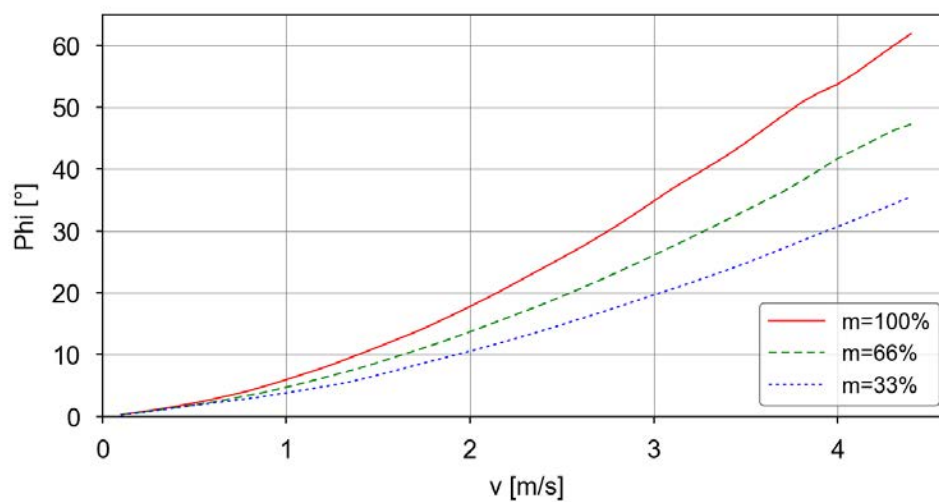
Extension zone 0, stopping distance and stopping time



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Extension zone 1, stopping distance and stopping time



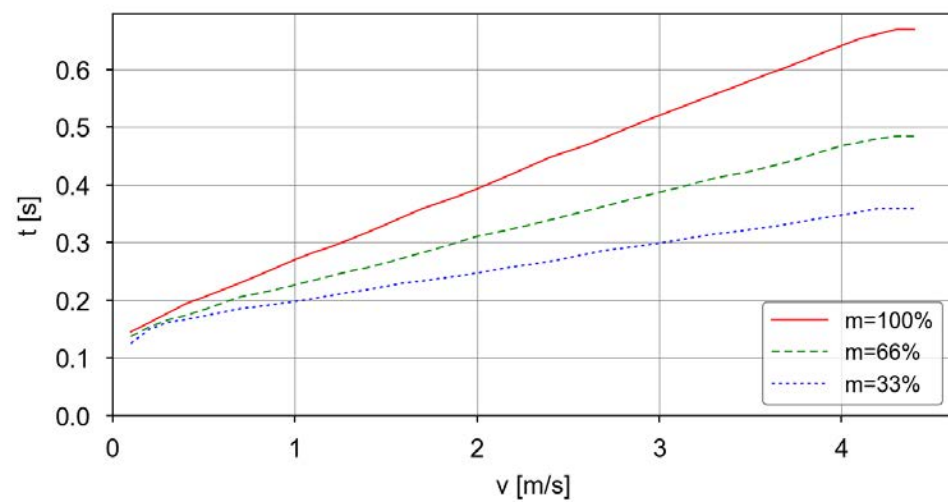
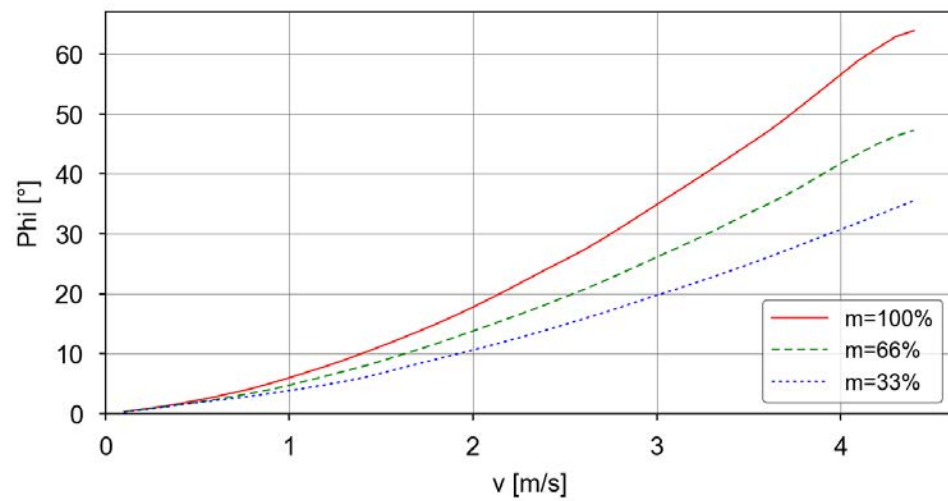
Continues on next page

10 IRB 4600

10.4 IRB 4600 2.55 m 40 kg

Continued

Extension zone 2, stopping distance and stopping time



11 IRB 6620

11.1 IRB 6620 2.20 m 150 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	29.1	0.49
2	25.2	0.44
3	19.0	0.29

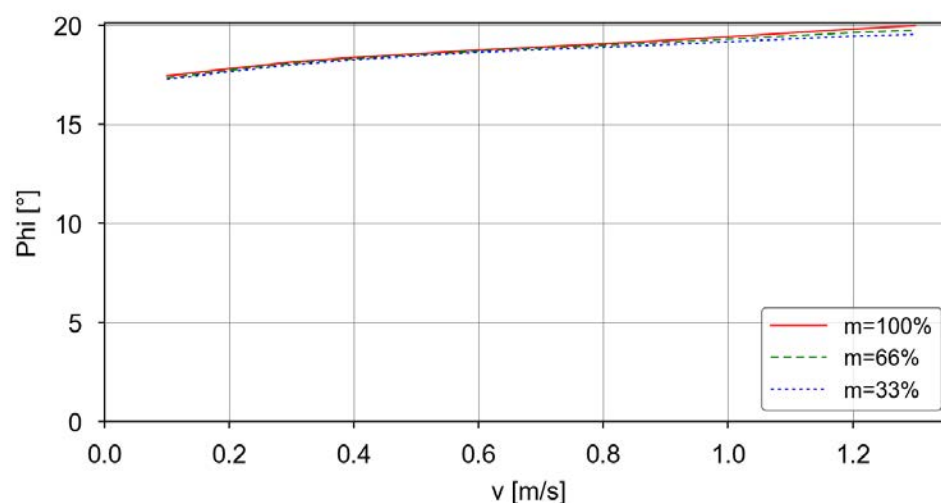
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.735
1	0.735	1.47
2	1.47	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

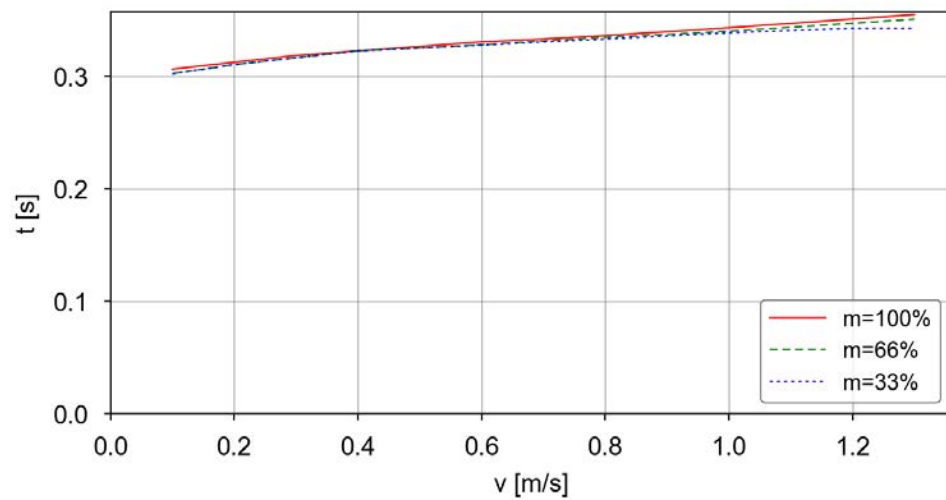


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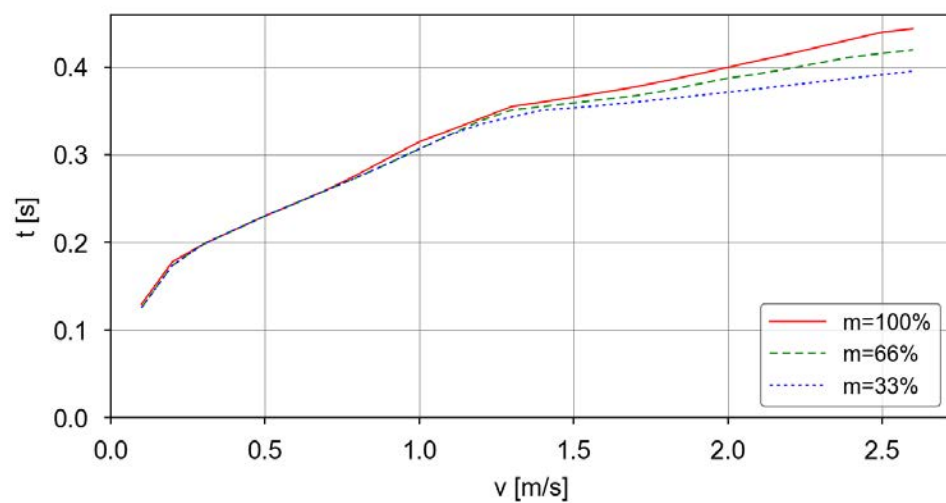
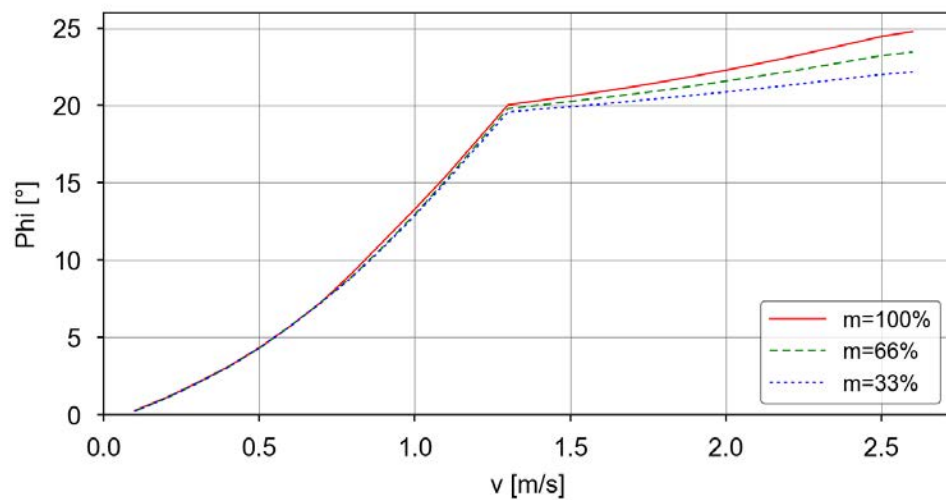
11 IRB 6620

11.1 IRB 6620 2.20 m 150 kg

Continued

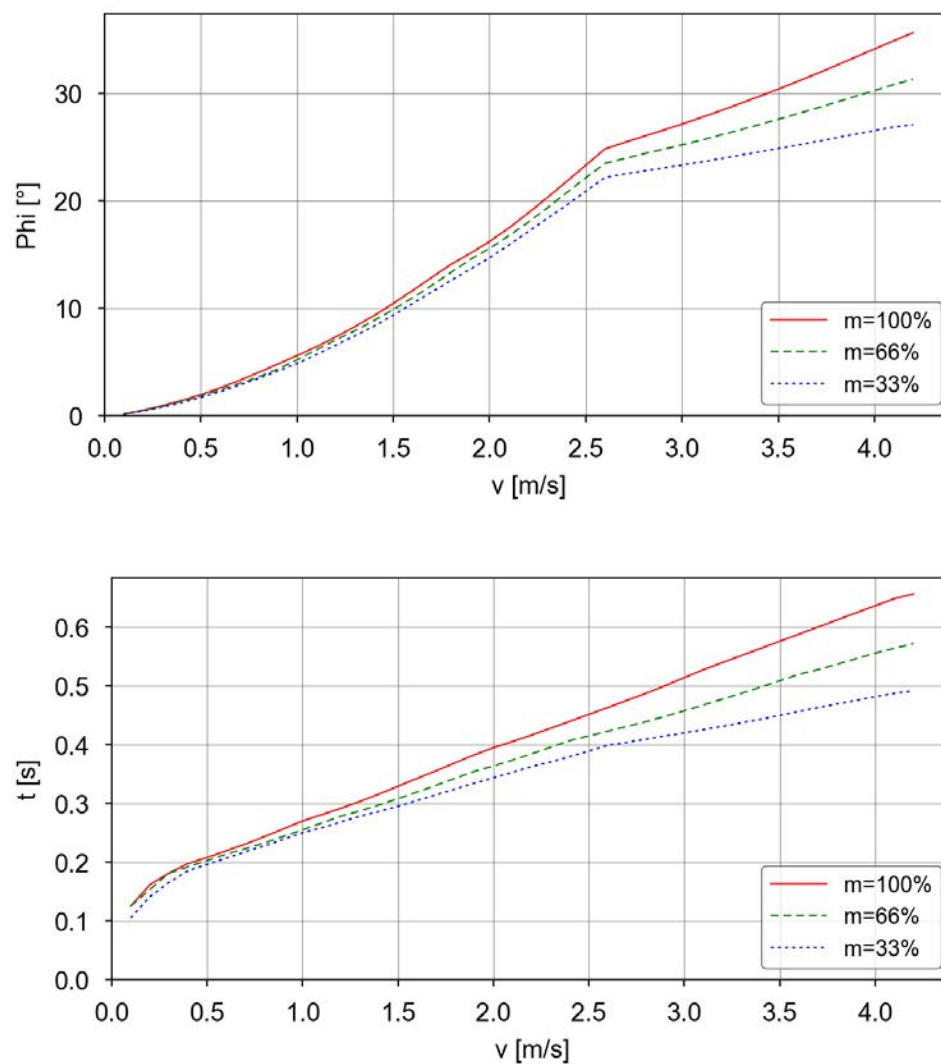


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

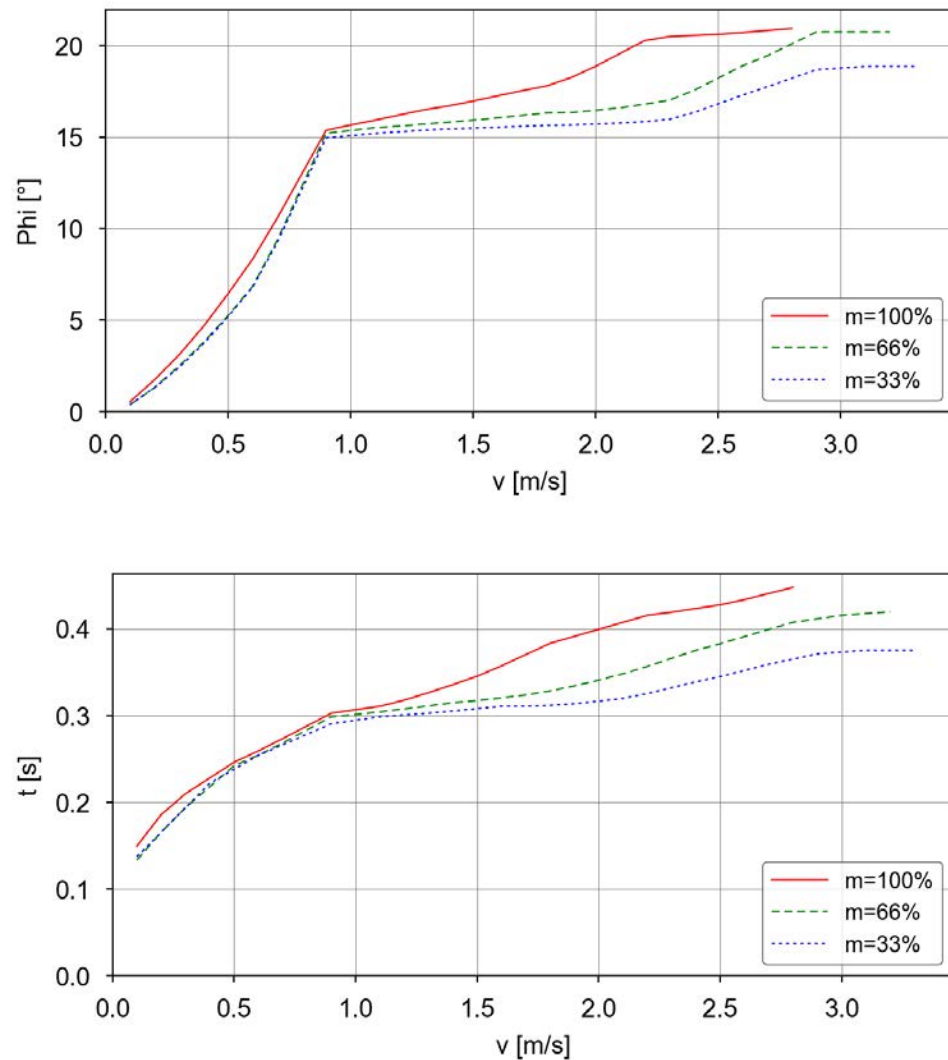
11 IRB 6620

11.1 IRB 6620 2.20 m 150 kg

Continued

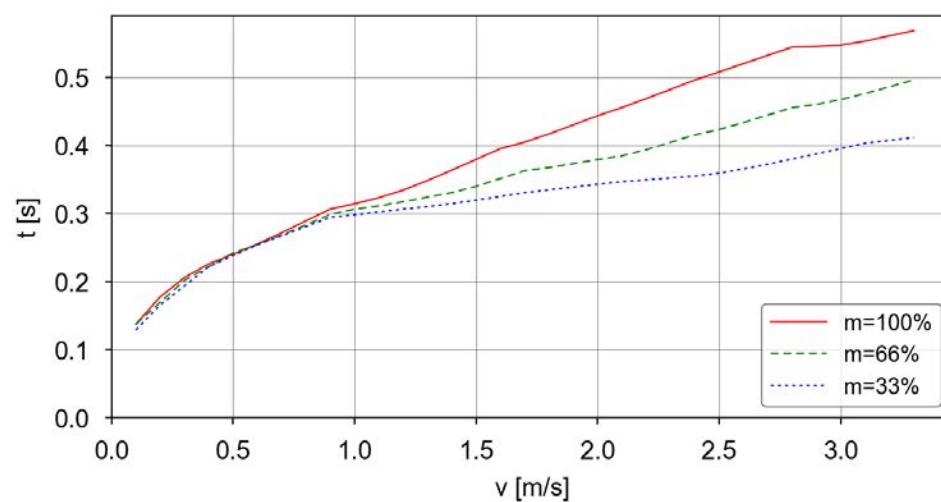
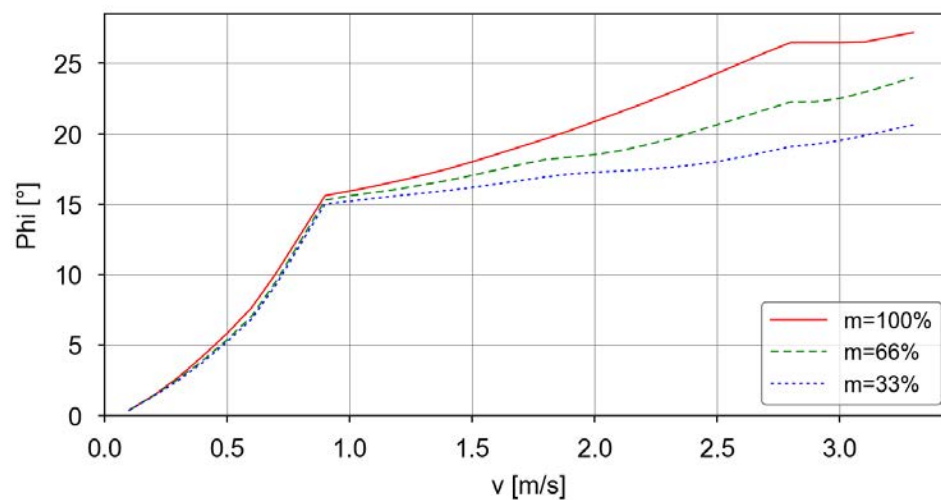
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

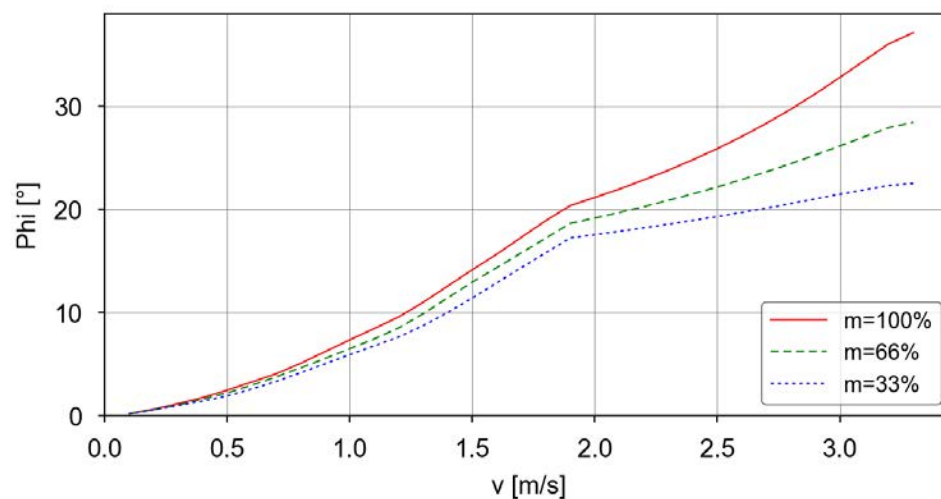


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

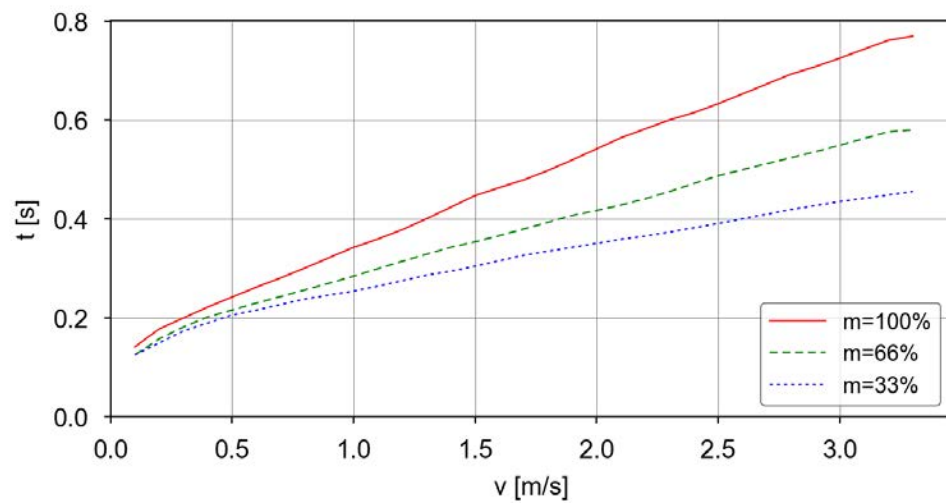


Continues on next page

11 IRB 6620

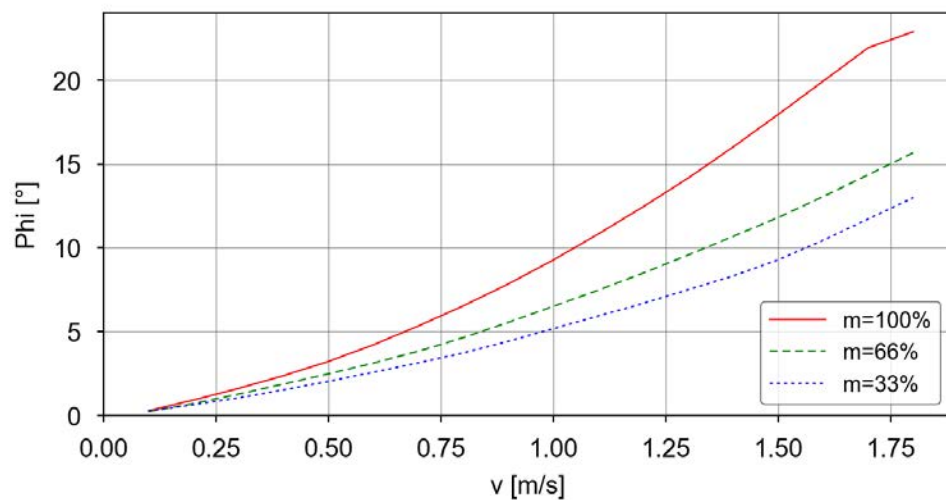
11.1 IRB 6620 2.20 m 150 kg

Continued

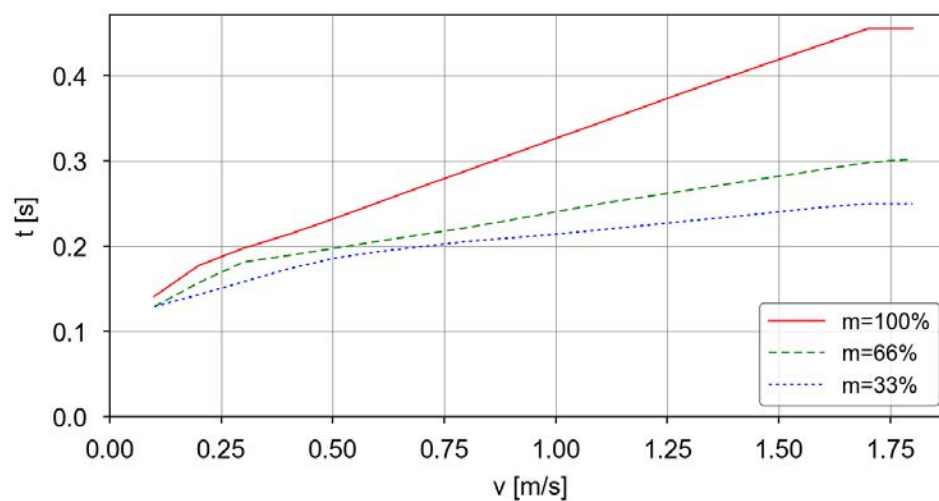


Category 1, Axis 3

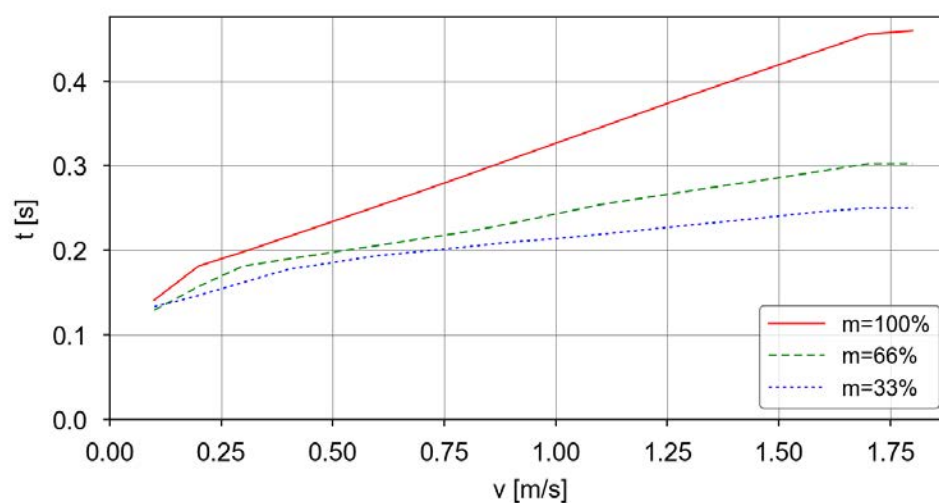
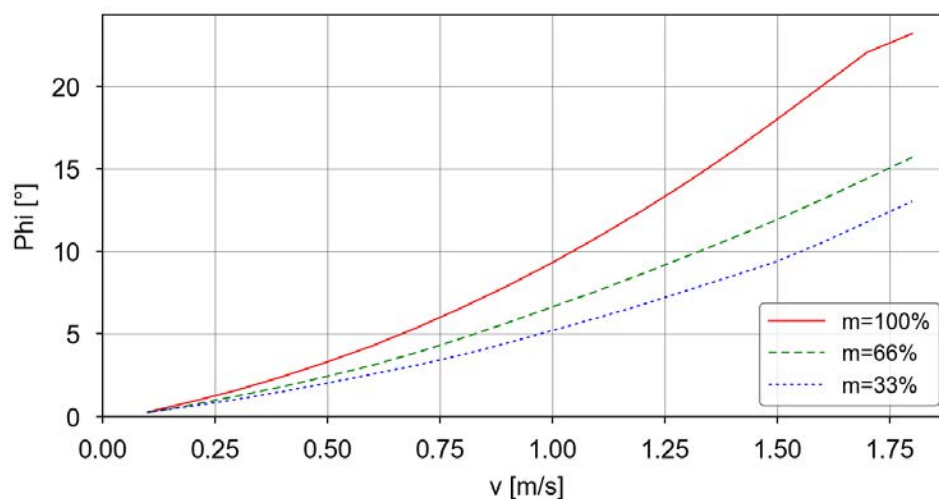
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



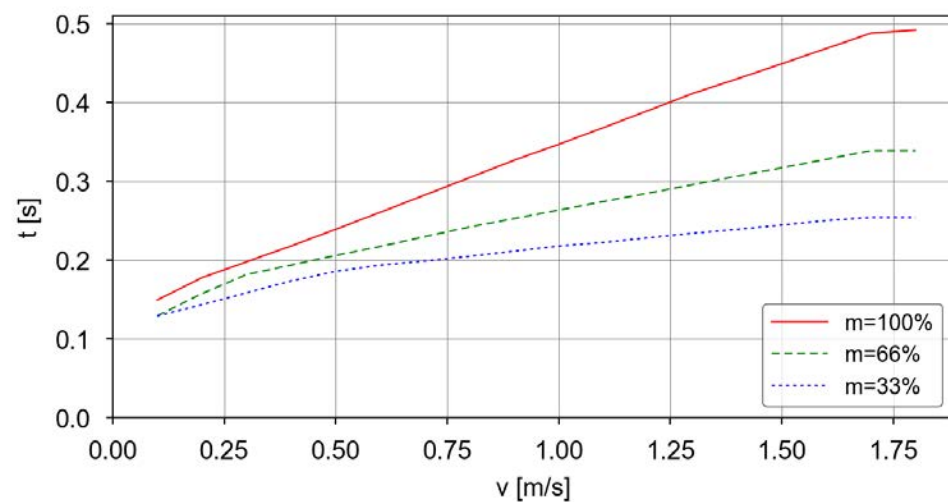
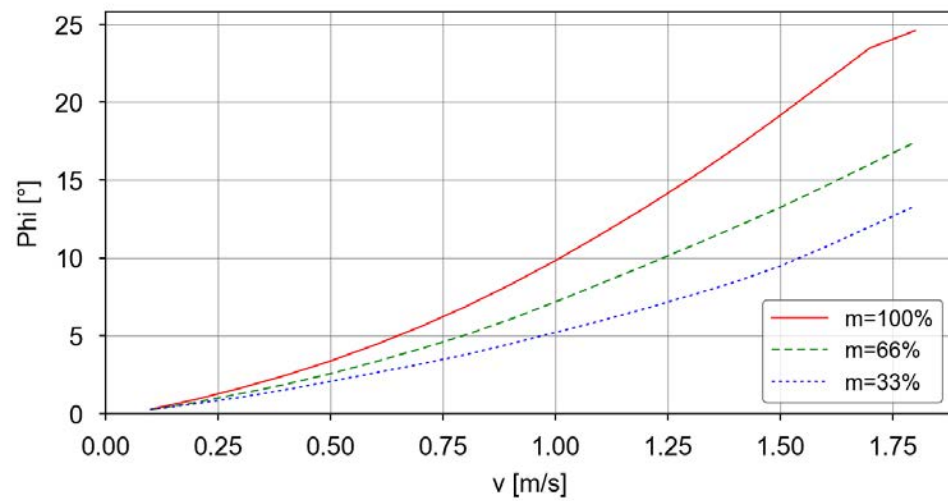
Continues on next page

11 IRB 6620

11.1 IRB 6620 2.20 m 150 kg

Continued

Extension zone 2, stopping distance and stopping time



12 IRB 6790

12.1 IRB 6790 2.65 m 235 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	38.2	0.68
2	20.3	0.37
3	14.4	0.22

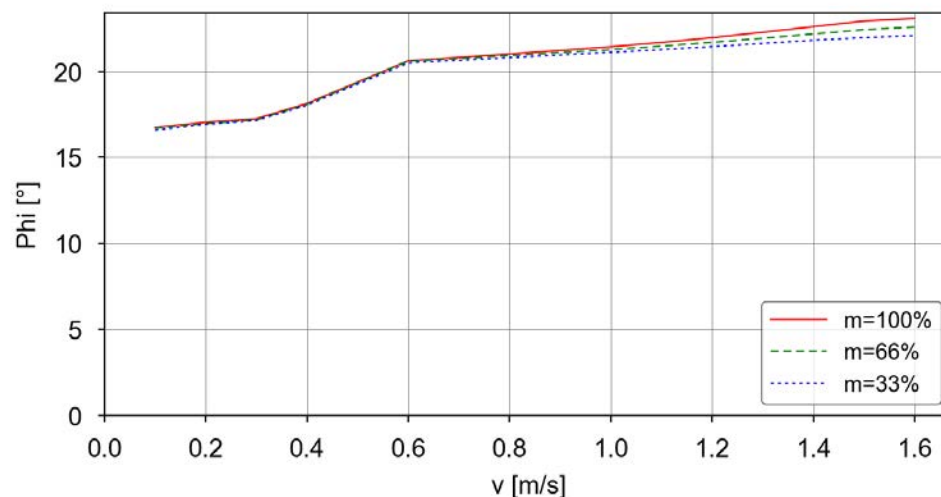
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.883
1	0.883	1.767
2	1.767	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

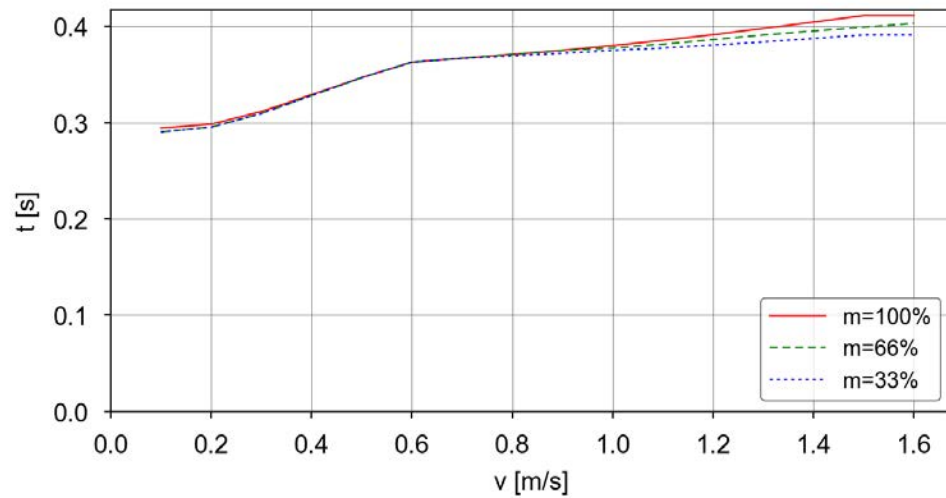


Continues on next page

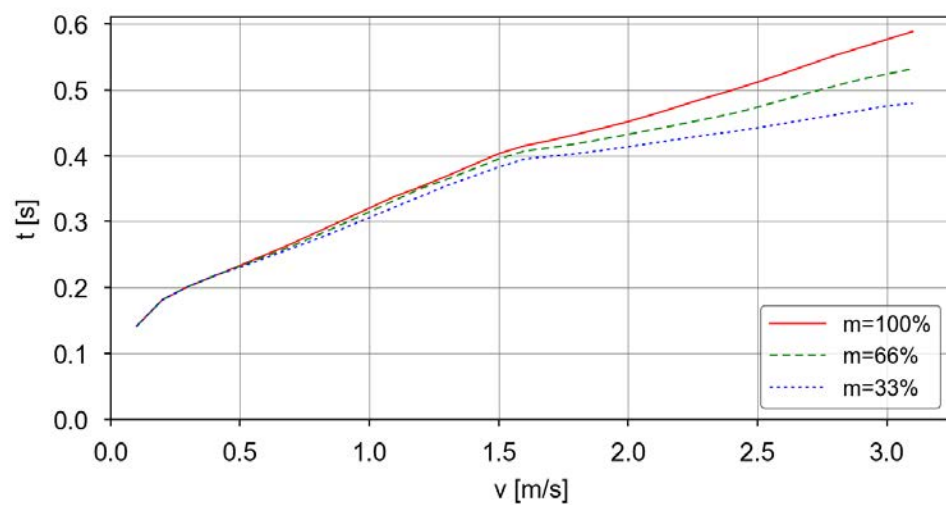
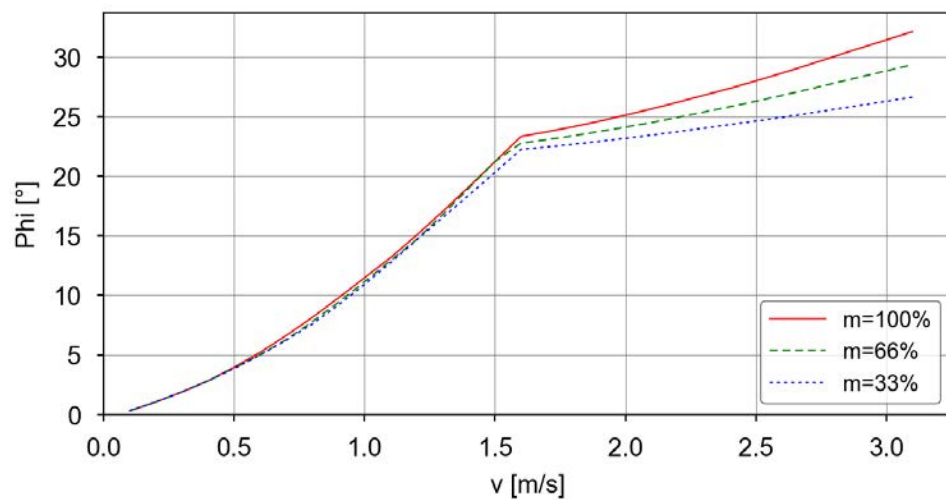
12 IRB 6790

12.1 IRB 6790 2.65 m 235 kg

Continued

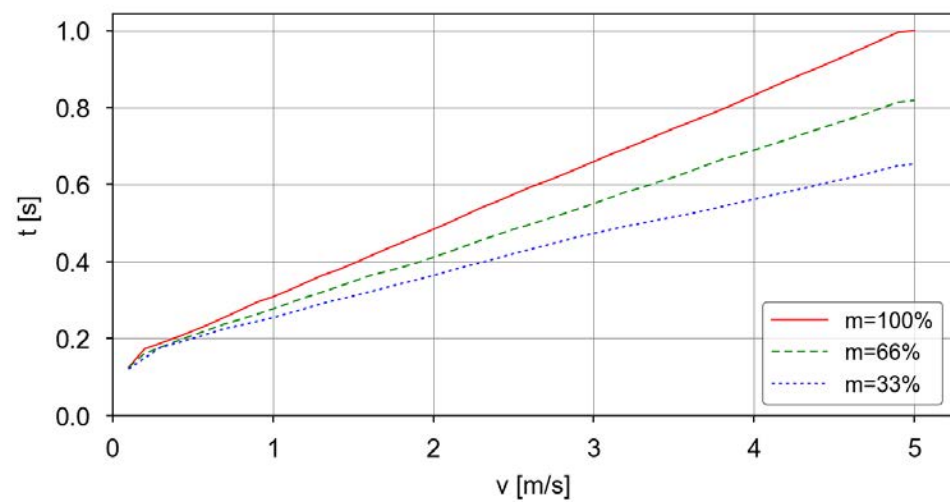
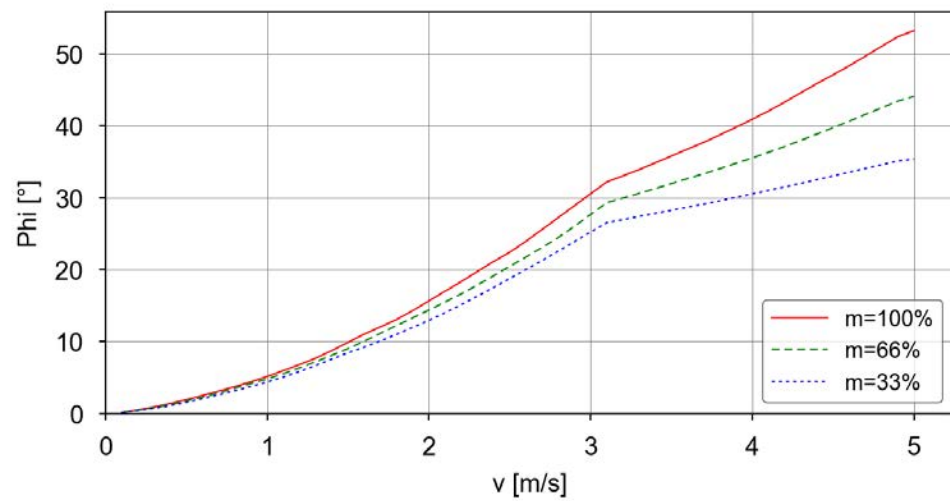


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

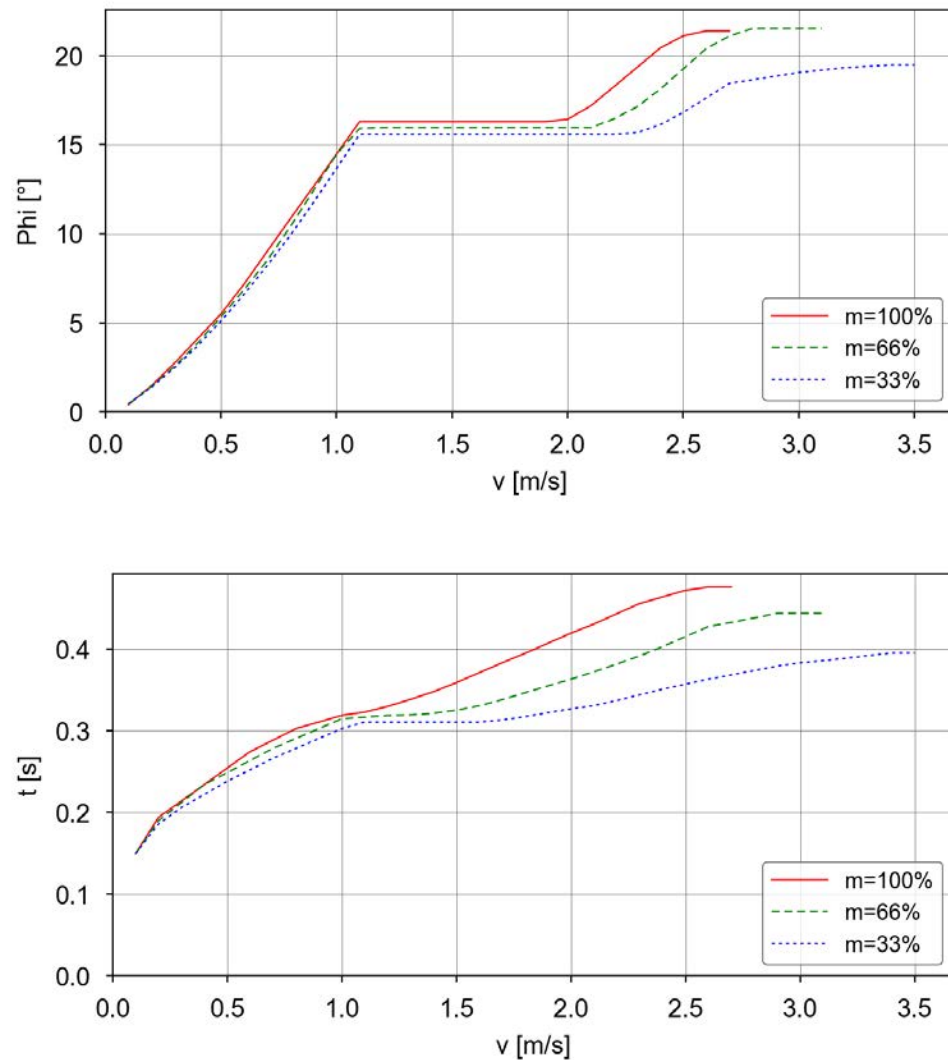
12 IRB 6790

12.1 IRB 6790 2.65 m 235 kg

Continued

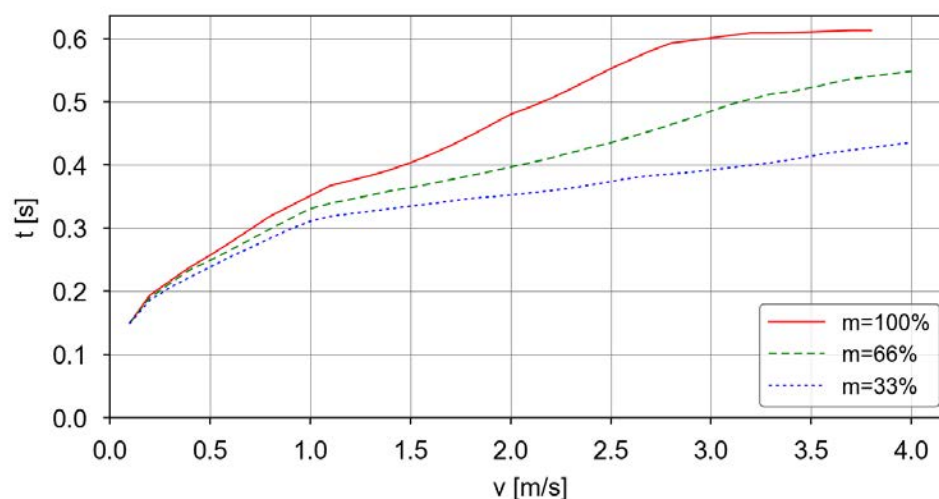
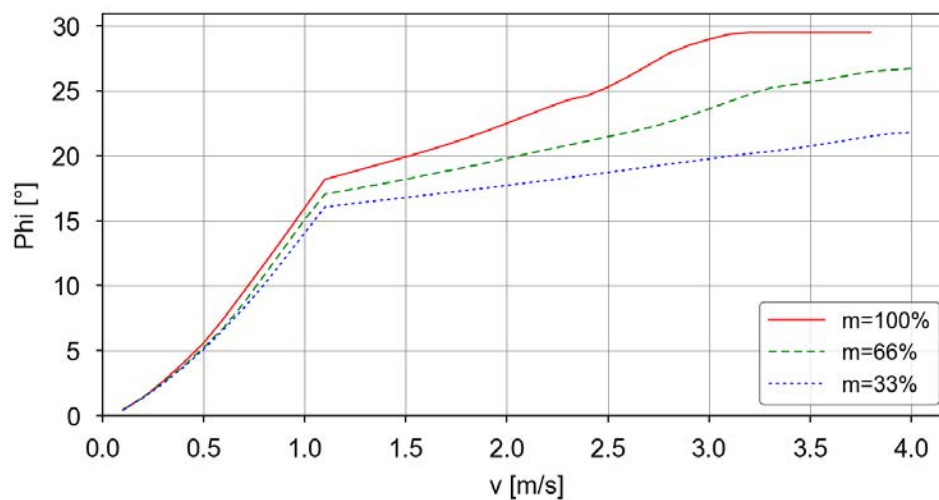
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

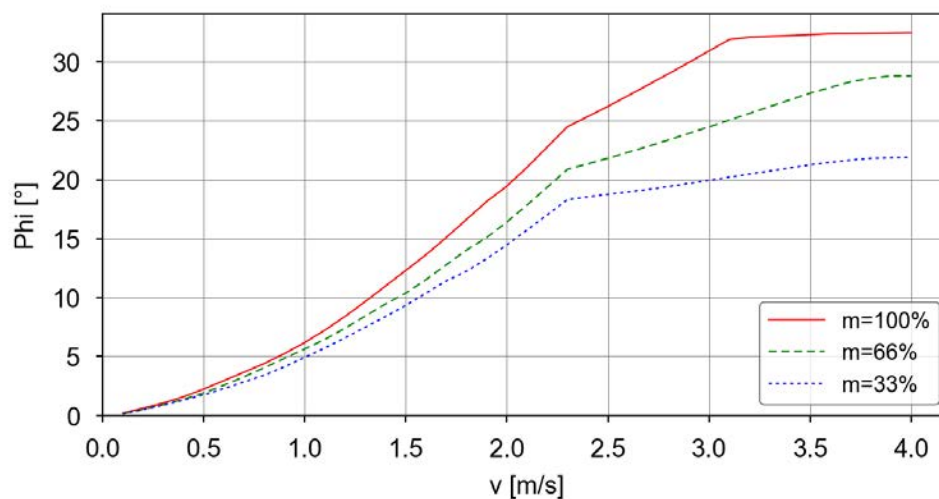


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

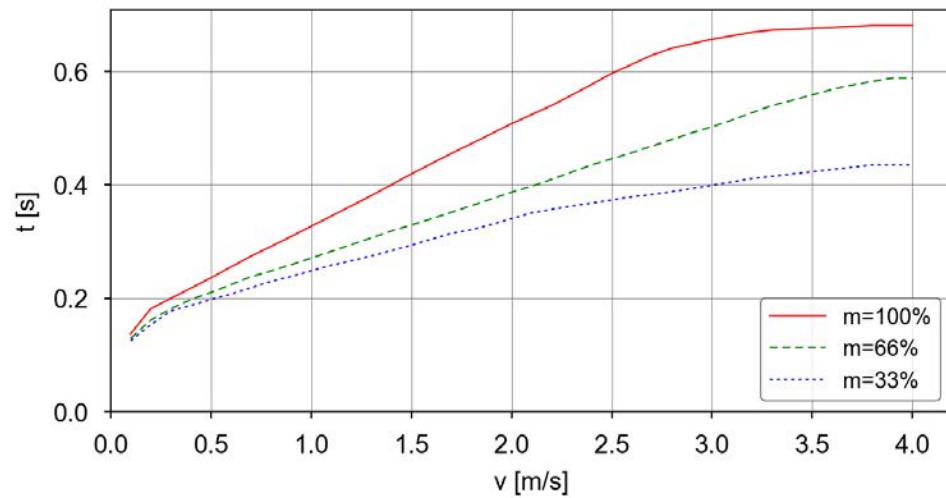


Continues on next page

12 IRB 6790

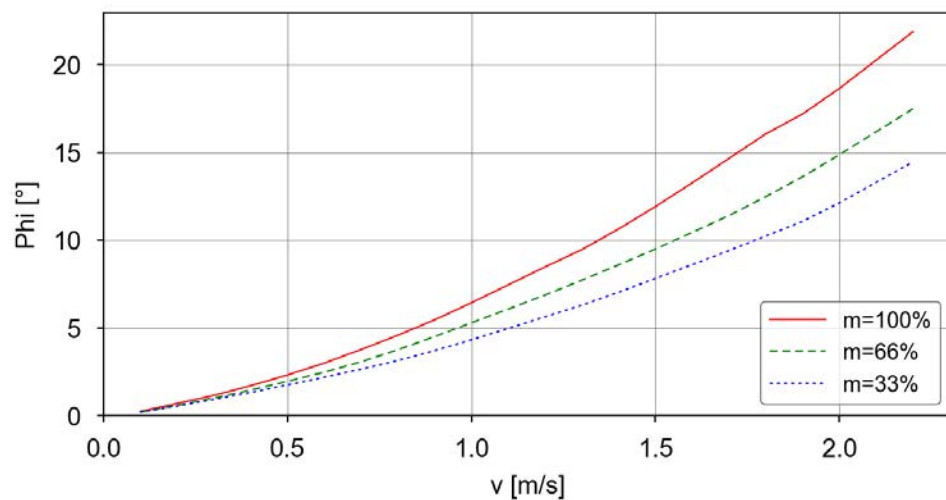
12.1 IRB 6790 2.65 m 235 kg

Continued

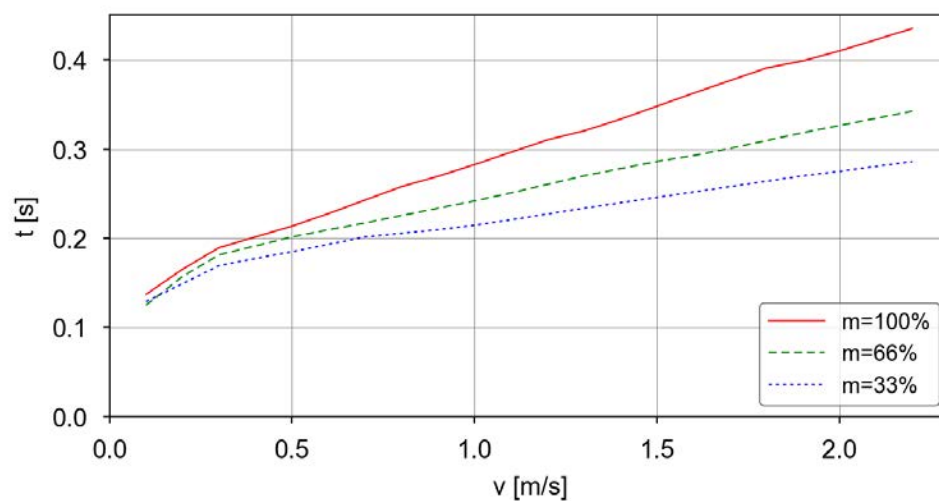


Category 1, Axis 3

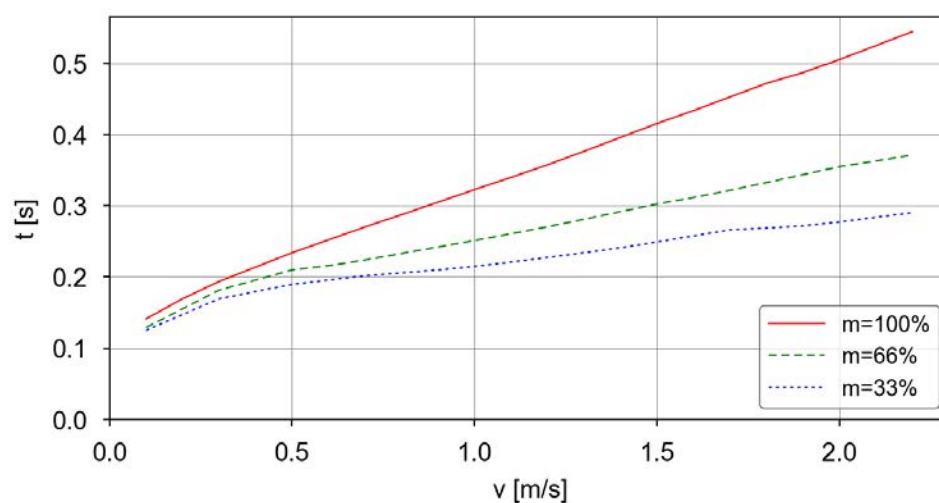
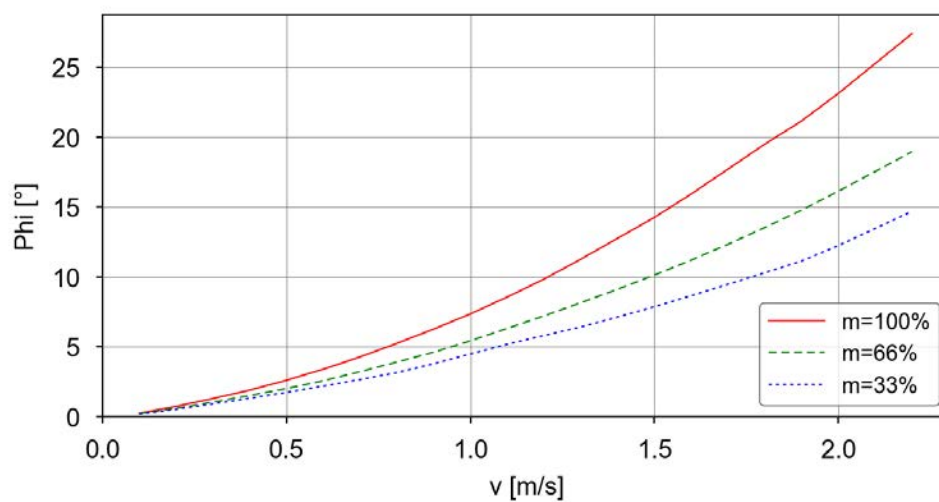
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



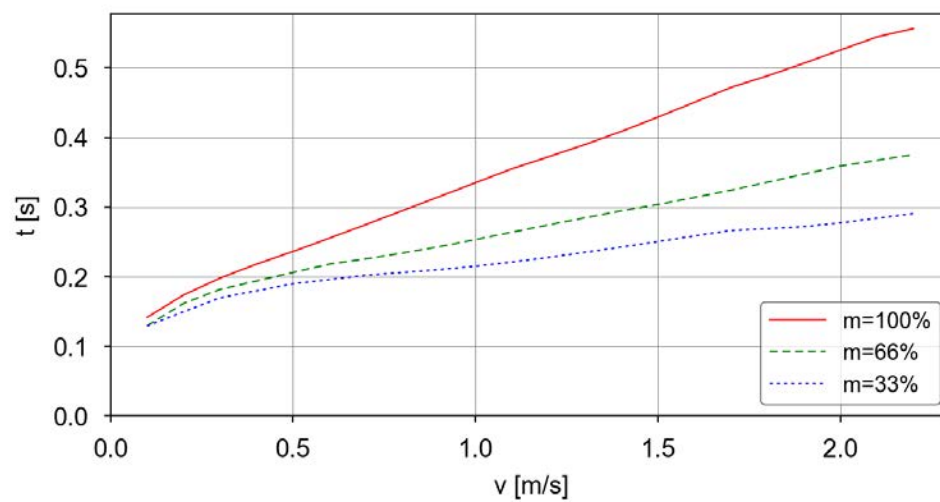
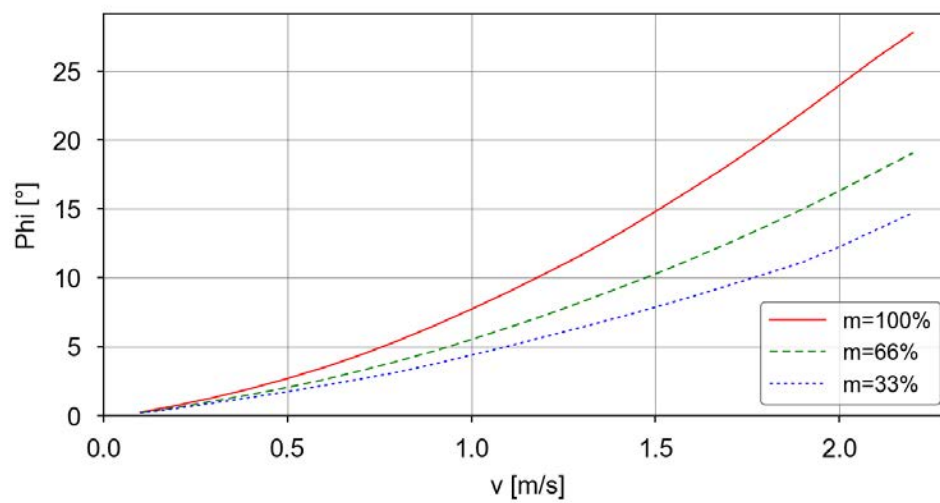
Continues on next page

12 IRB 6790

12.1 IRB 6790 2.65 m 235 kg

Continued

Extension zone 2, stopping distance and stopping time



12.2 IRB 6790 2.80 m 205 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	40.0	0.71
2	20.6	0.37
3	14.1	0.22

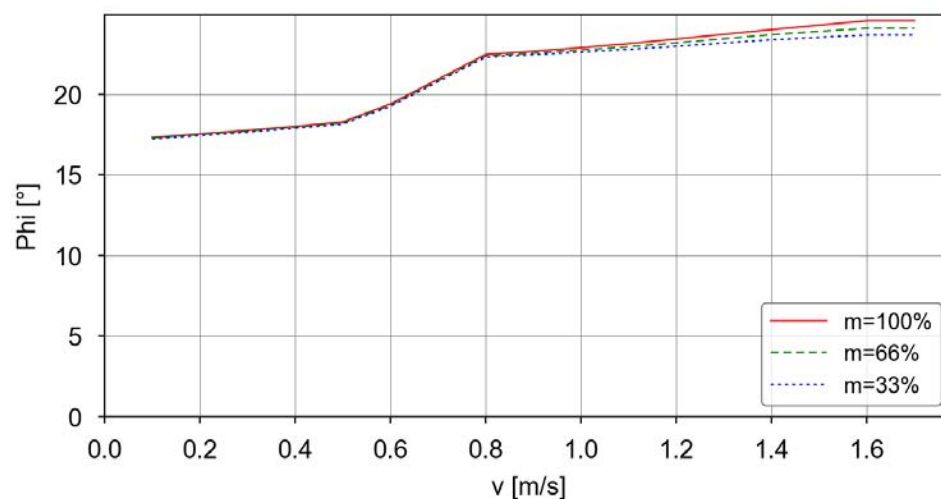
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.931
1	0.931	1.863
2	1.863	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

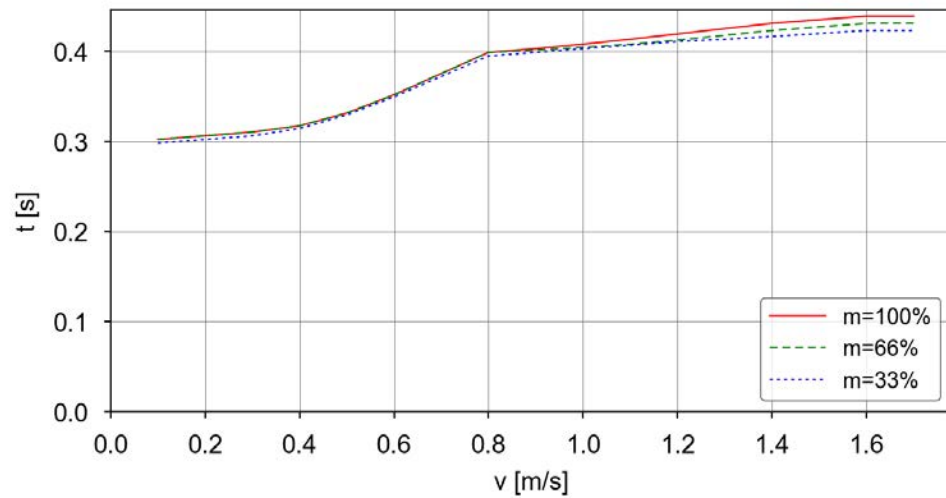


Continues on next page

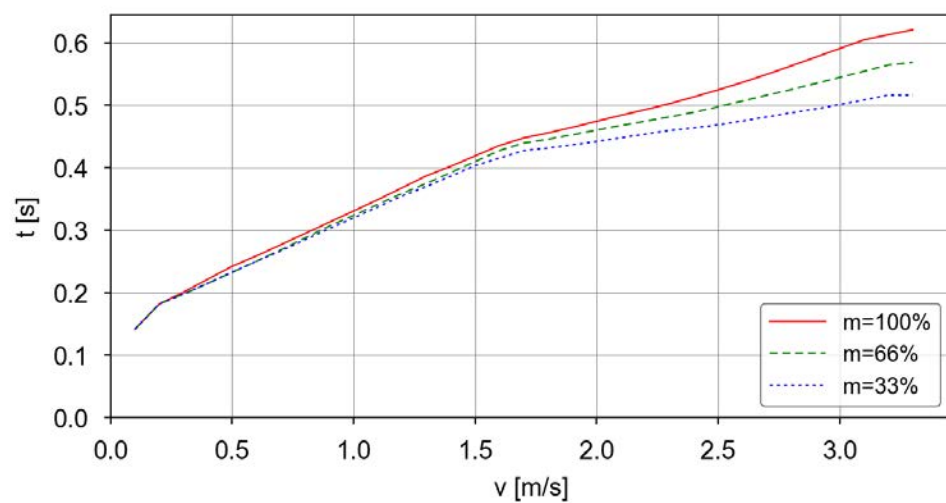
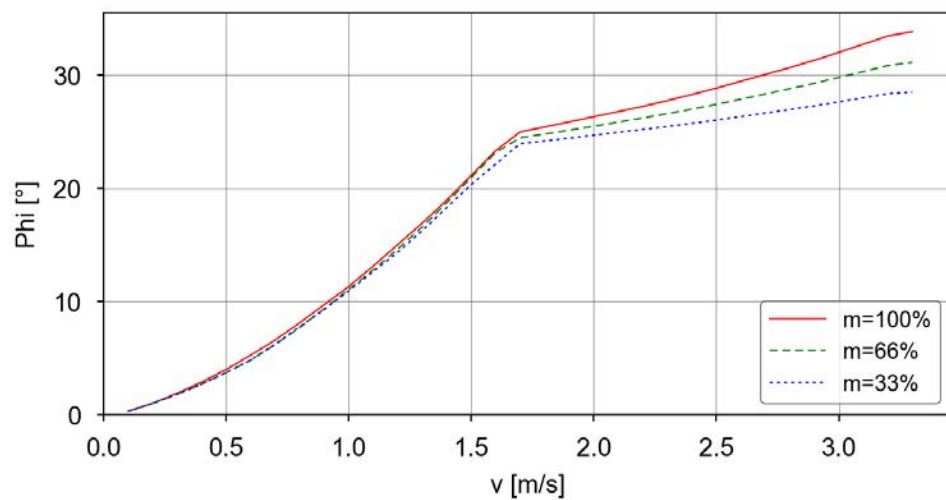
12 IRB 6790

12.2 IRB 6790 2.80 m 205 kg

Continued

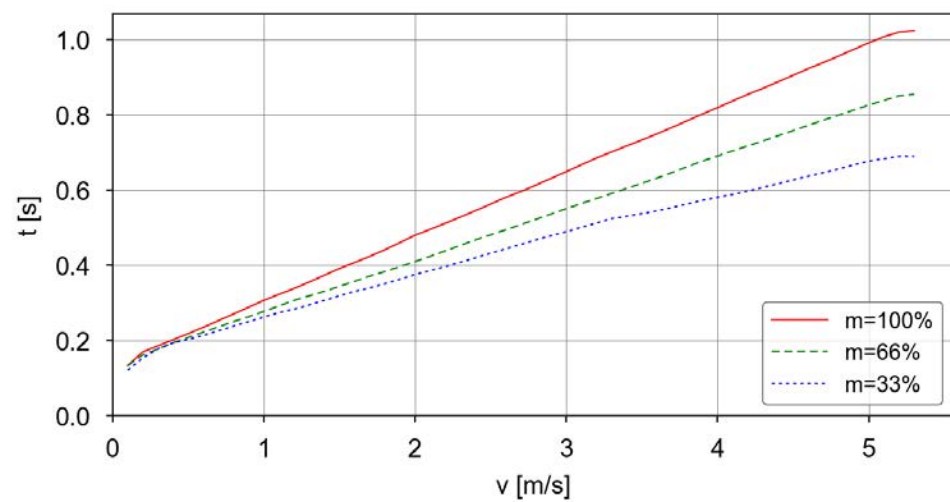
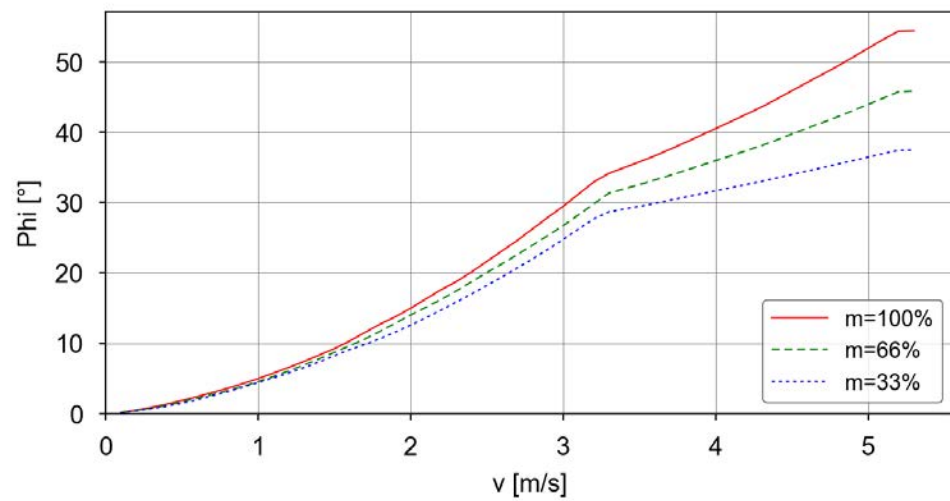


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

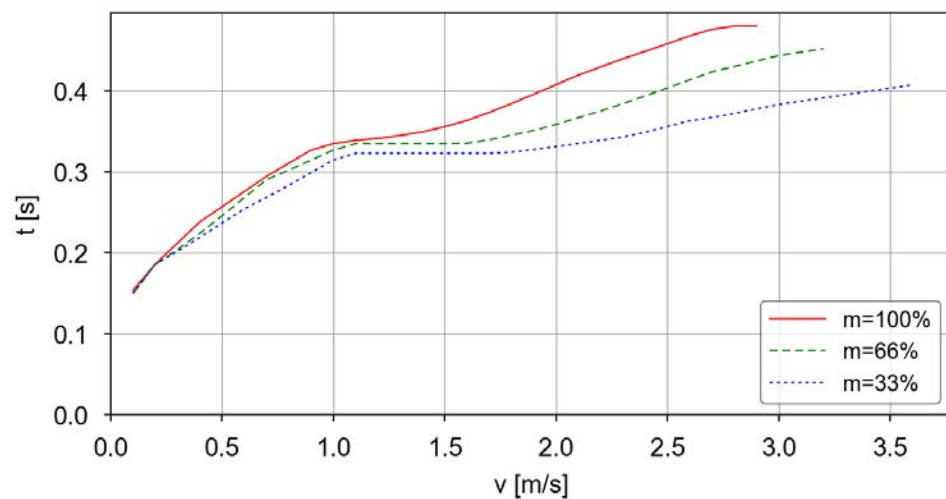
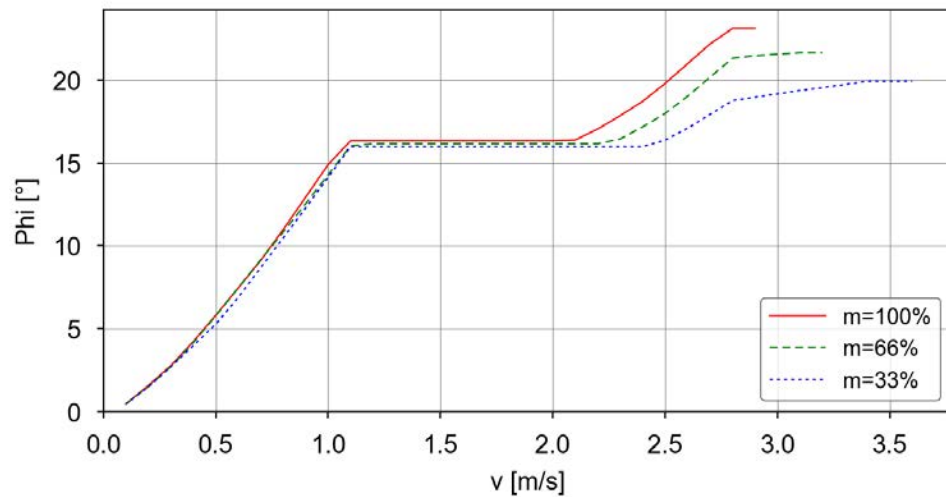
12 IRB 6790

12.2 IRB 6790 2.80 m 205 kg

Continued

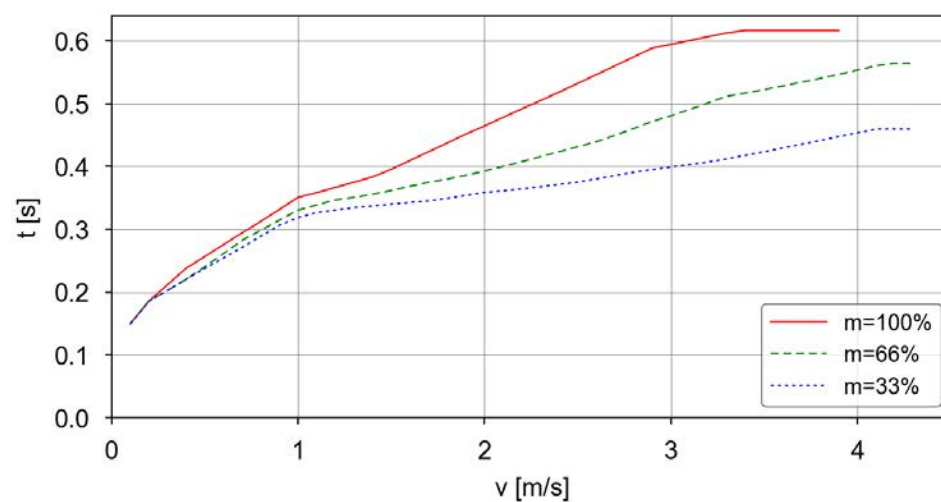
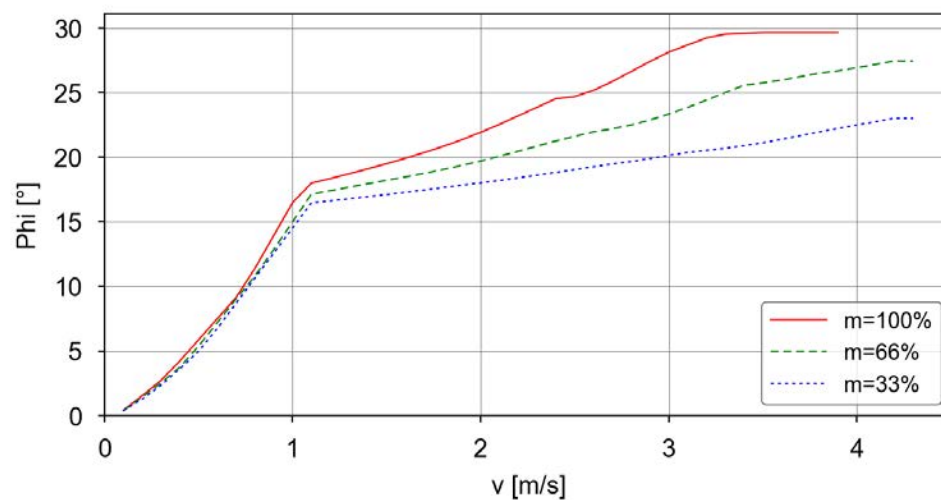
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

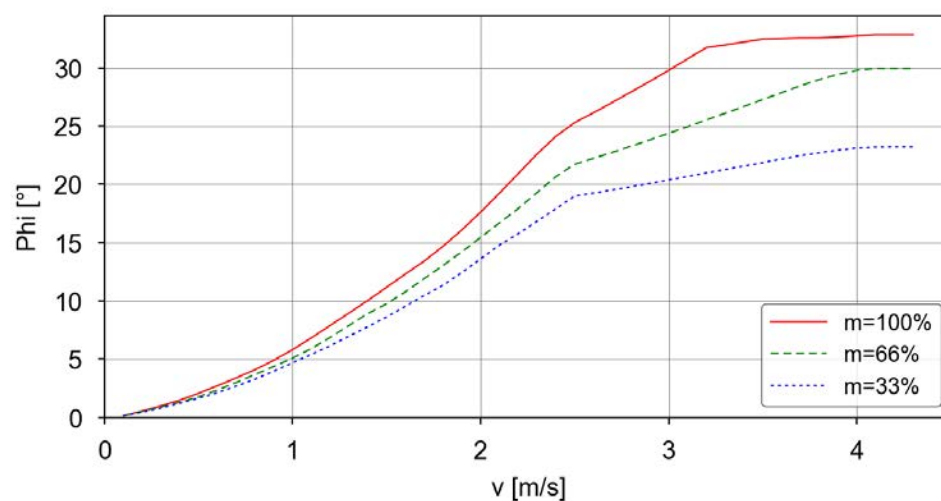


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

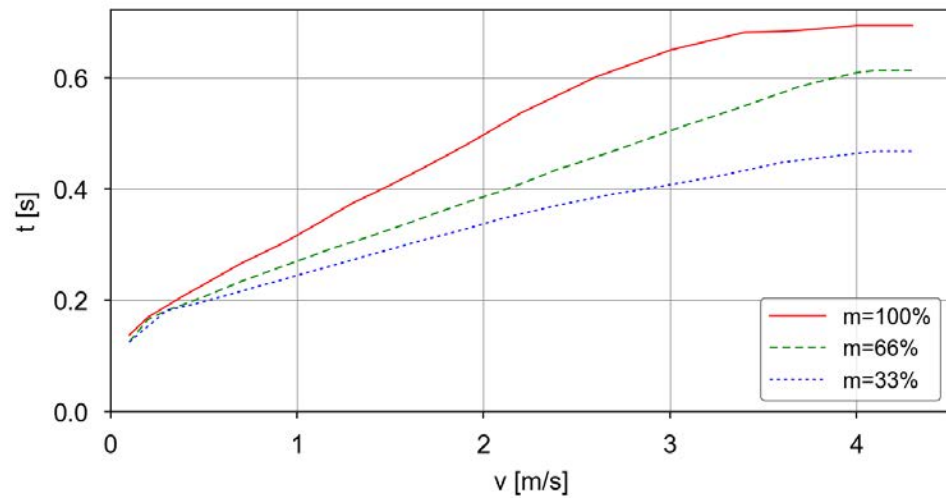


Continues on next page

12 IRB 6790

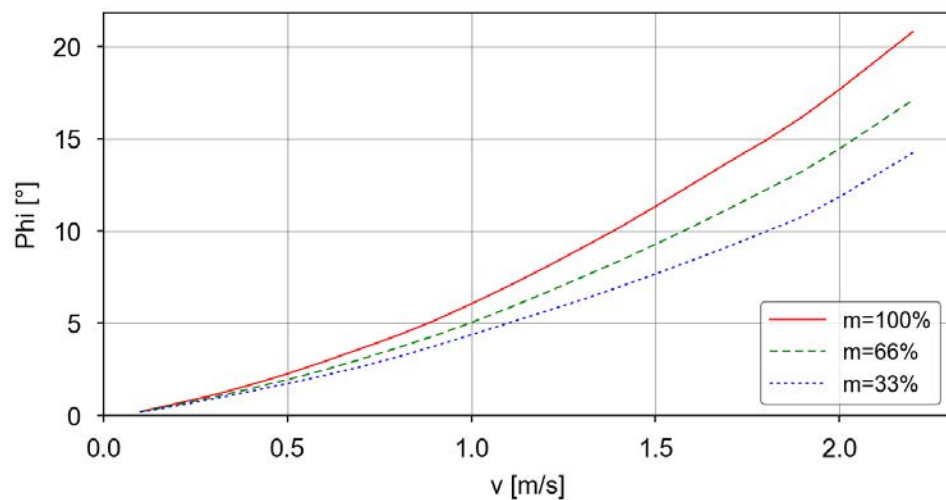
12.2 IRB 6790 2.80 m 205 kg

Continued

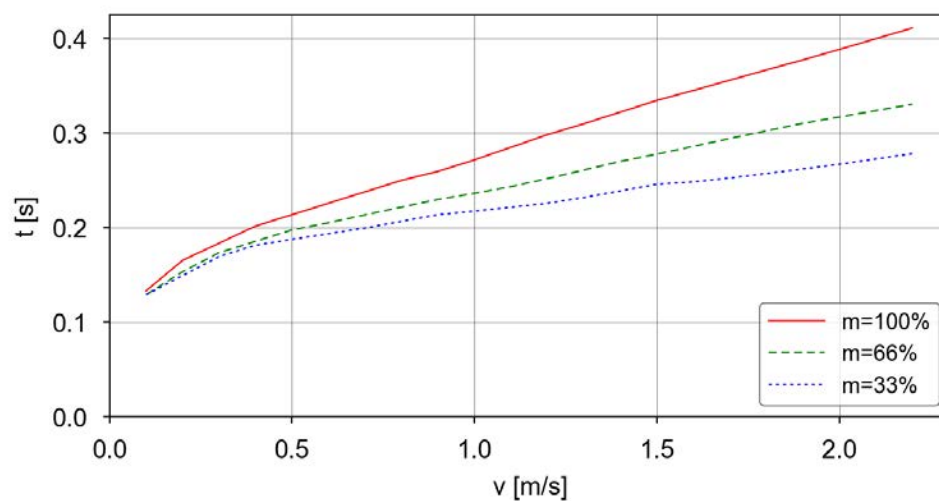


Category 1, Axis 3

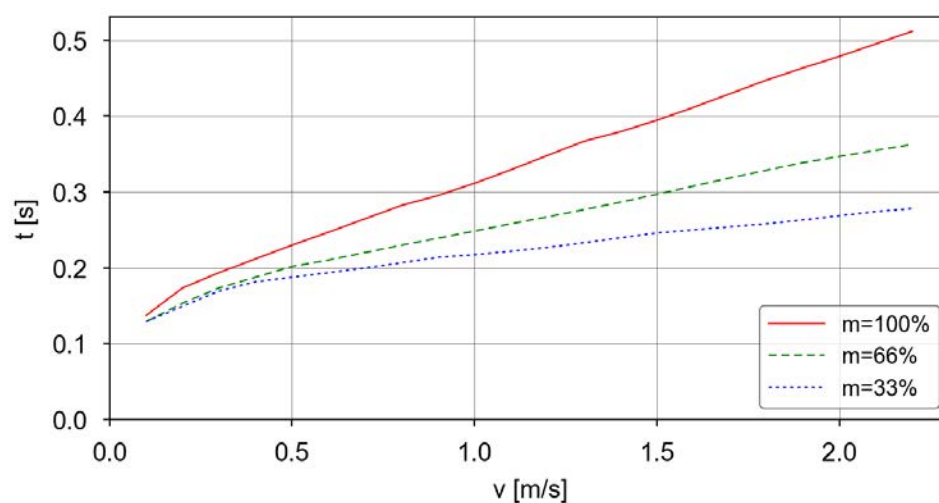
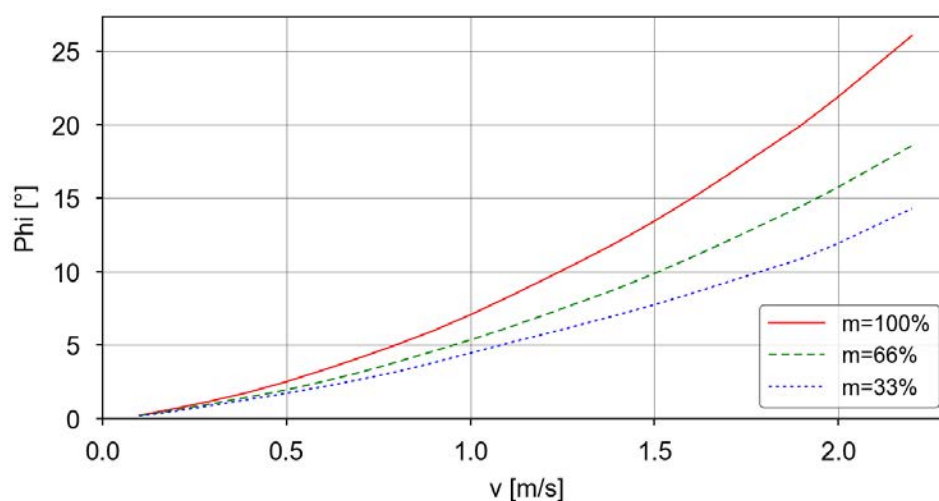
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



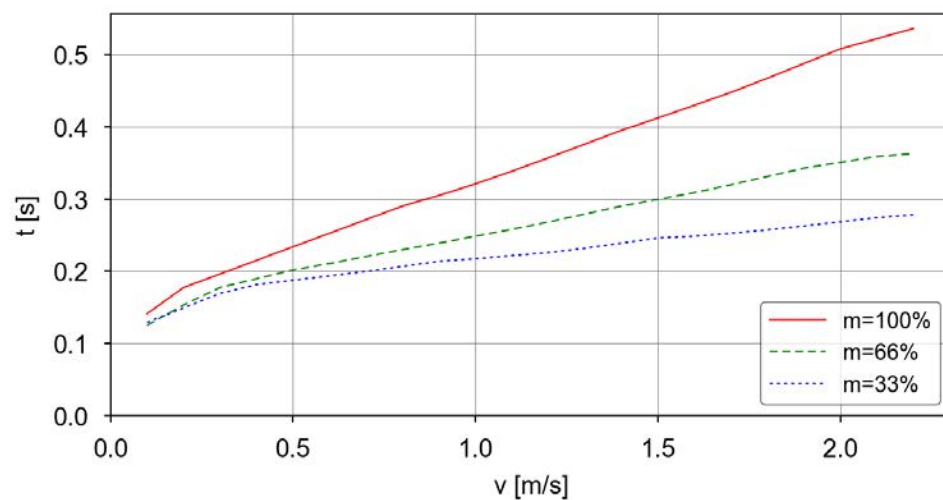
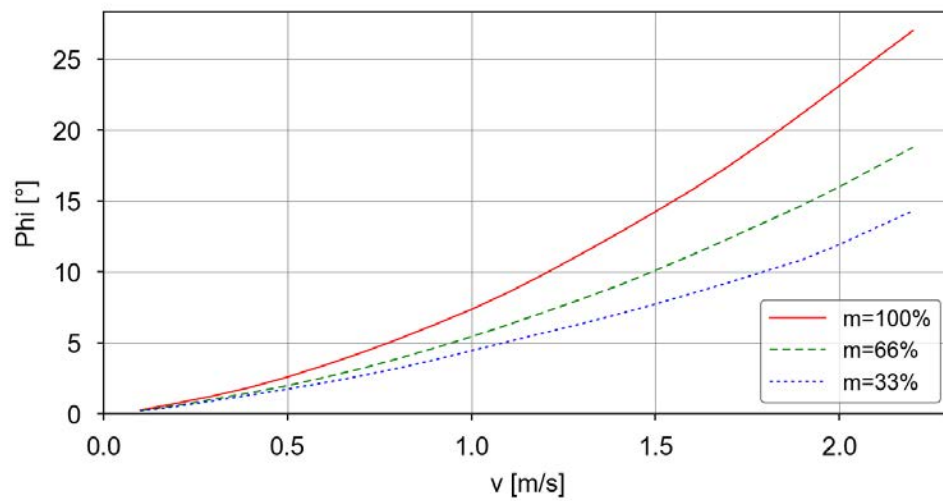
Continues on next page

12 IRB 6790

12.2 IRB 6790 2.80 m 205 kg

Continued

Extension zone 2, stopping distance and stopping time



13 IRB 8700

13.1 IRB 8700 3.50 m 800 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	44.4	1.31
2	11.4	0.32
3	13.0	0.37

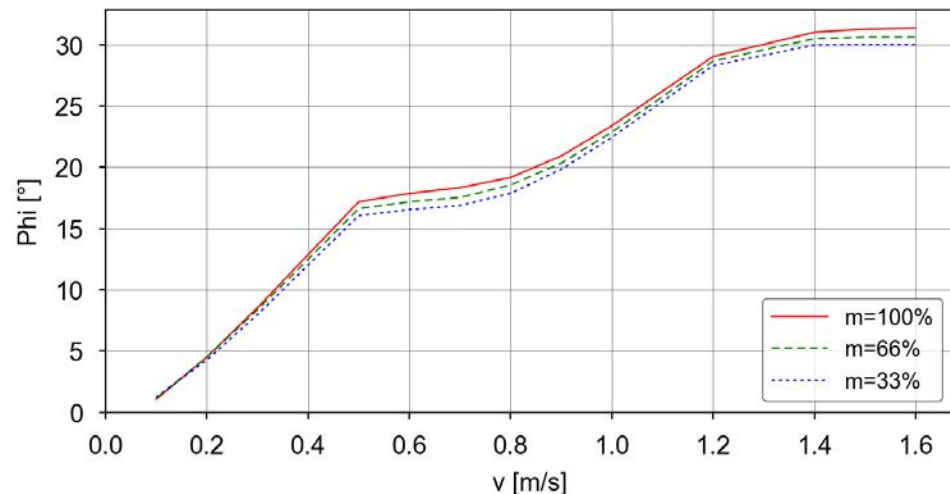
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.169
1	1.169	2.338
2	2.338	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

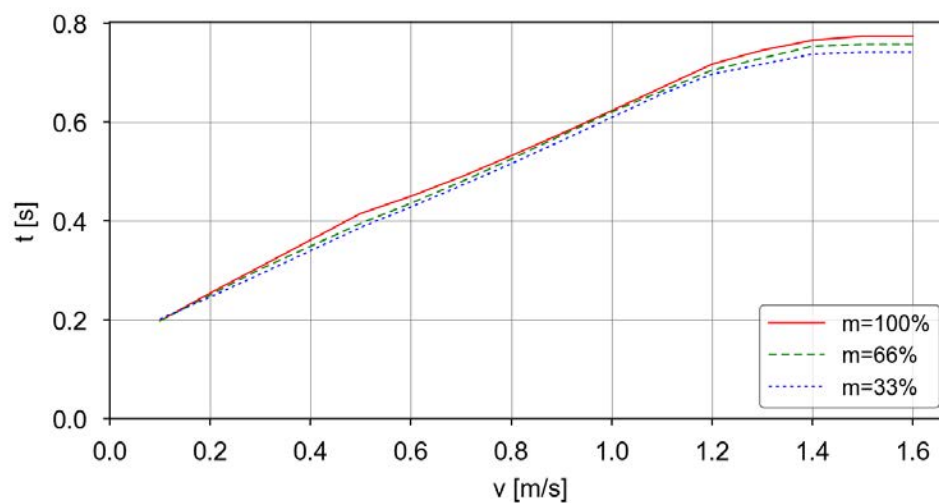


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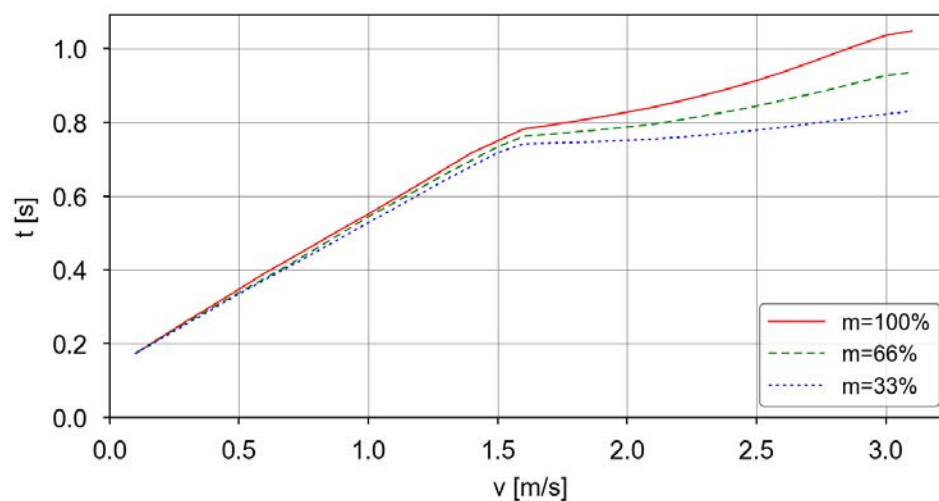
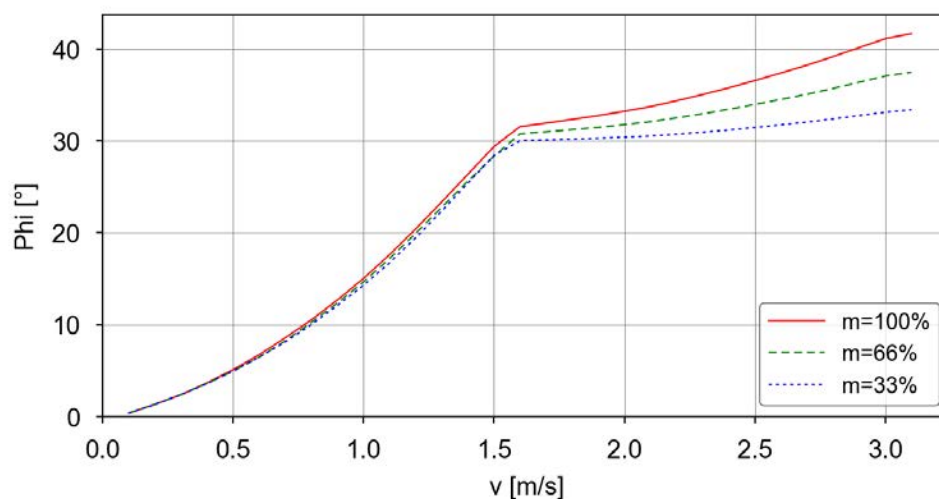
13 IRB 8700

13.1 IRB 8700 3.50 m 800 kg

Continued

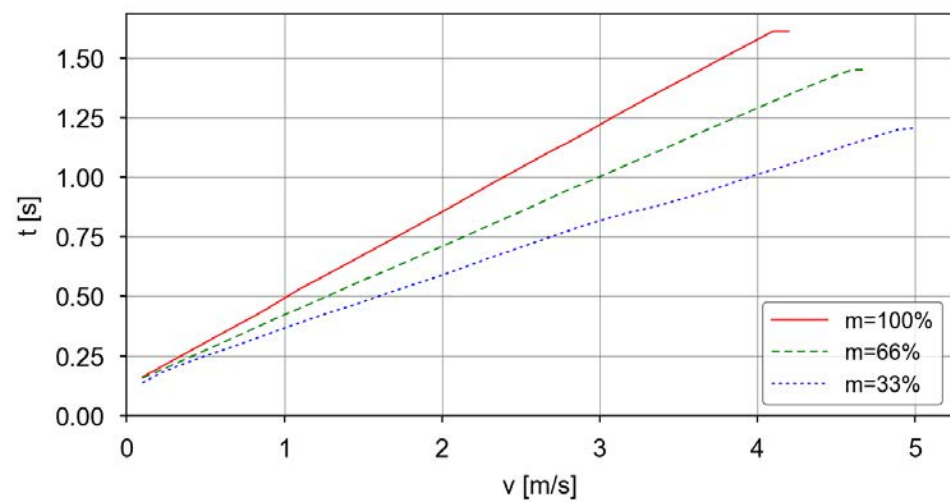
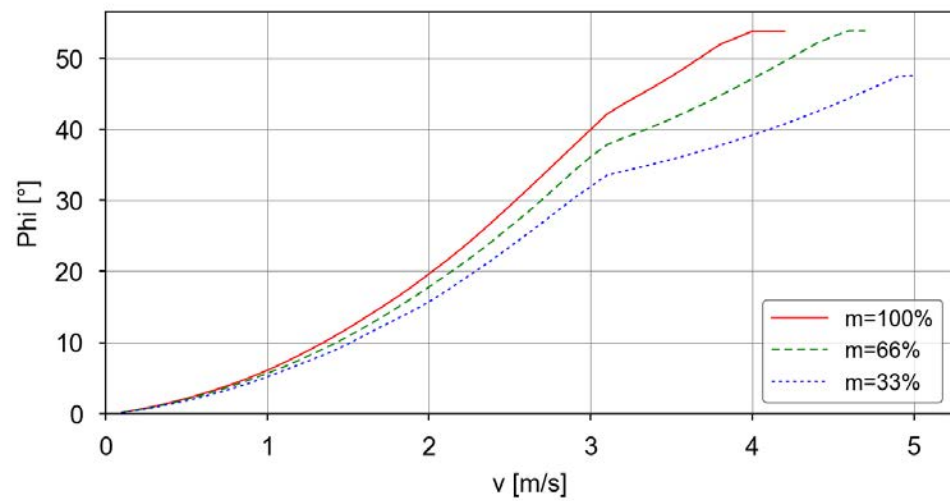


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

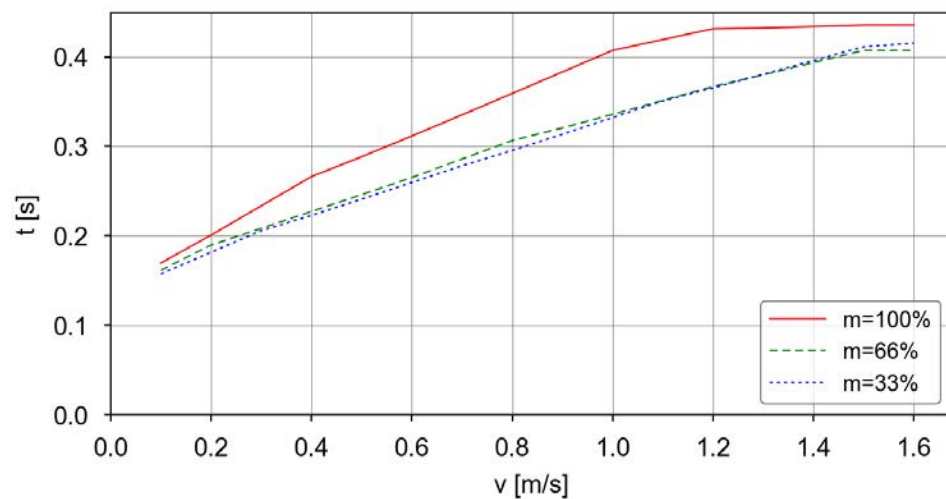
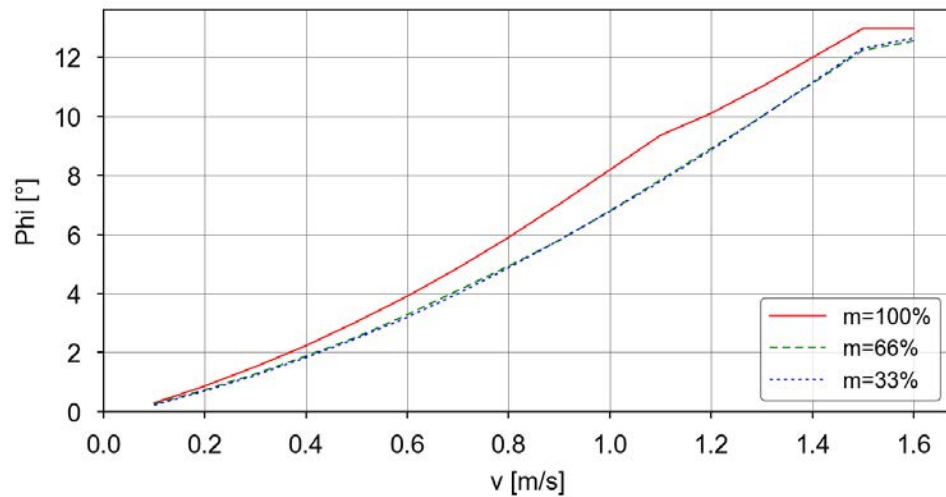
13 IRB 8700

13.1 IRB 8700 3.50 m 800 kg

Continued

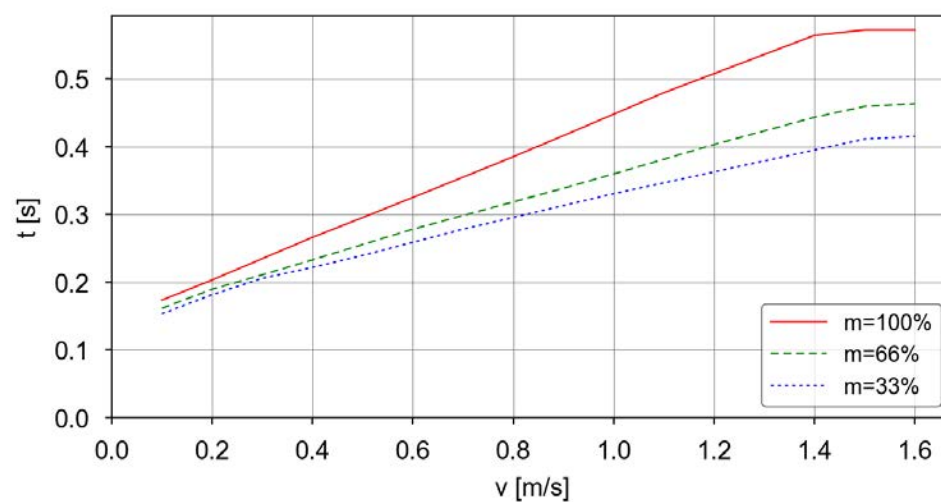
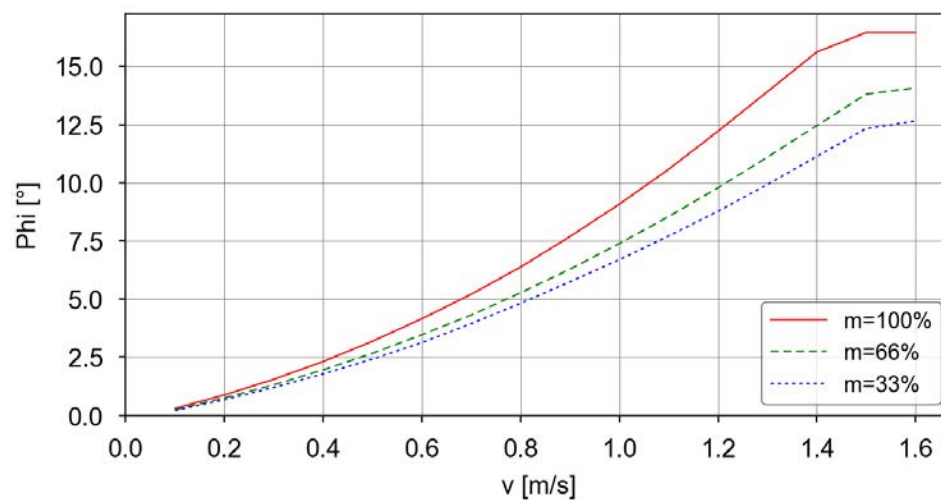
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

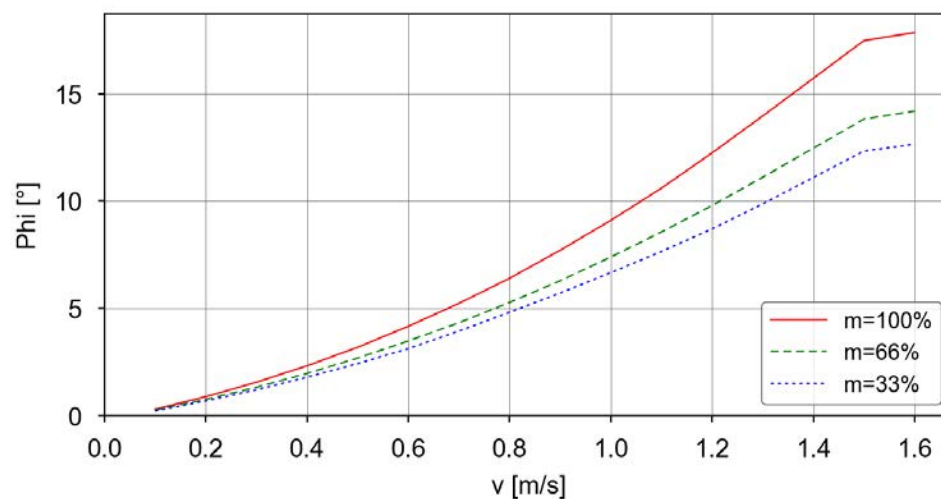


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

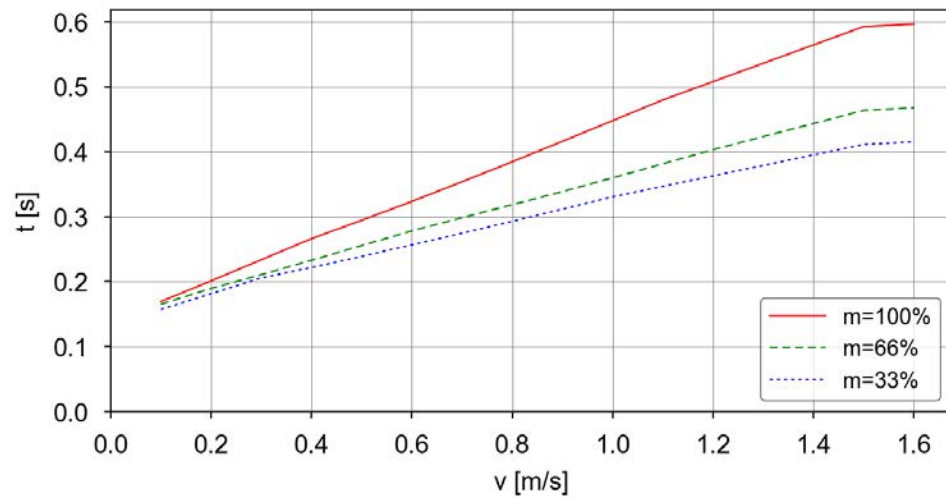


Continues on next page

13 IRB 8700

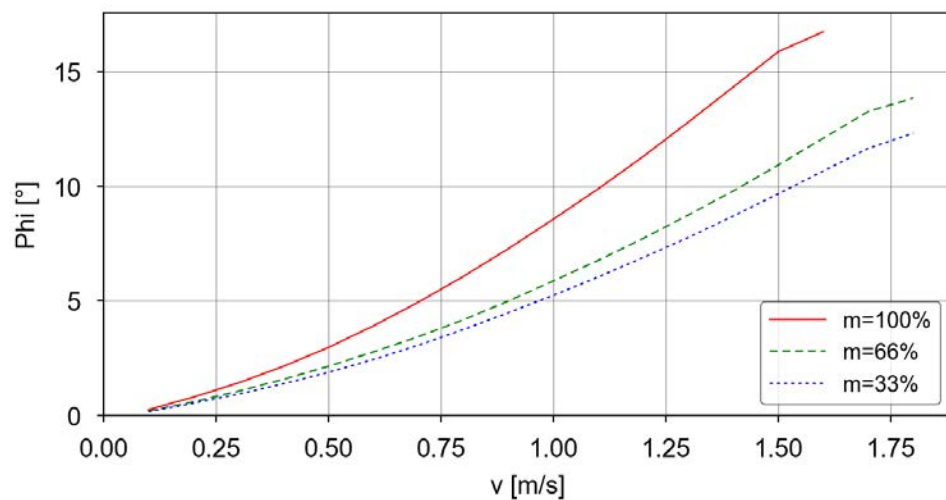
13.1 IRB 8700 3.50 m 800 kg

Continued

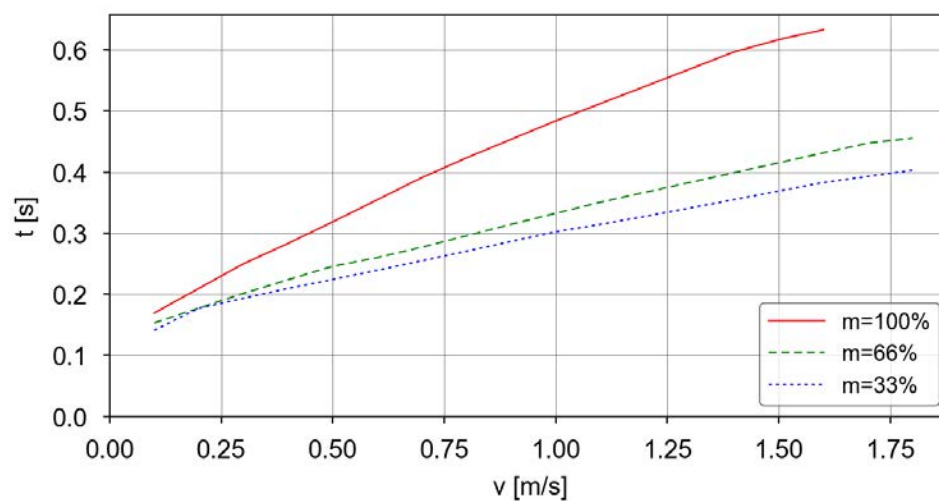


Category 1, Axis 3

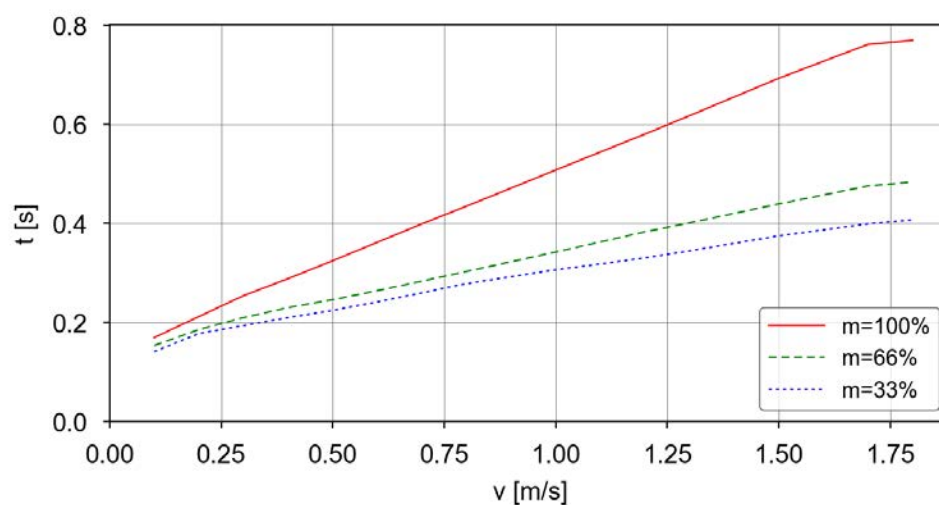
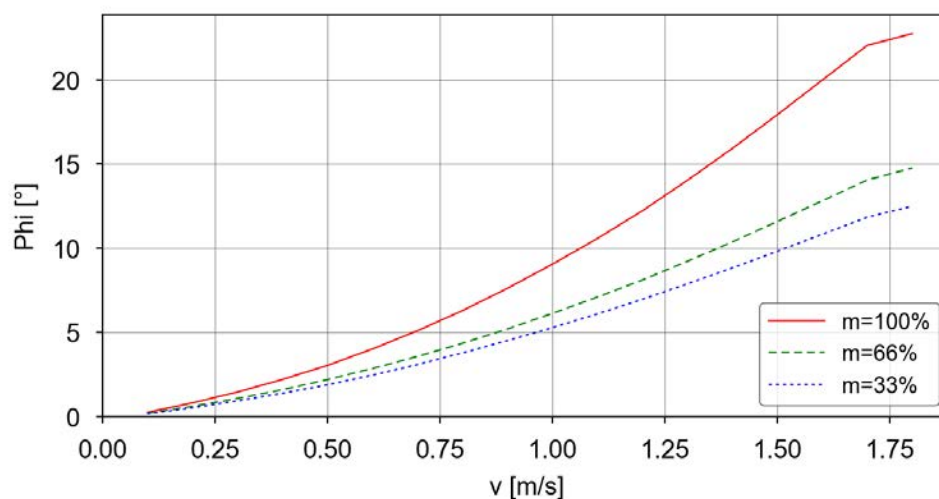
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



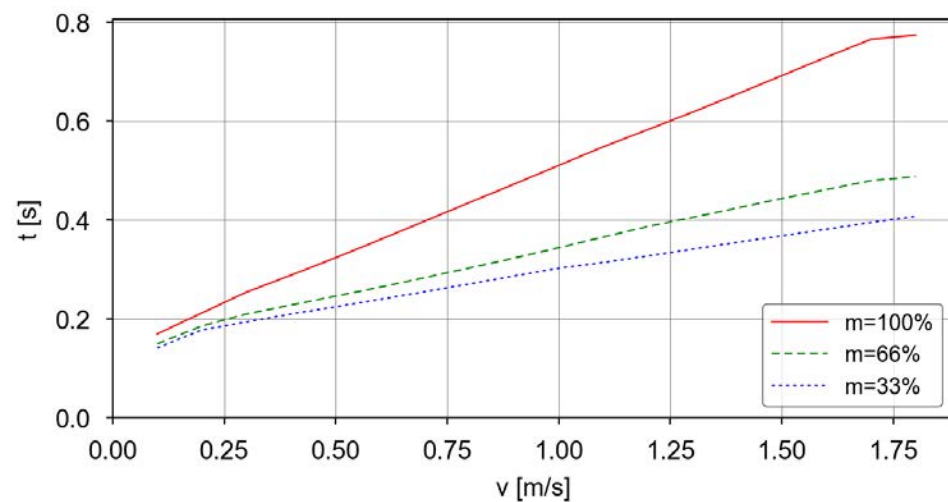
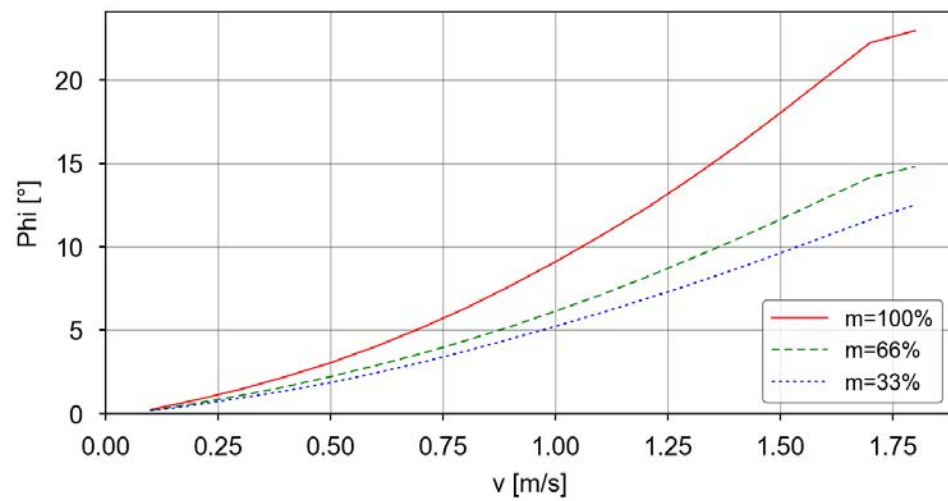
Continues on next page

13 IRB 8700

13.1 IRB 8700 3.50 m 800 kg

Continued

Extension zone 2, stopping distance and stopping time



13.2 IRB 8700 4.20 m 550 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	44.4	1.33
2	10.0	0.27
3	14.4	0.44

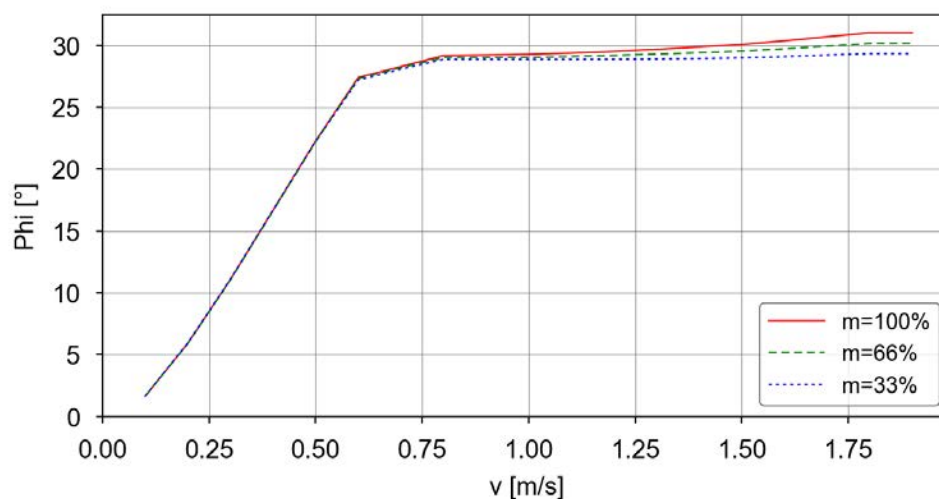
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.399
1	1.399	2.798
2	2.798	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

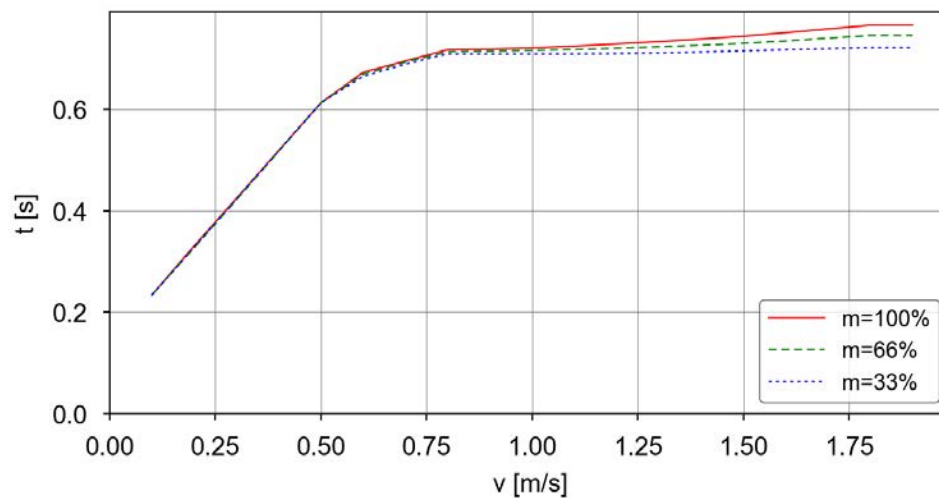


Continues on next page

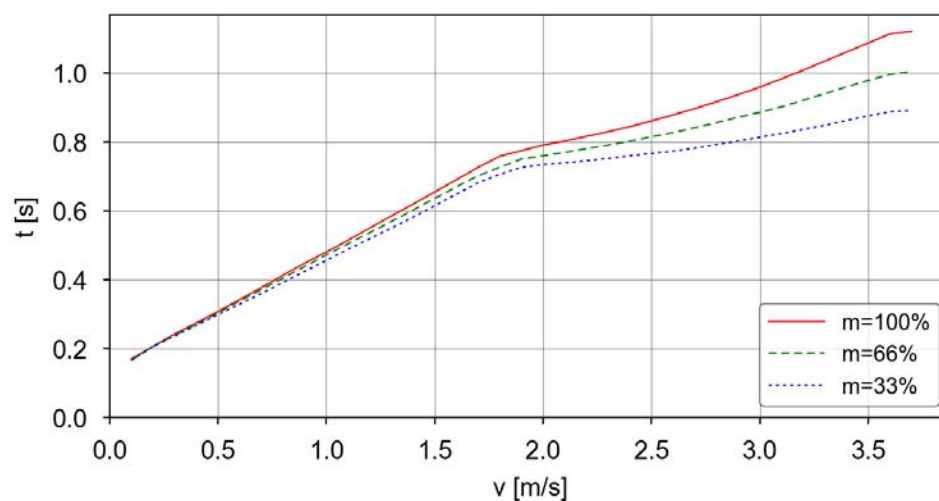
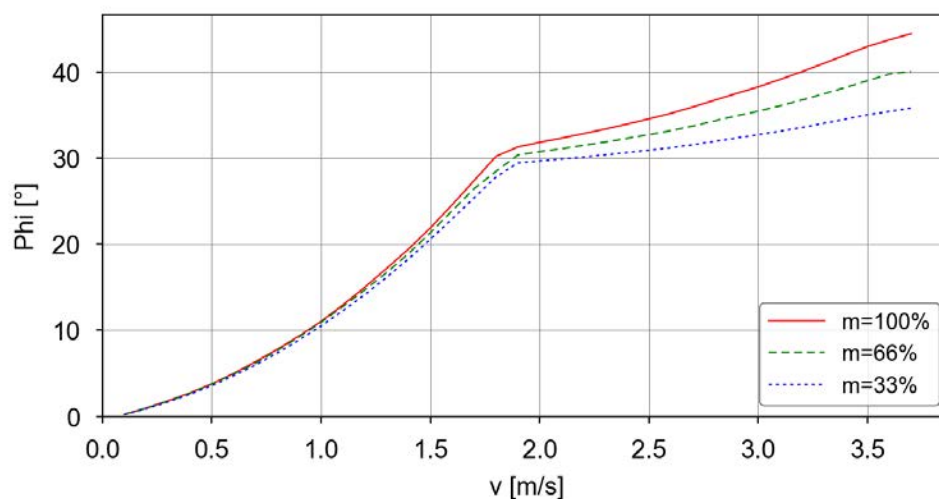
13 IRB 8700

13.2 IRB 8700 4.20 m 550 kg

Continued

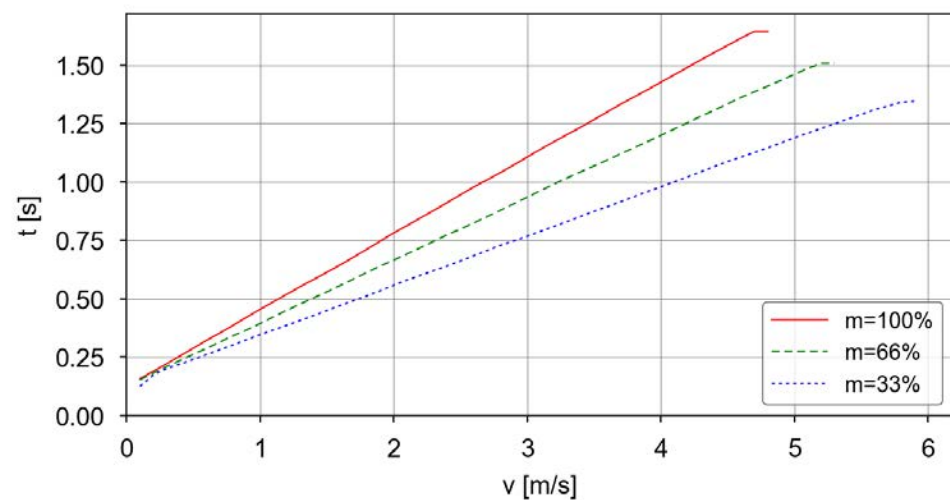
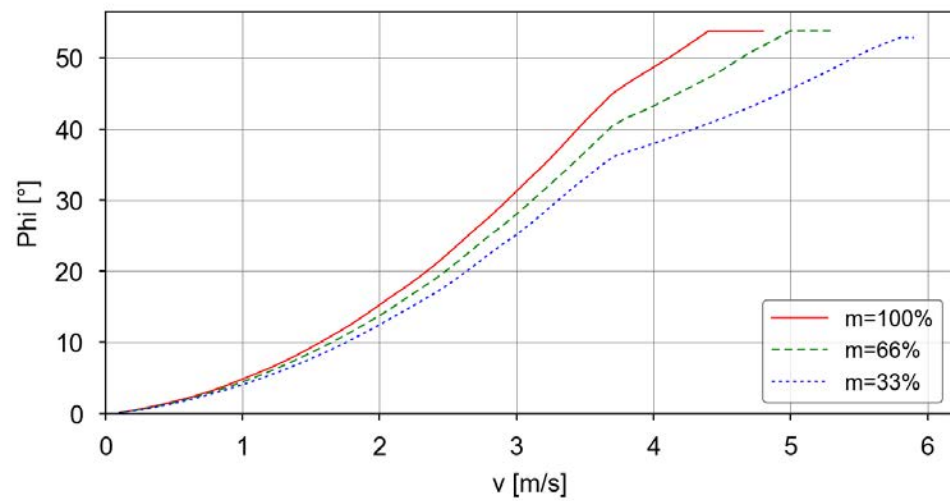


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

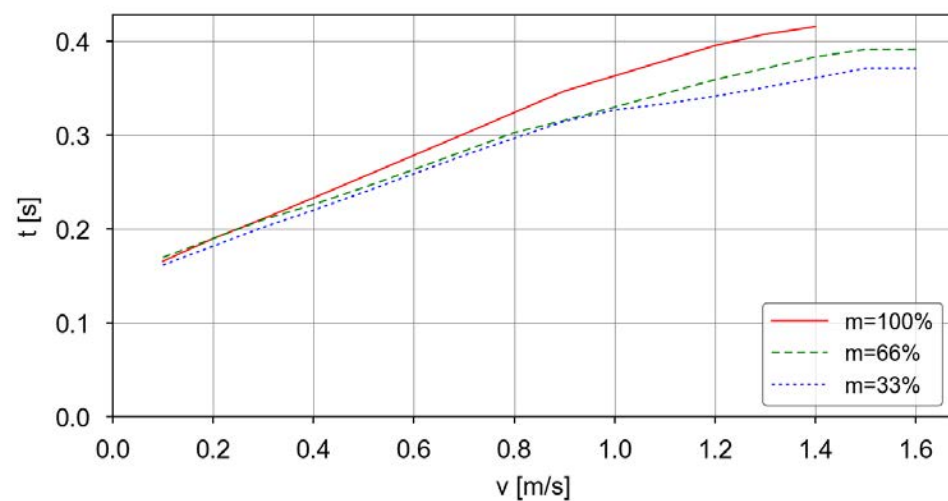
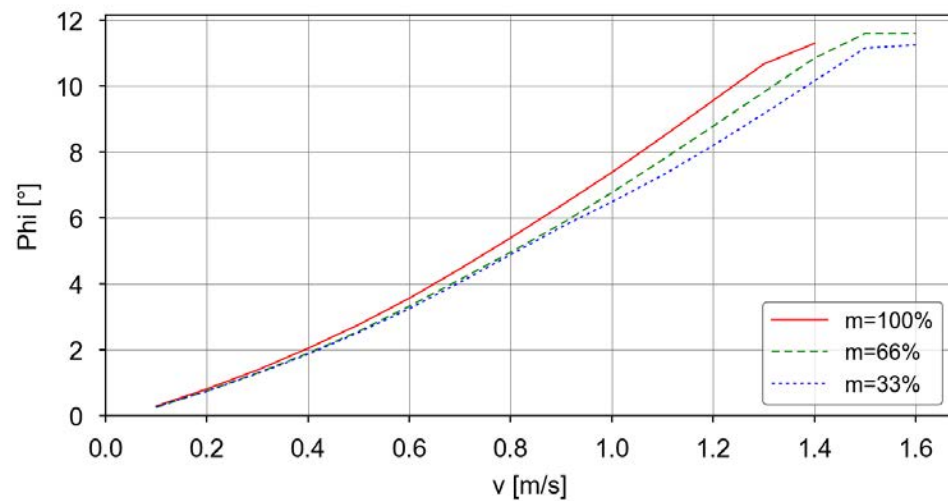
13 IRB 8700

13.2 IRB 8700 4.20 m 550 kg

Continued

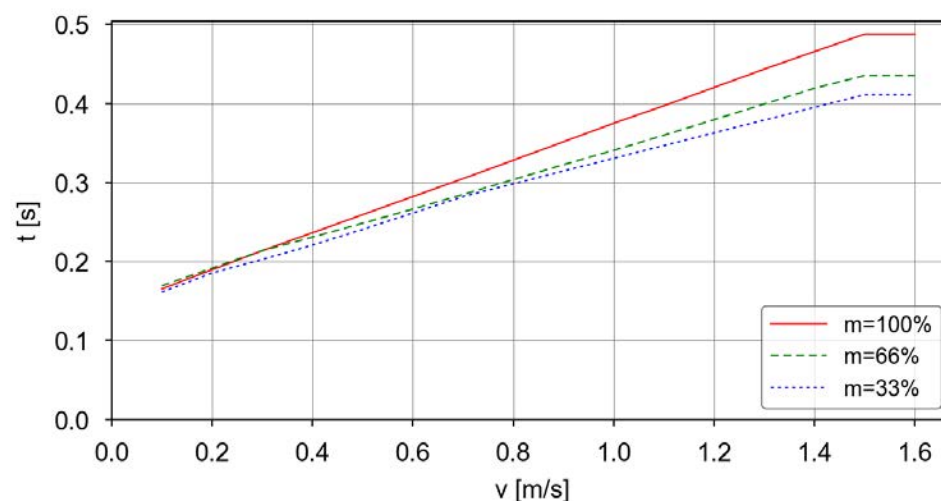
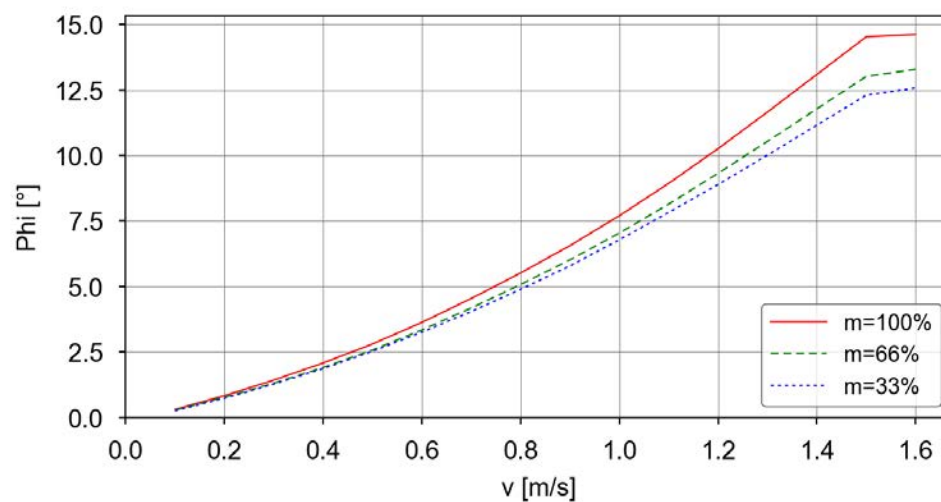
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

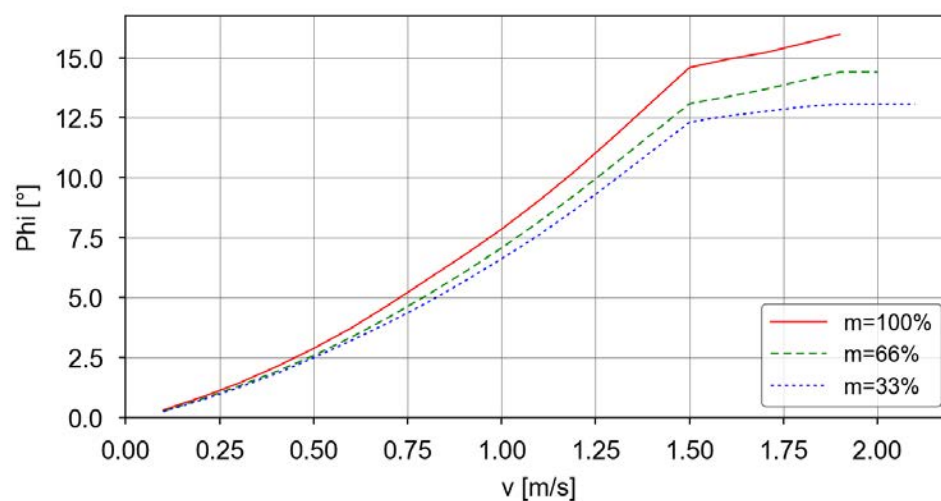


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

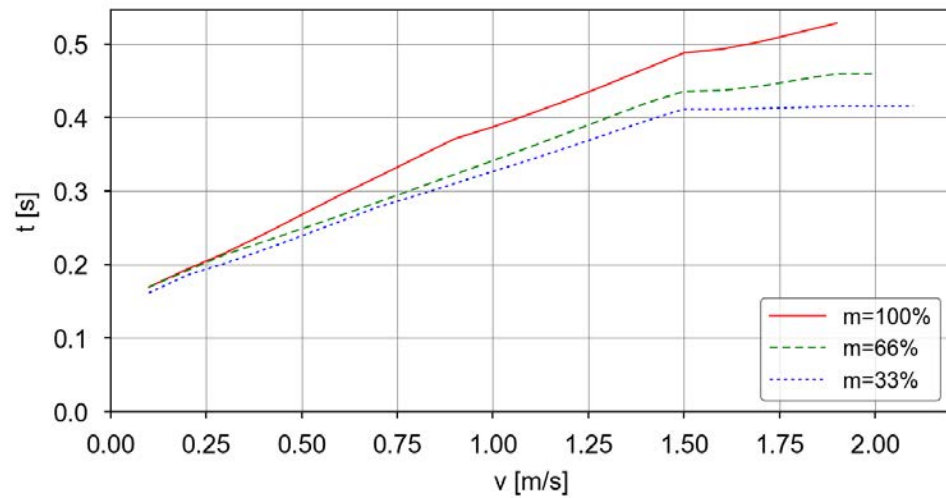


Continues on next page

13 IRB 8700

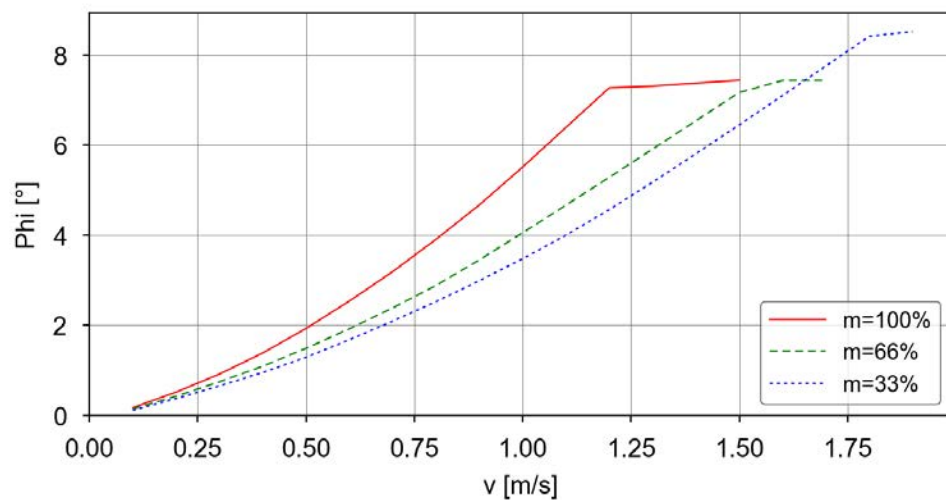
13.2 IRB 8700 4.20 m 550 kg

Continued

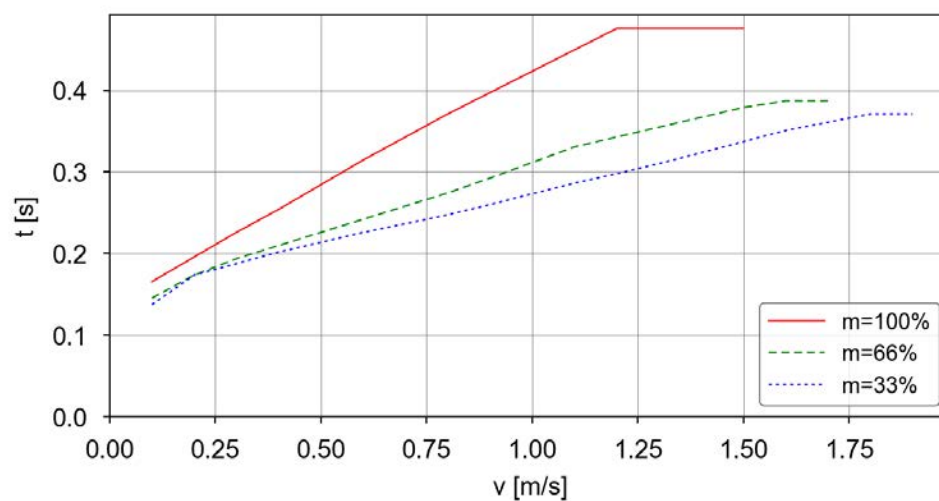


Category 1, Axis 3

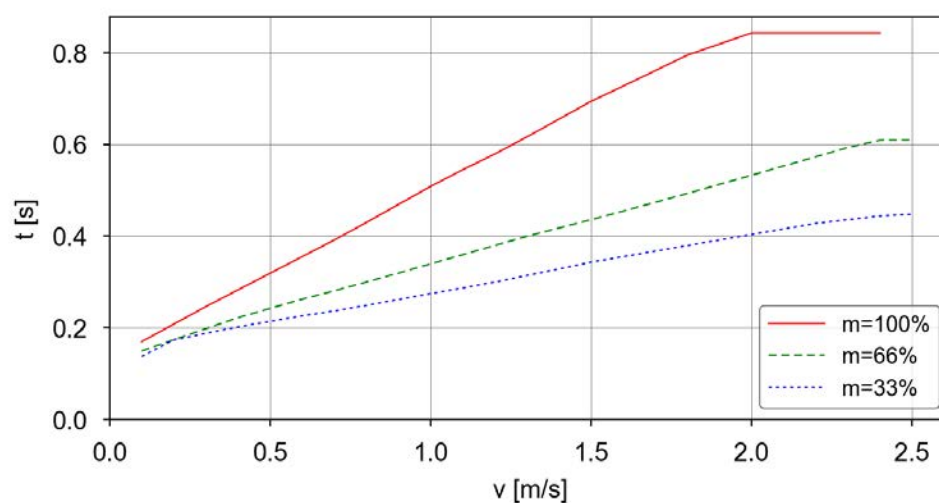
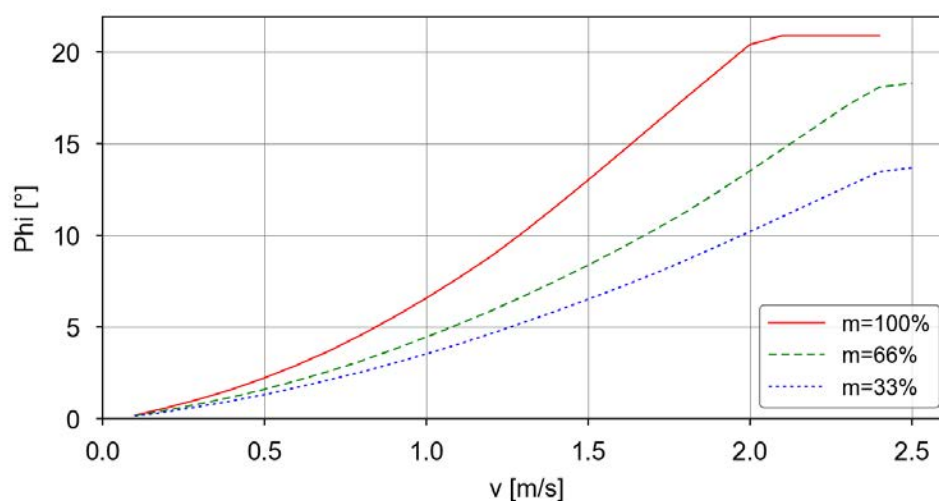
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



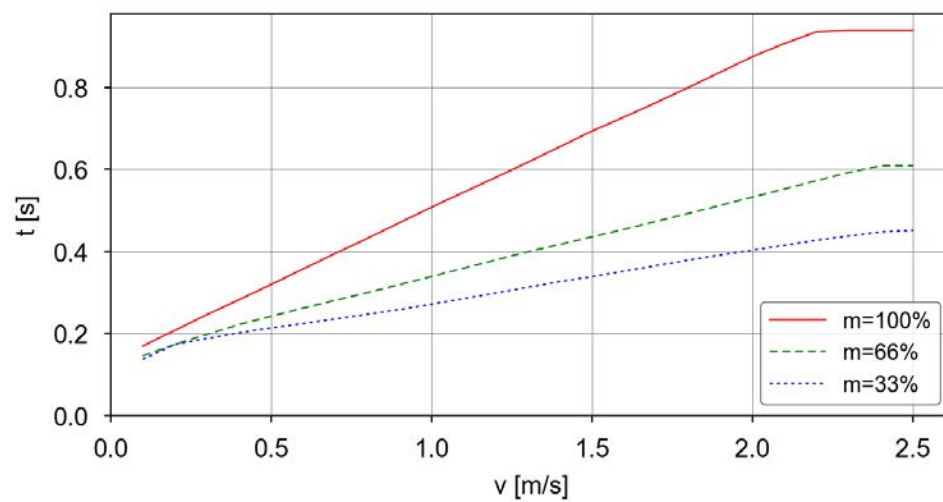
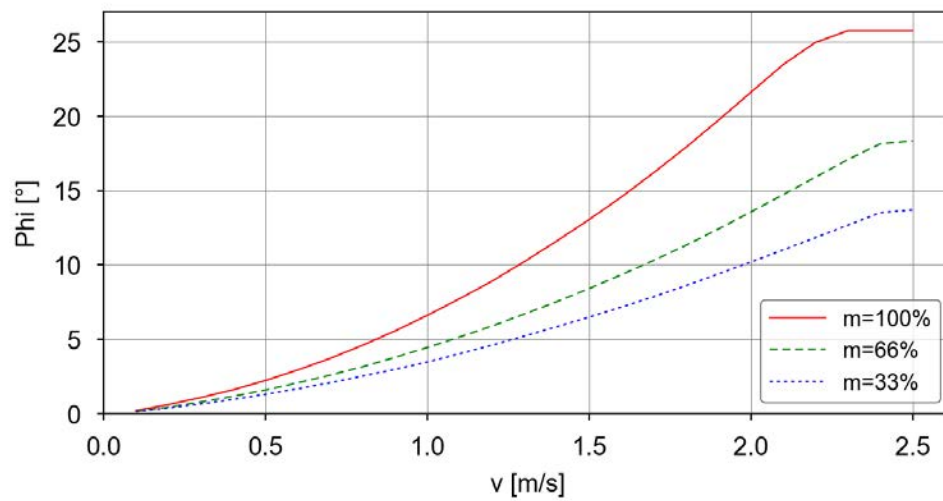
Continues on next page

13 IRB 8700

13.2 IRB 8700 4.20 m 550 kg

Continued

Extension zone 2, stopping distance and stopping time



13.3 IRB 8700LeanID 3.50 m 630 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	44.4	1.19
2	10.1	0.27
3	9.6	0.25

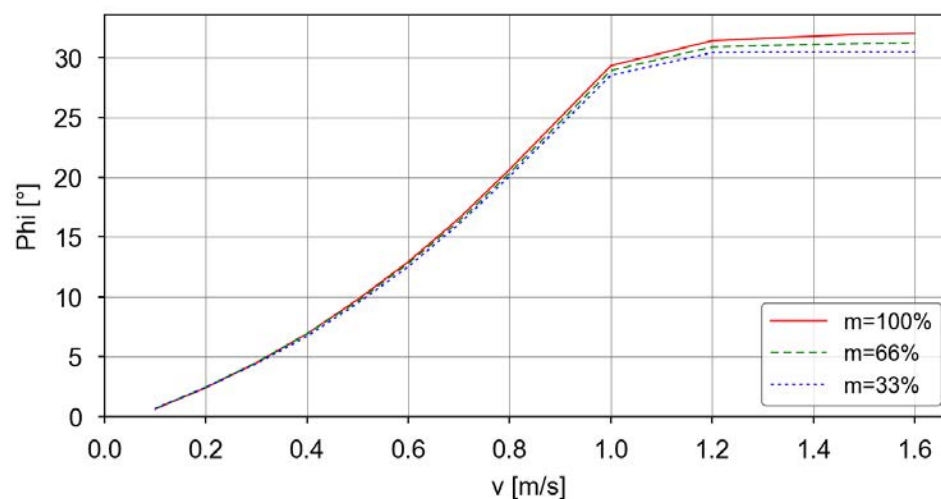
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.169
1	1.169	2.338
2	2.338	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

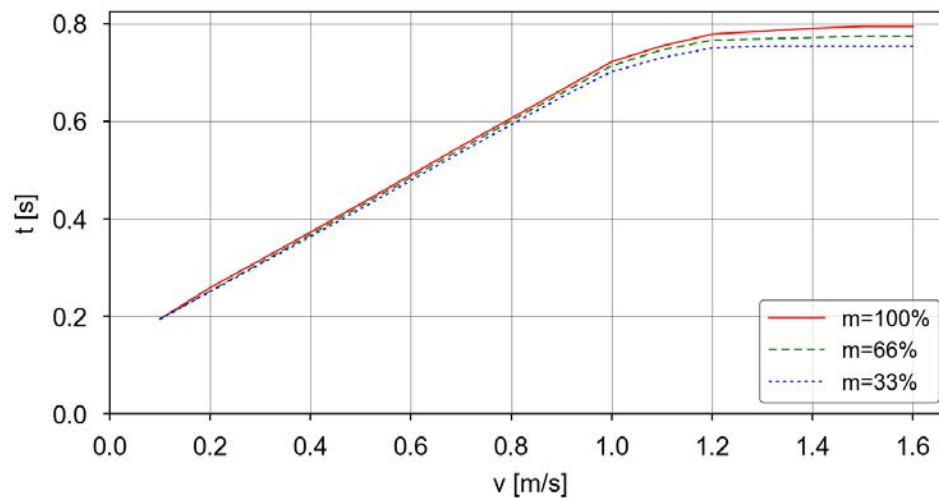


Continues on next page

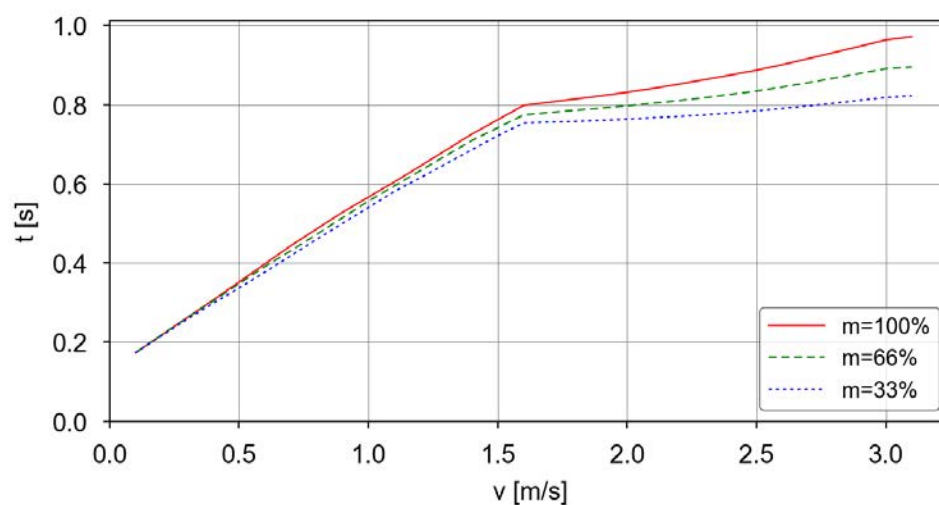
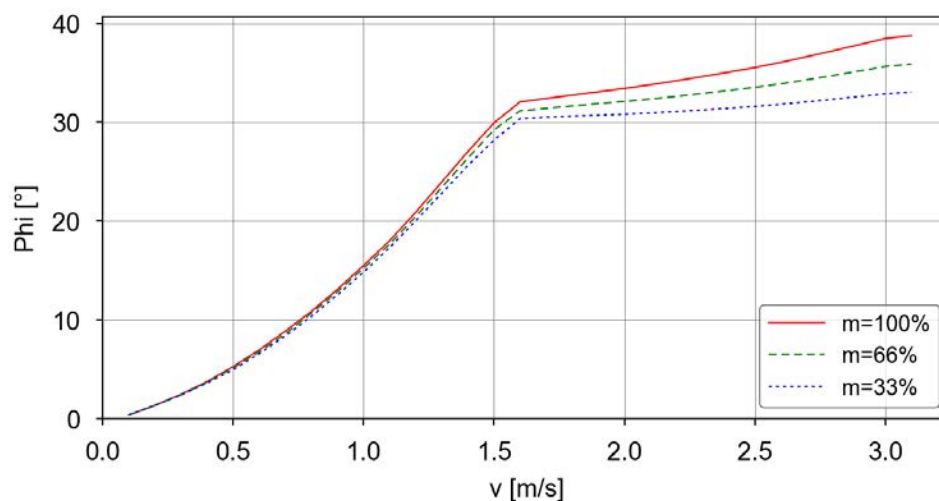
13 IRB 8700

13.3 IRB 8700LeanID 3.50 m 630 kg

Continued

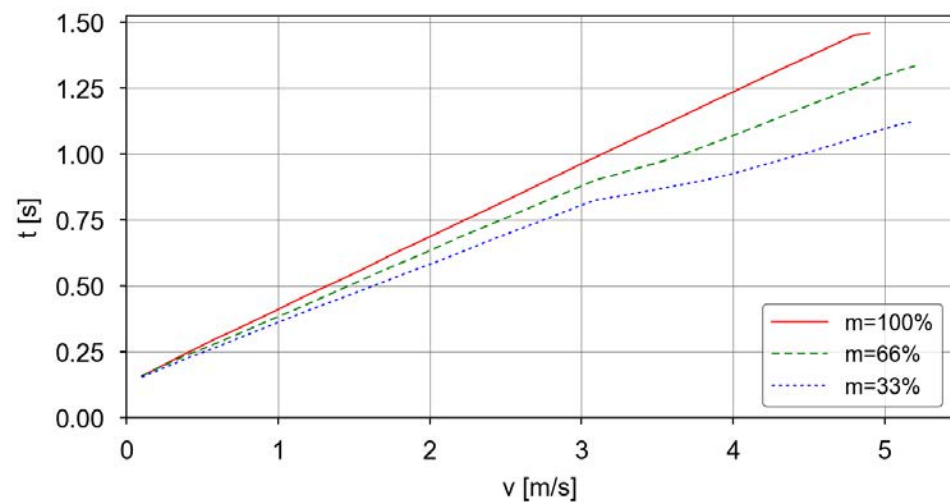
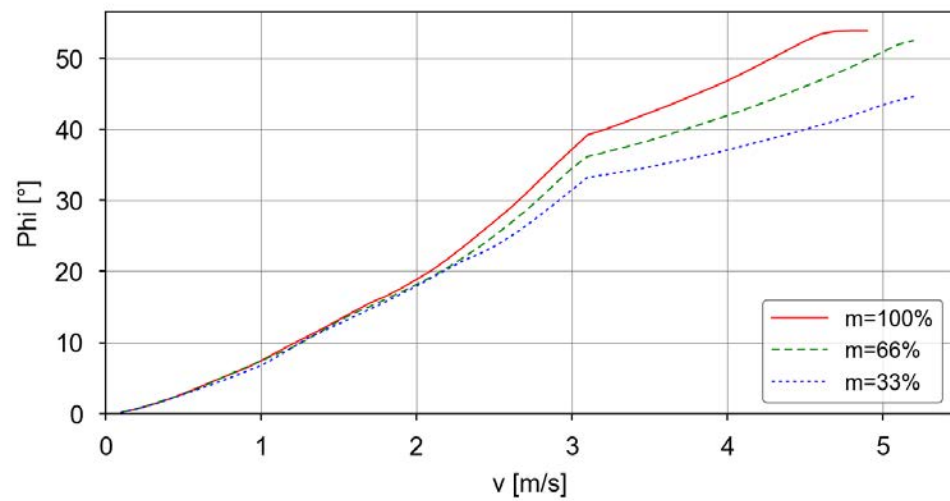


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

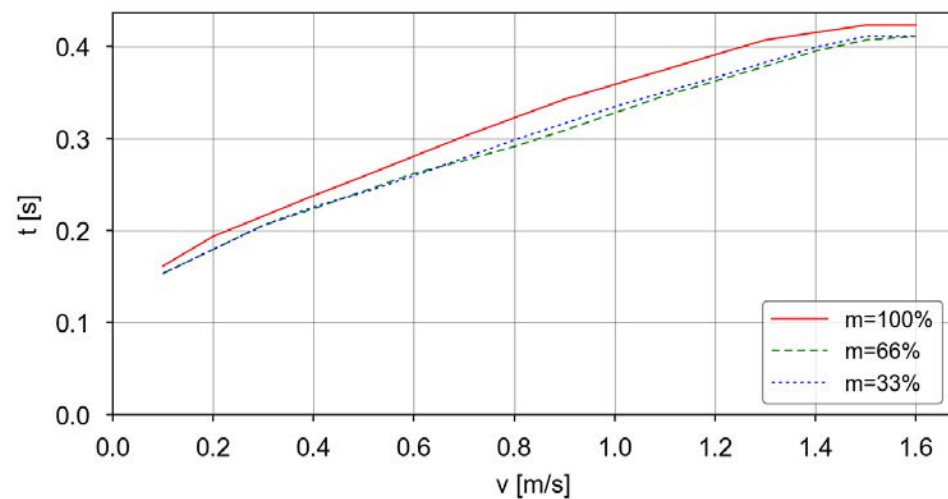
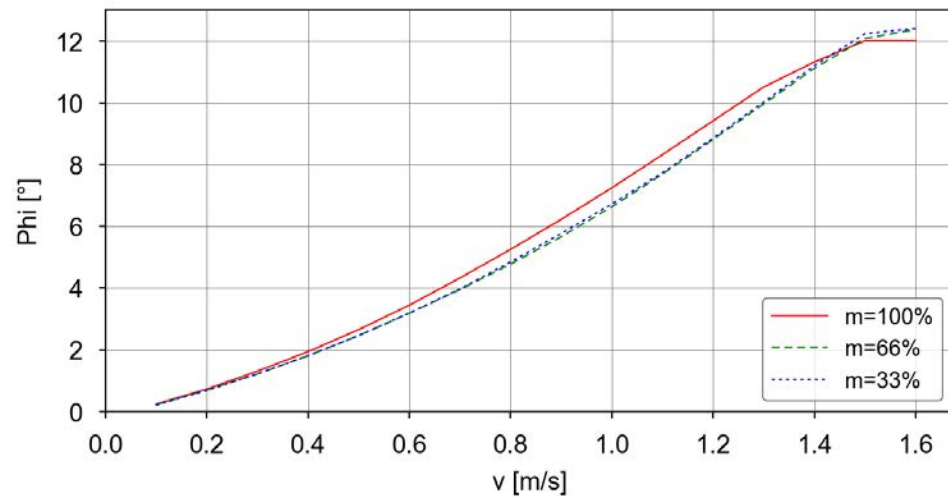
13 IRB 8700

13.3 IRB 8700LeanID 3.50 m 630 kg

Continued

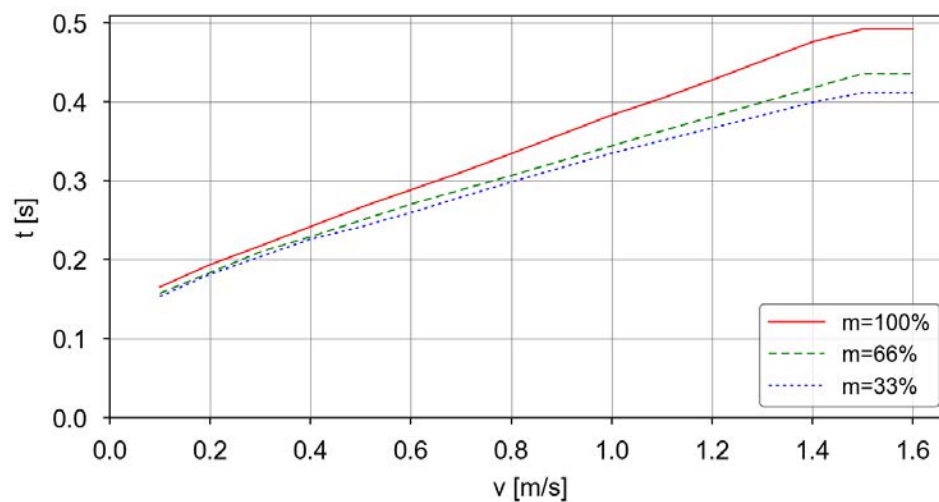
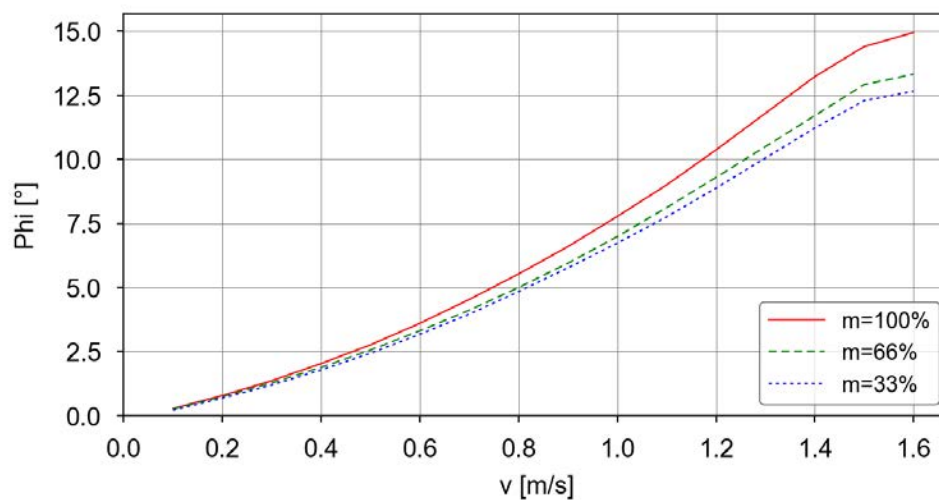
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

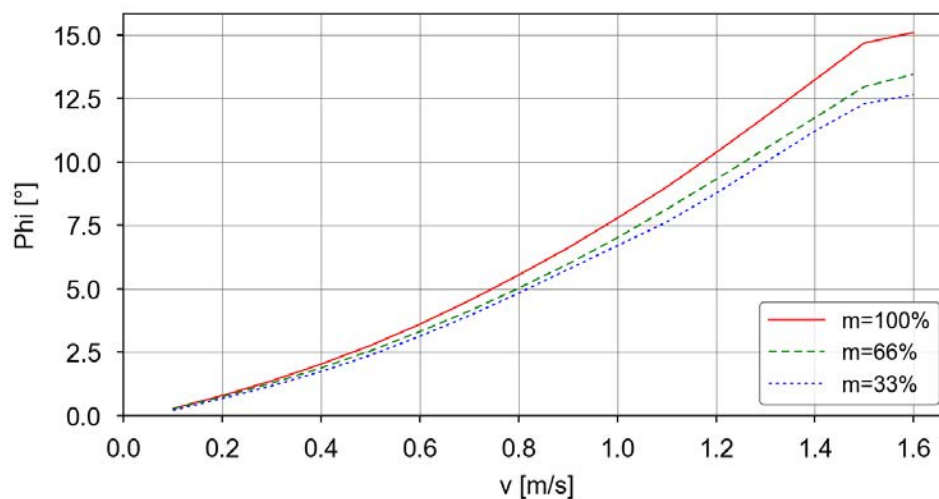


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Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

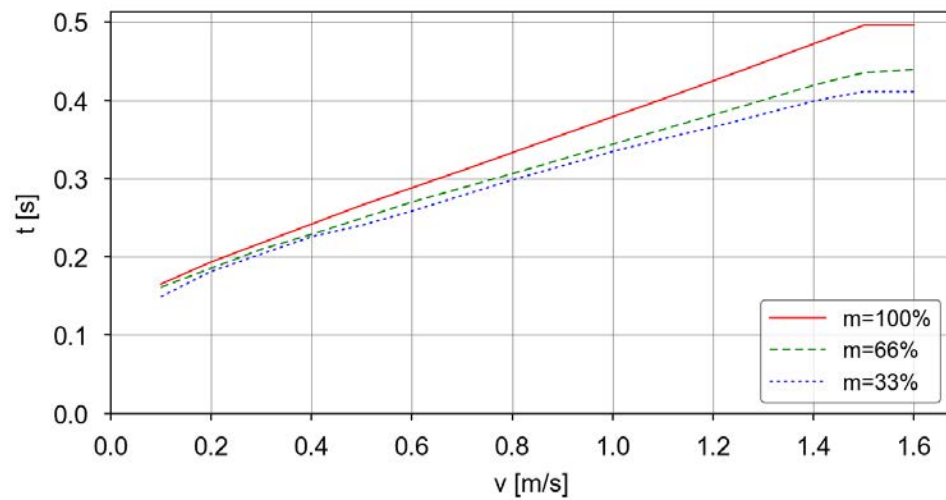


Continues on next page

13 IRB 8700

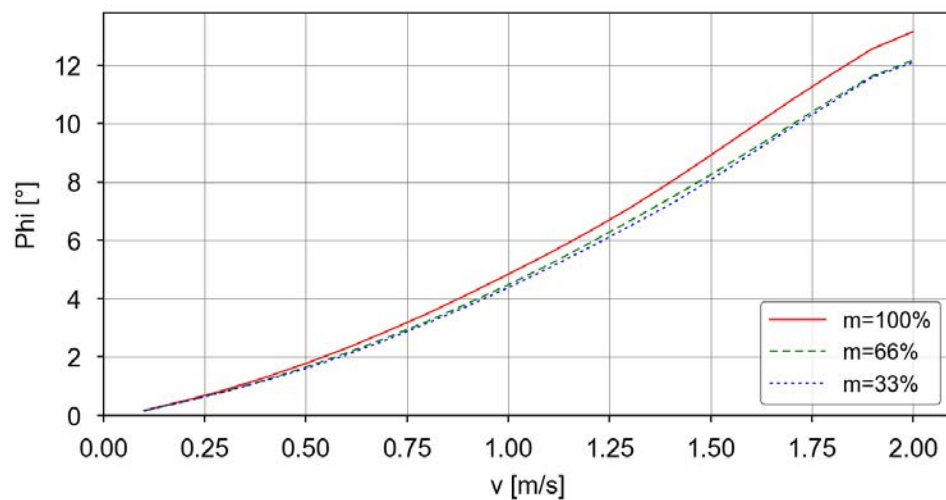
13.3 IRB 8700LeanID 3.50 m 630 kg

Continued

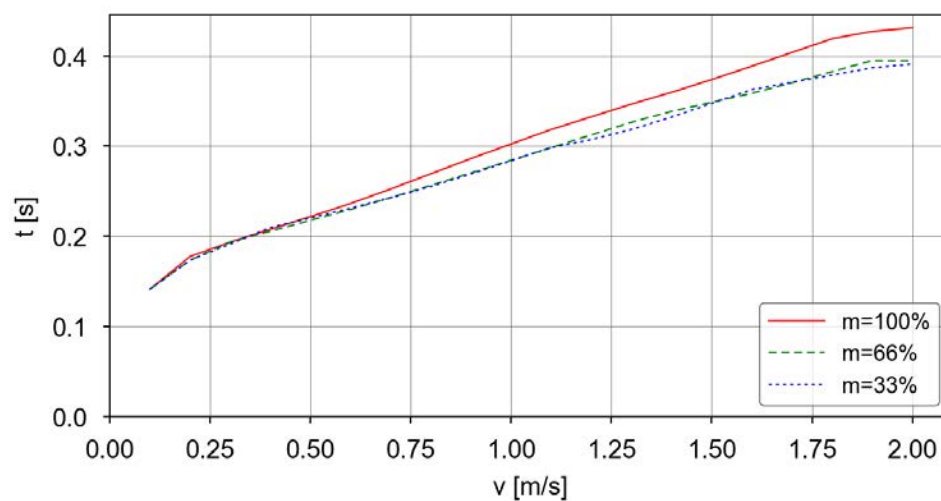


Category 1, Axis 3

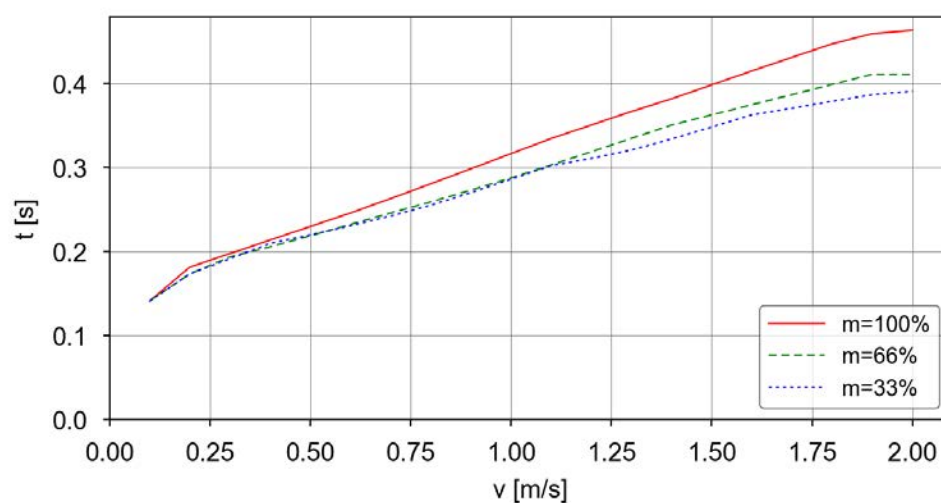
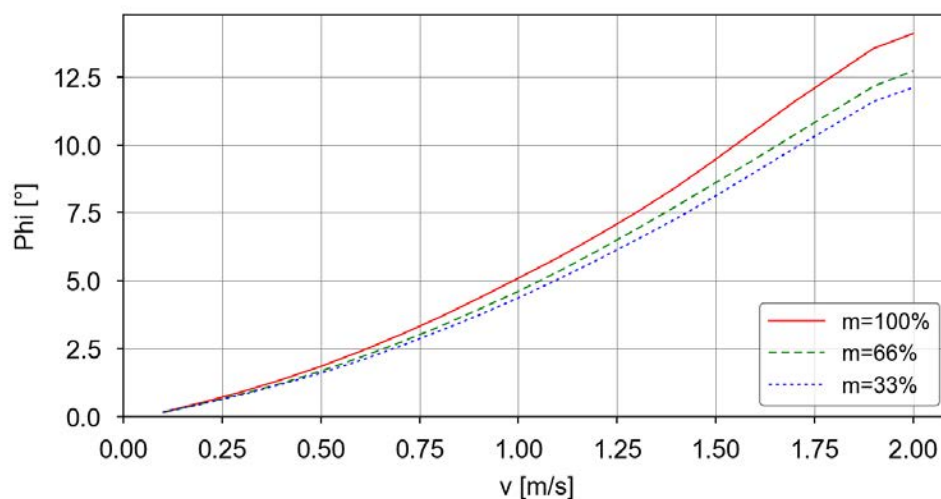
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



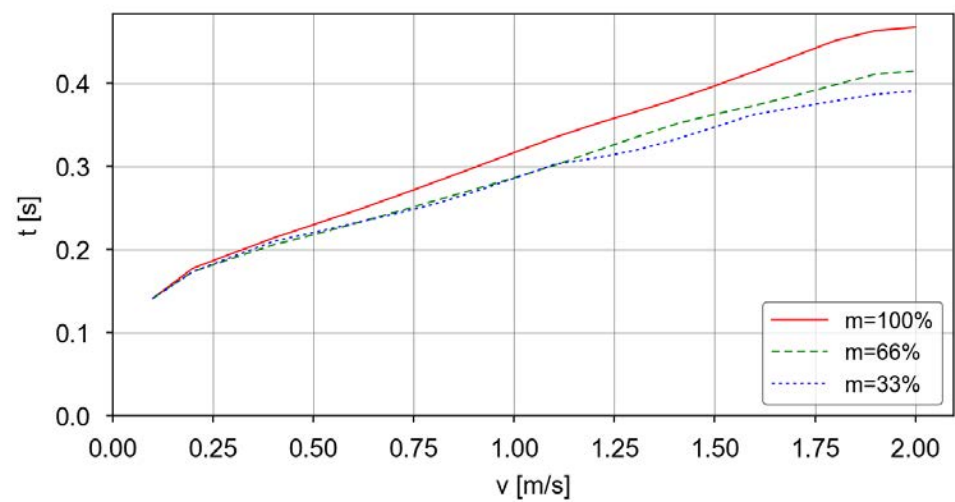
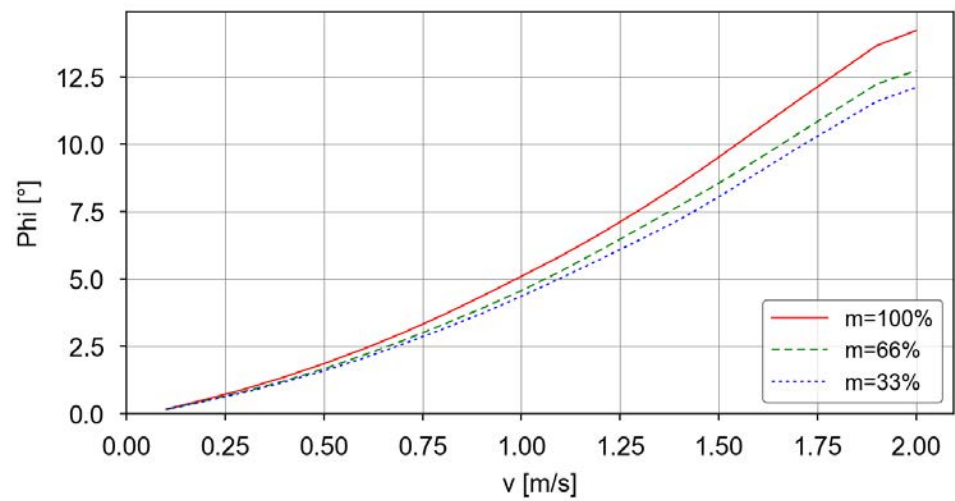
Continues on next page

13 IRB 8700

13.3 IRB 8700LeanID 3.50 m 630 kg

Continued

Extension zone 2, stopping distance and stopping time



13.4 IRB 8700LeanID 4.20 m 475 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	44.4	1.26
2	9.5	0.25
3	12.0	0.34

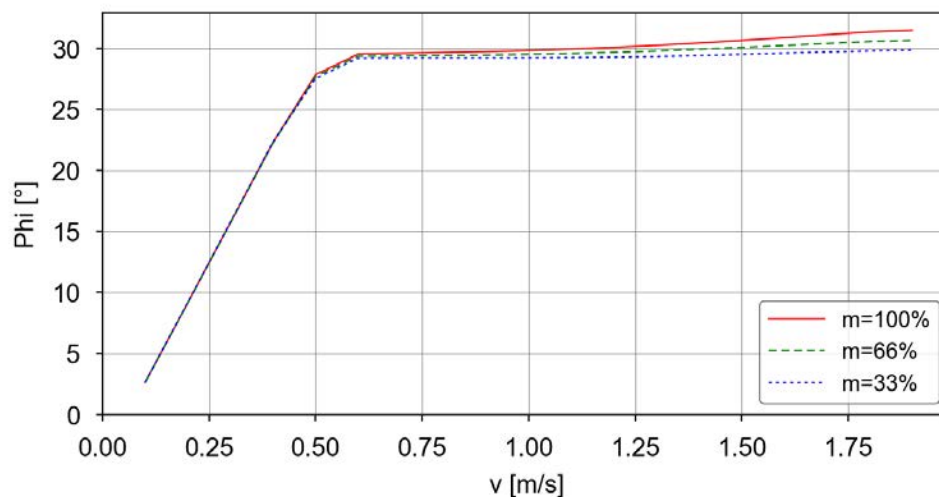
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.399
1	1.399	2.798
2	2.798	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

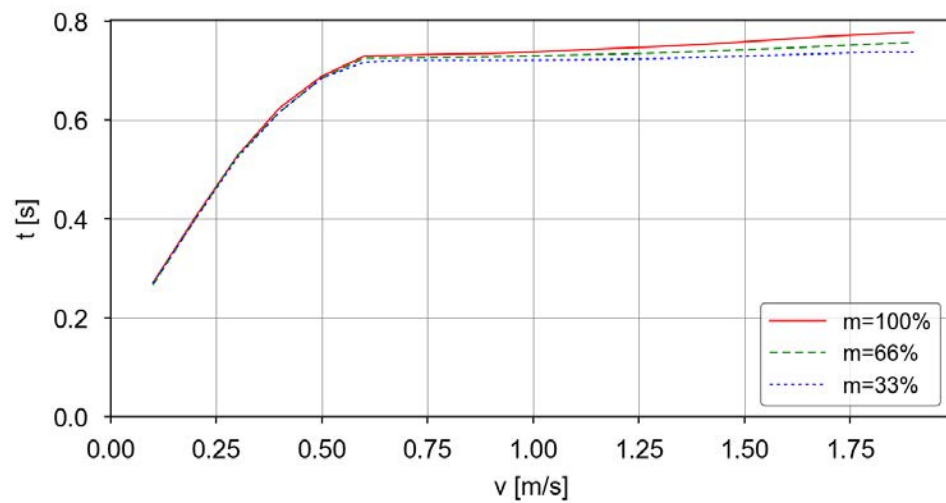


Continues on next page

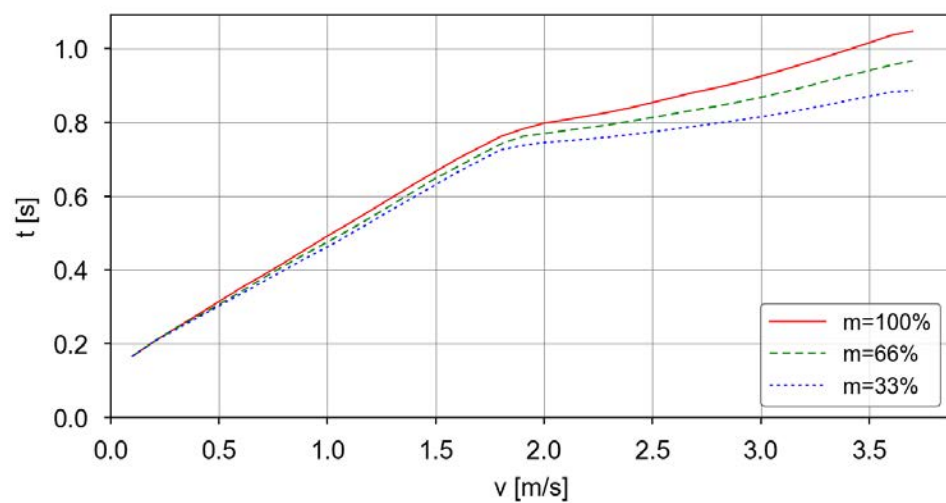
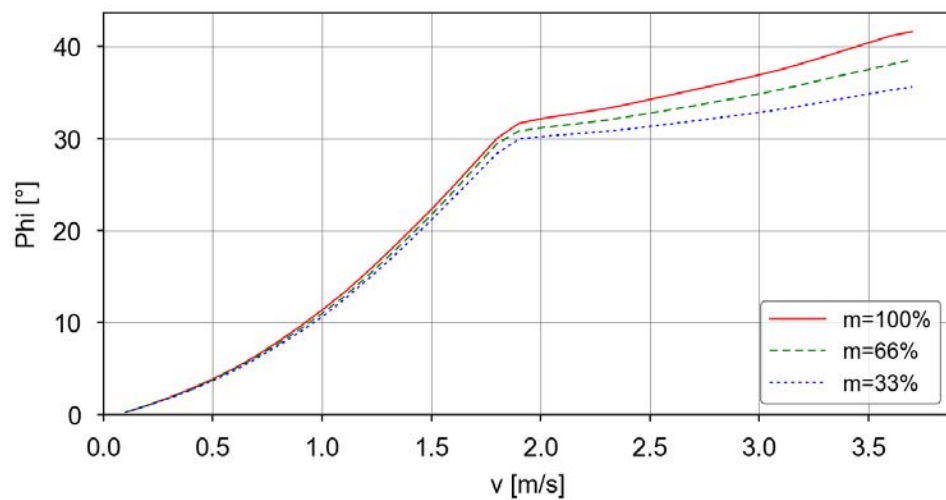
13 IRB 8700

13.4 IRB 8700LeanID 4.20 m 475 kg

Continued

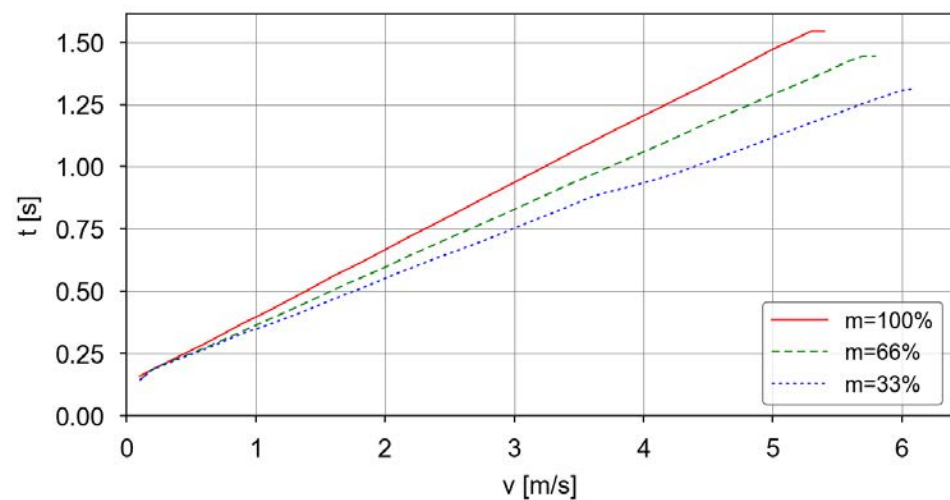
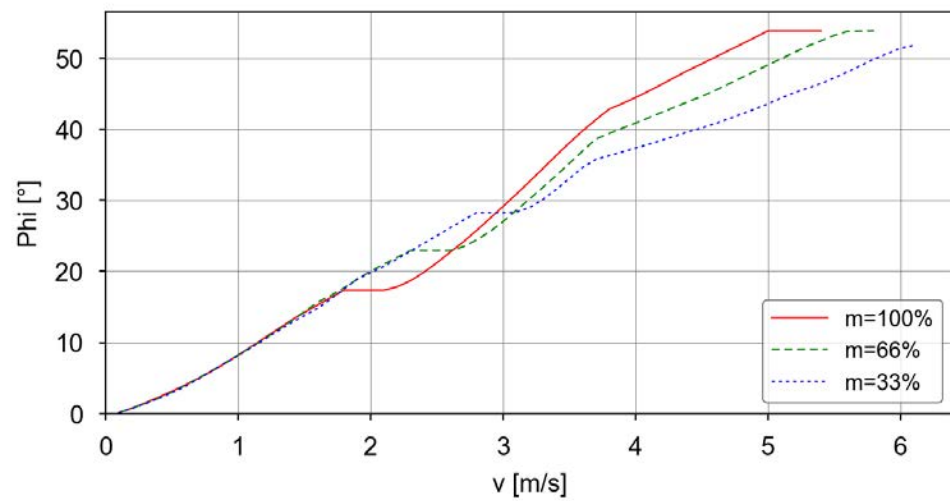


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

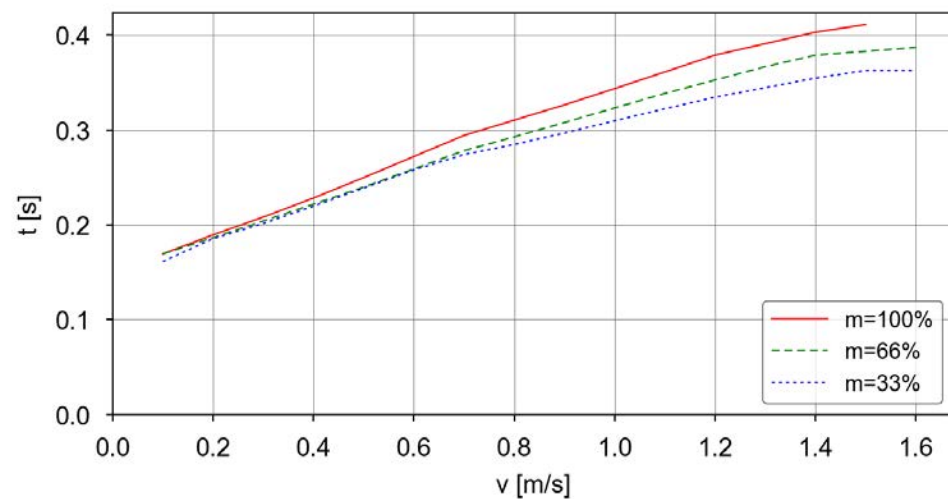
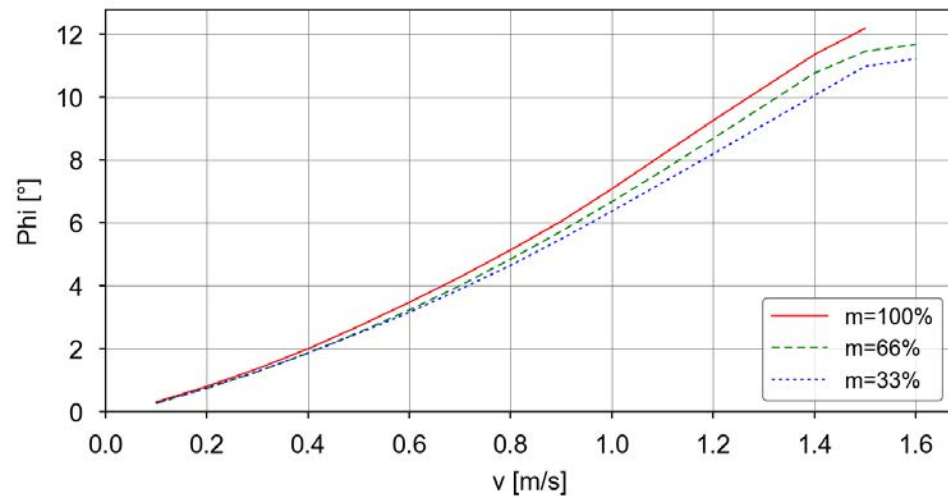
13 IRB 8700

13.4 IRB 8700LeanID 4.20 m 475 kg

Continued

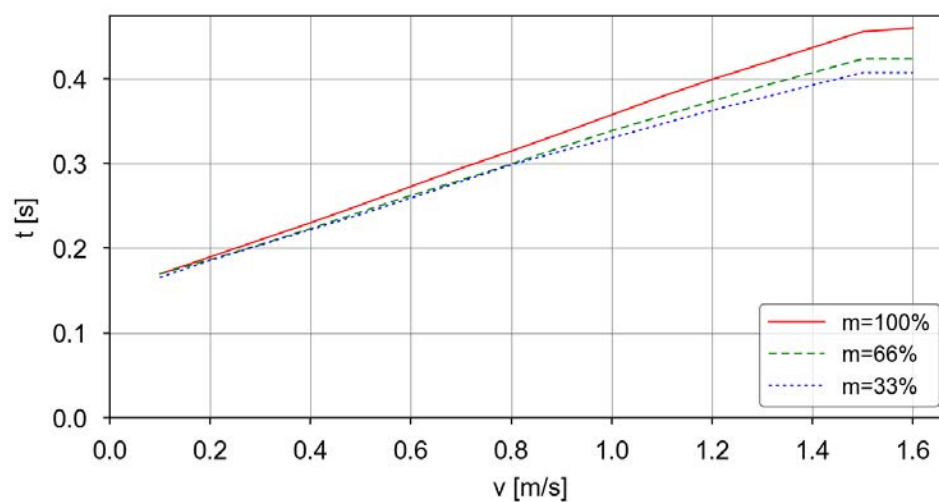
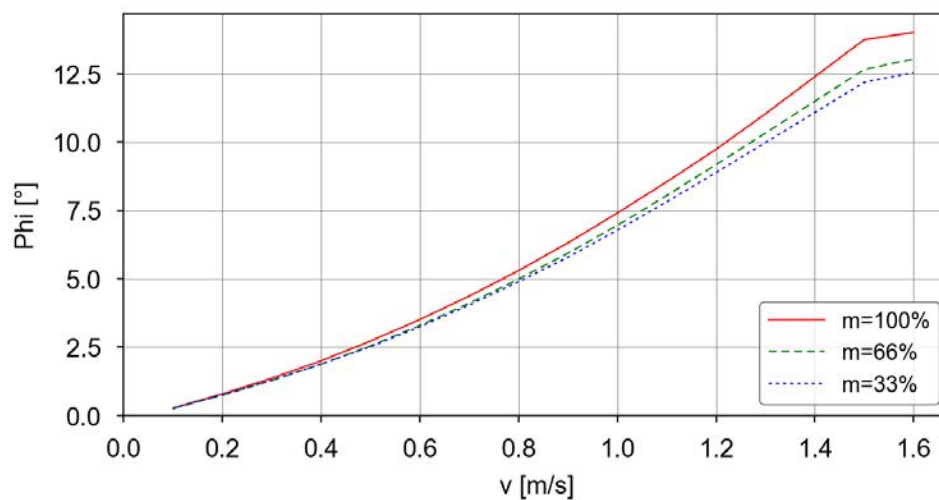
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

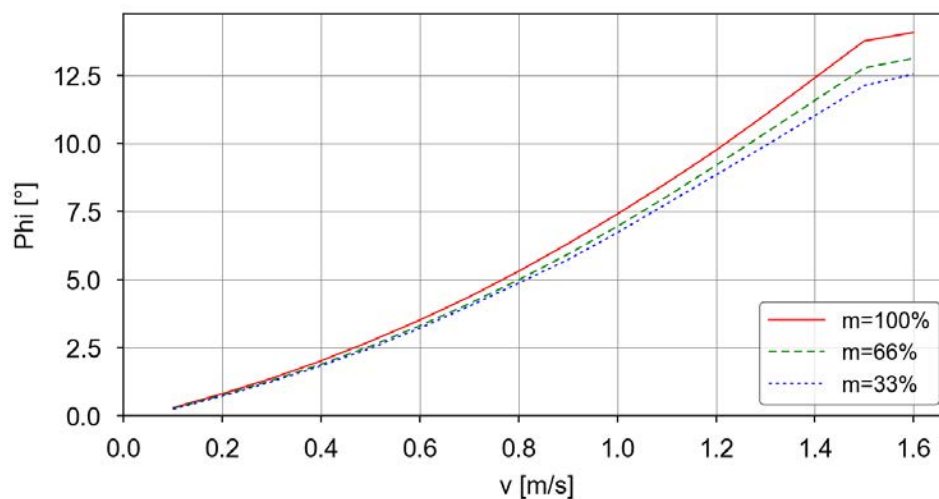


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

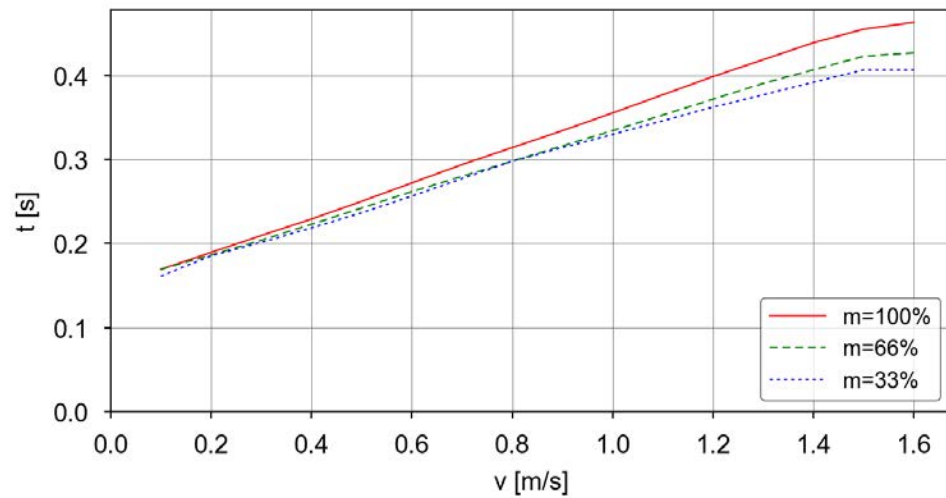


Continues on next page

13 IRB 8700

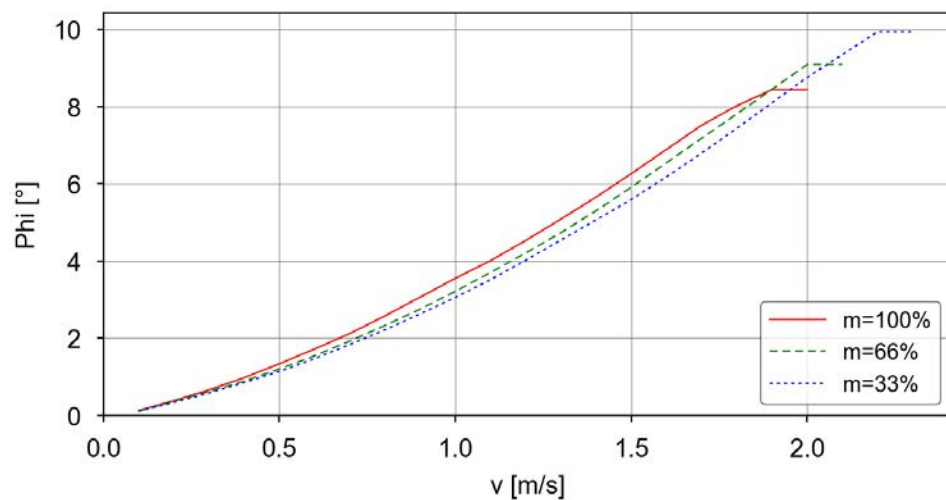
13.4 IRB 8700LeanID 4.20 m 475 kg

Continued

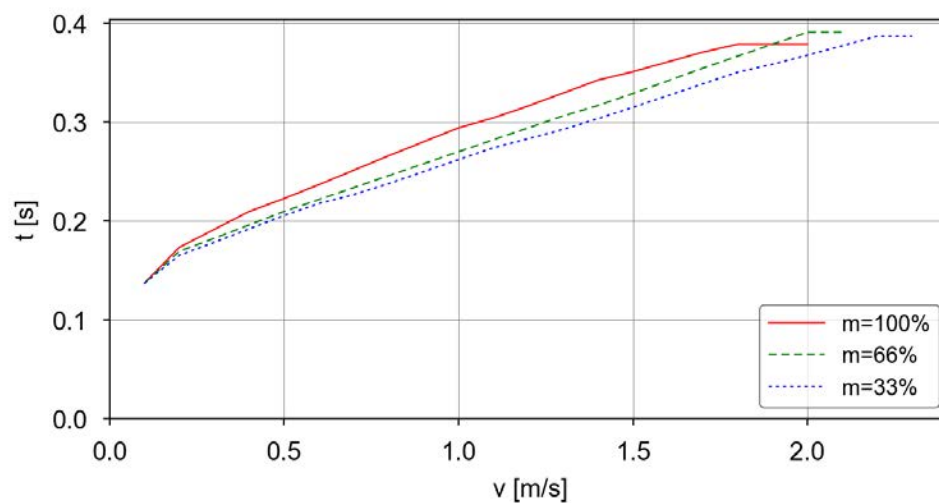


Category 1, Axis 3

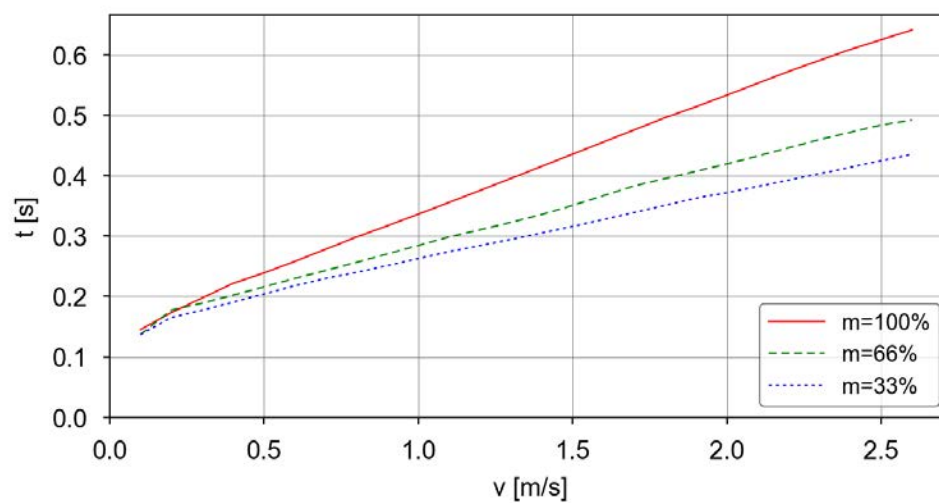
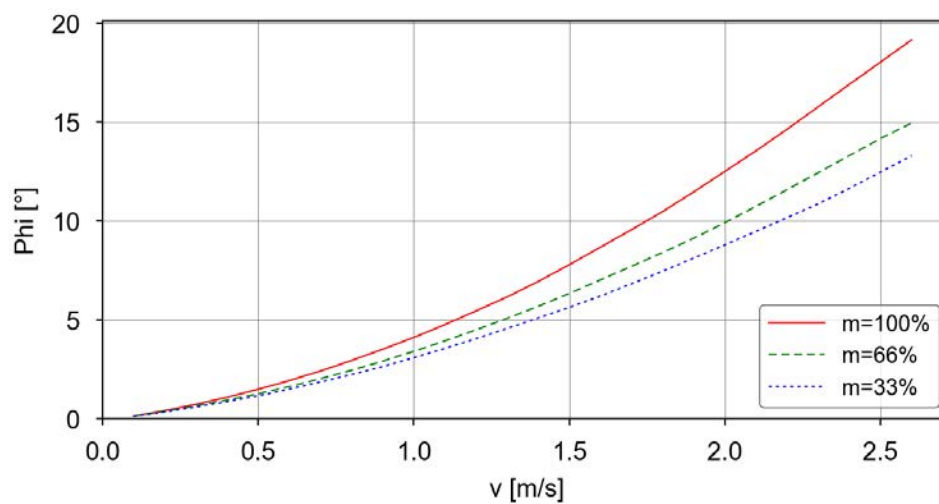
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



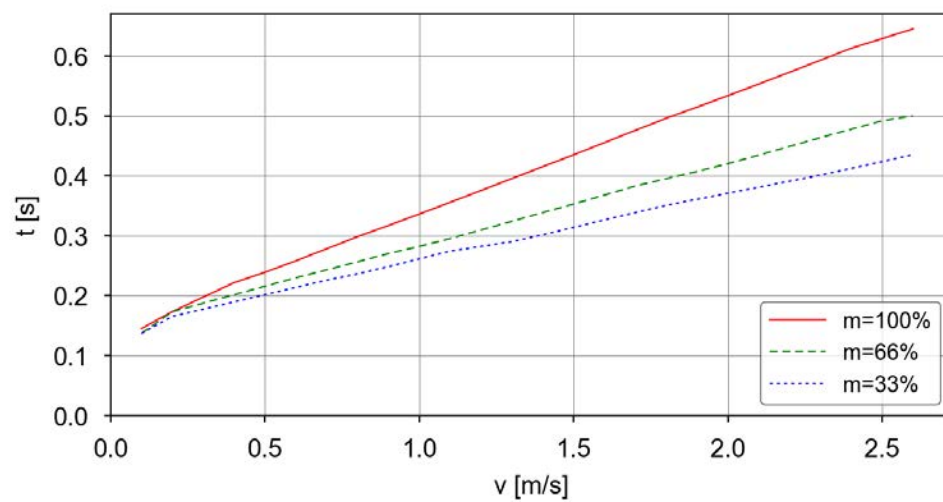
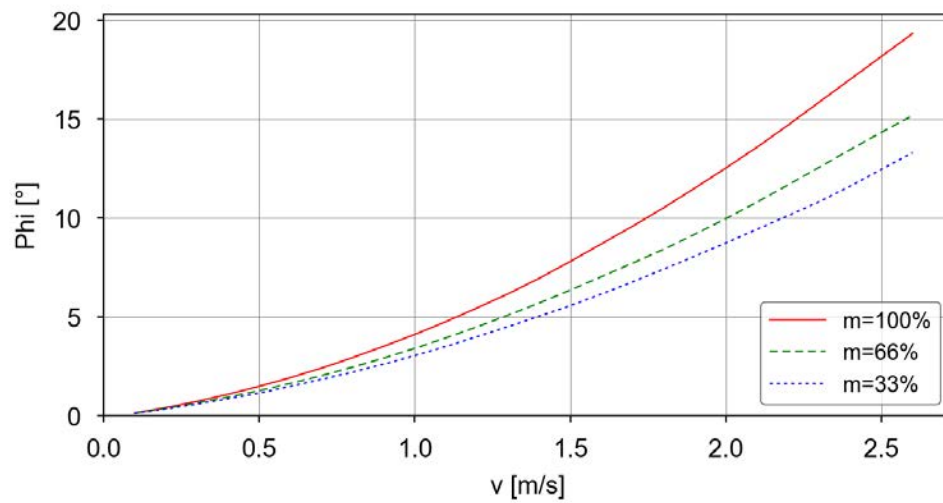
Continues on next page

13 IRB 8700

13.4 IRB 8700LeanID 4.20 m 475 kg

Continued

Extension zone 2, stopping distance and stopping time



14 IRB 460

14.1 IRB 460 2.4 m 110 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	41.5	0.49
2	14.6	0.17
3	13.6	0.15

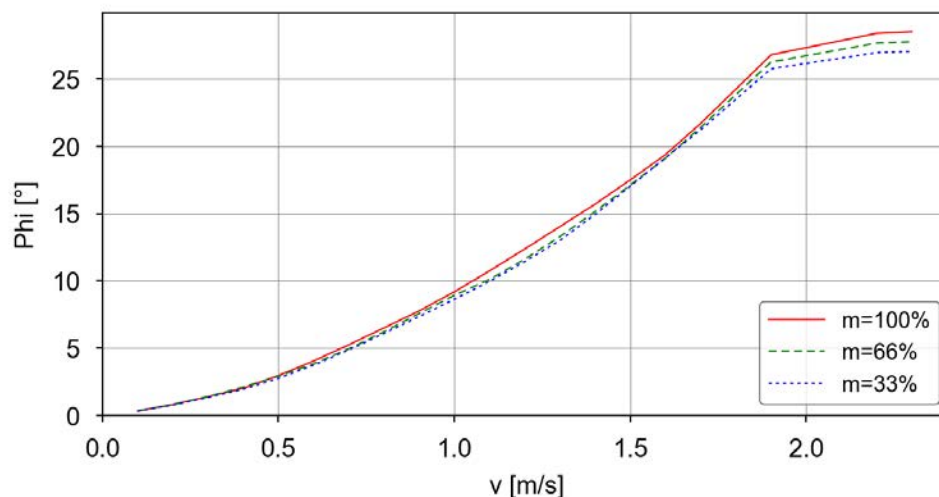
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	0.889
1	0.889	1.778
2	1.778	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

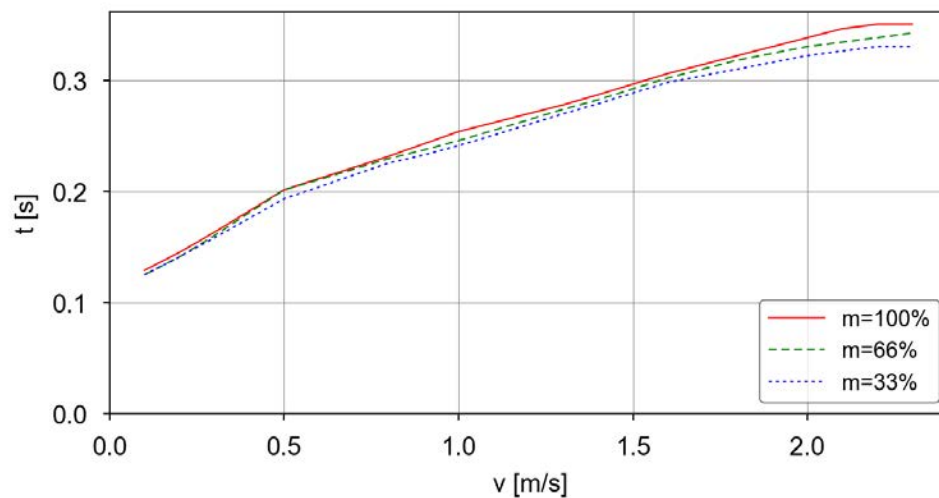


Continues on next page

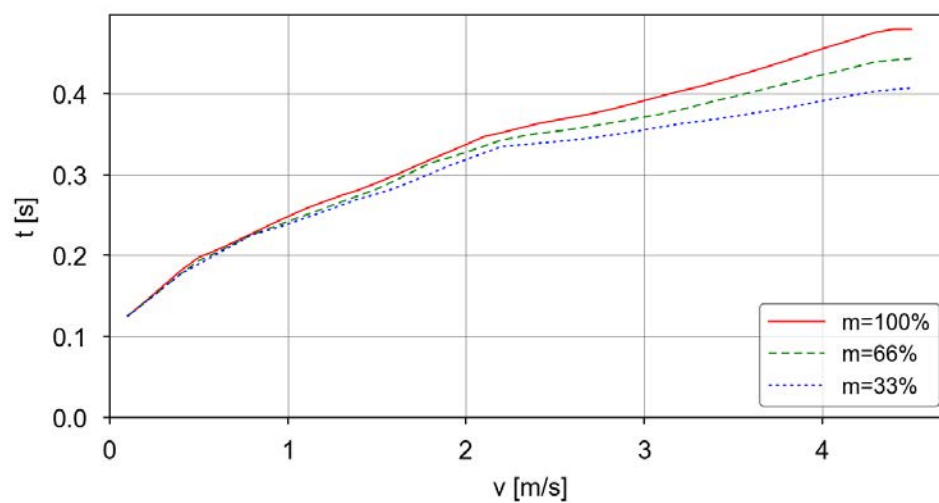
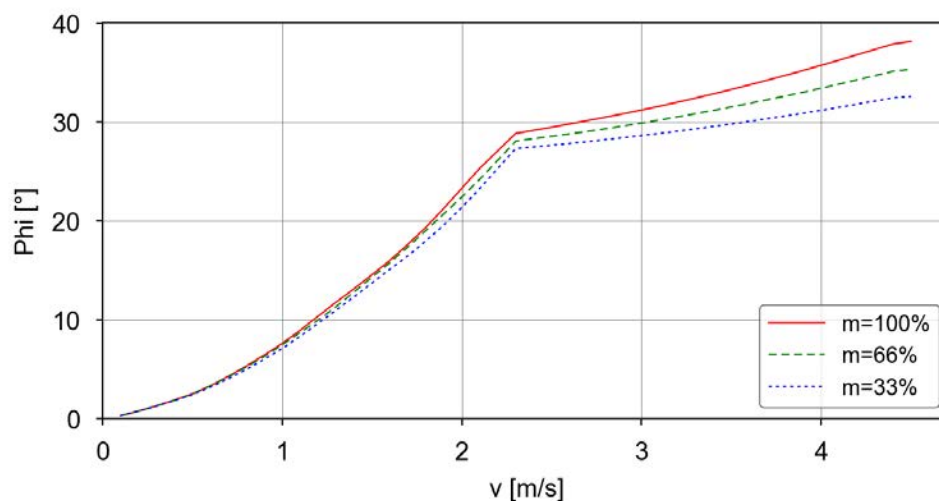
14 IRB 460

14.1 IRB 460 2.4 m 110 kg

Continued

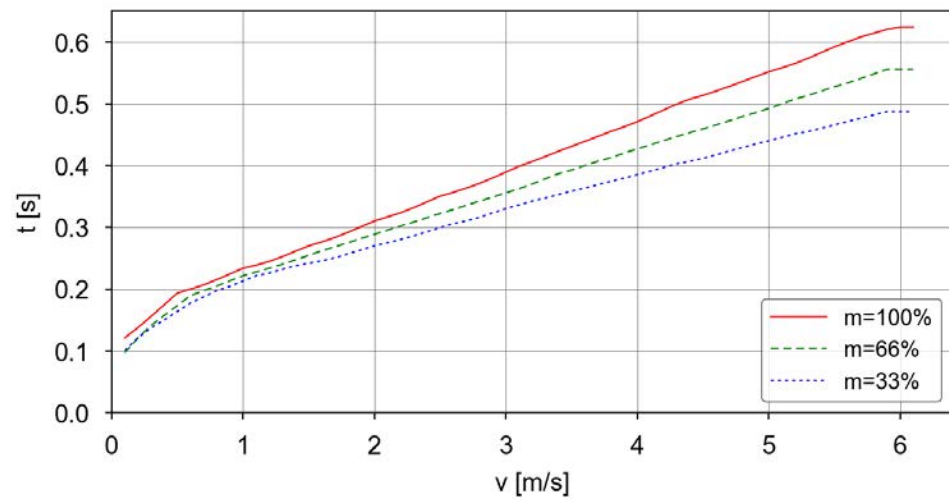
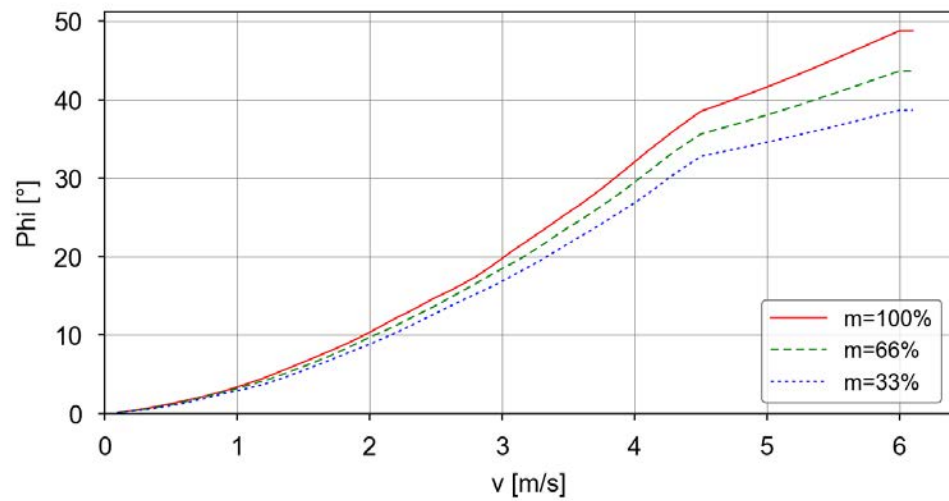


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

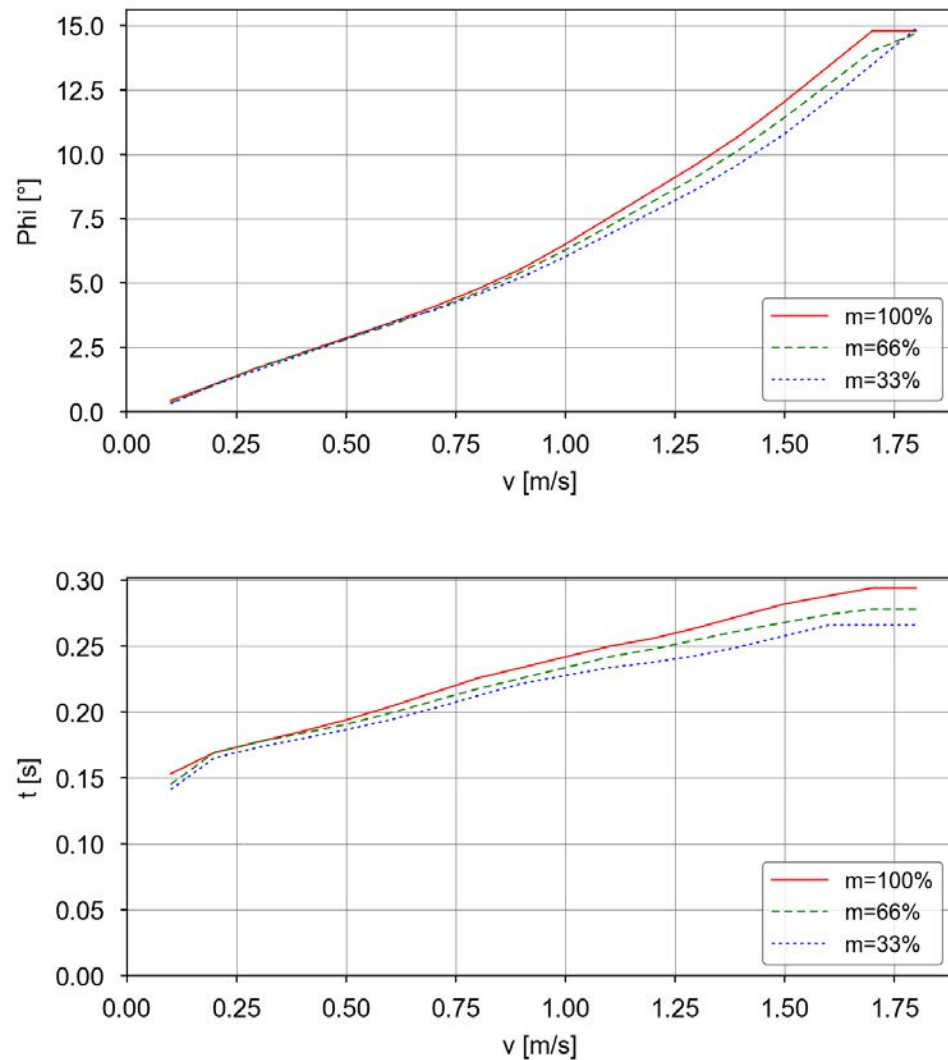
14 IRB 460

14.1 IRB 460 2.4 m 110 kg

Continued

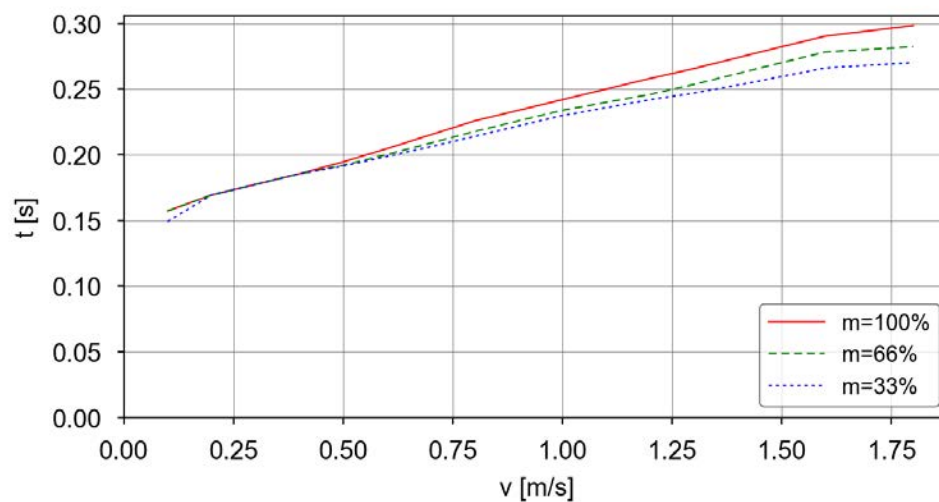
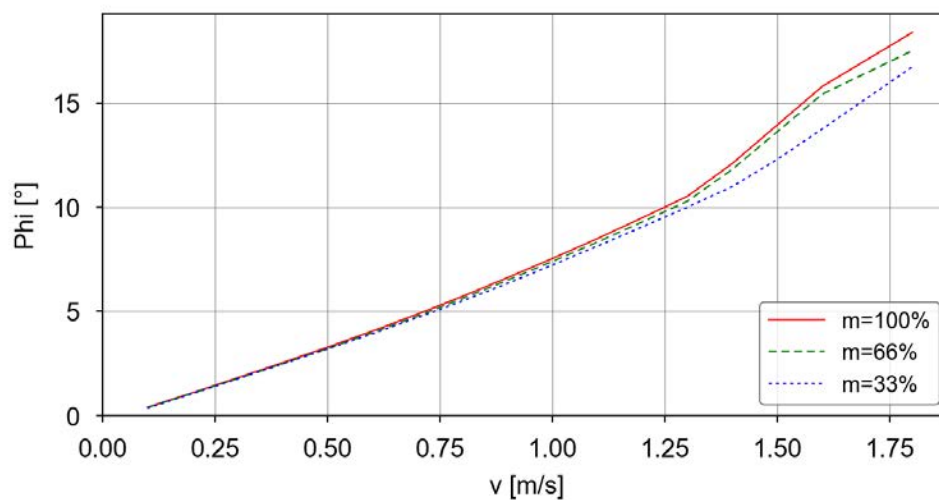
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

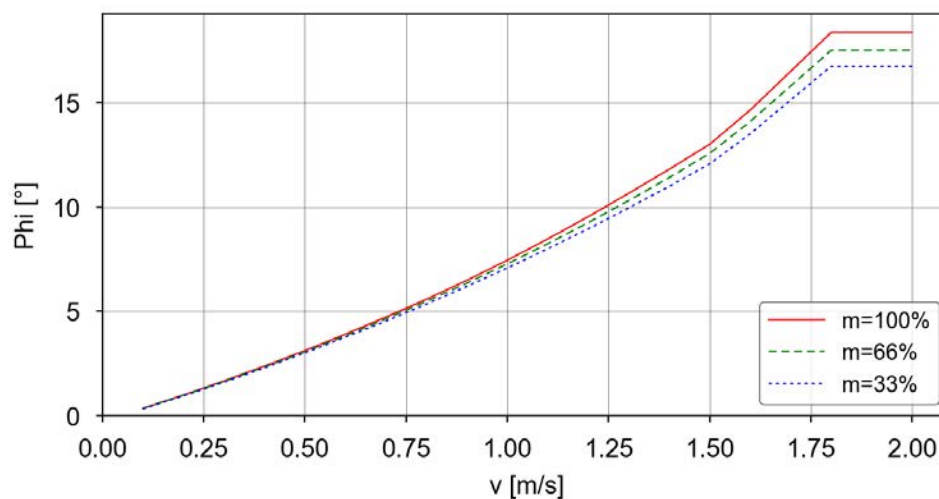


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

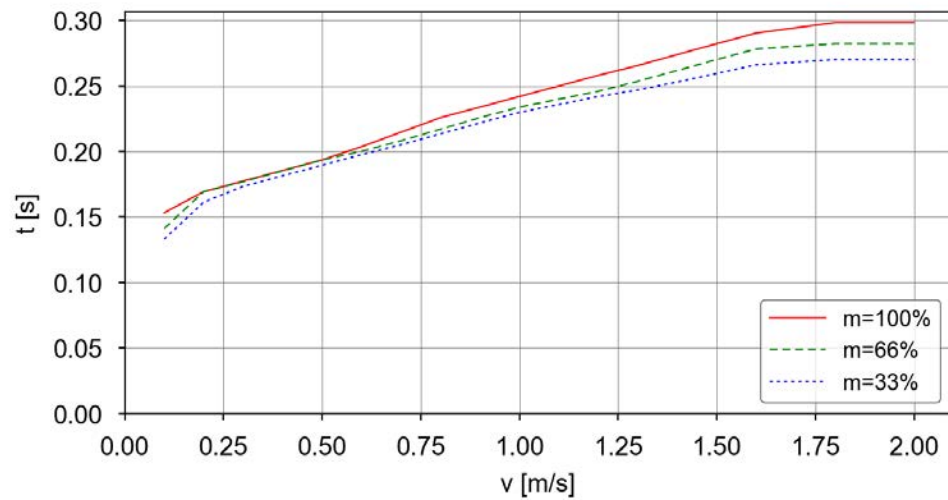


Continues on next page

14 IRB 460

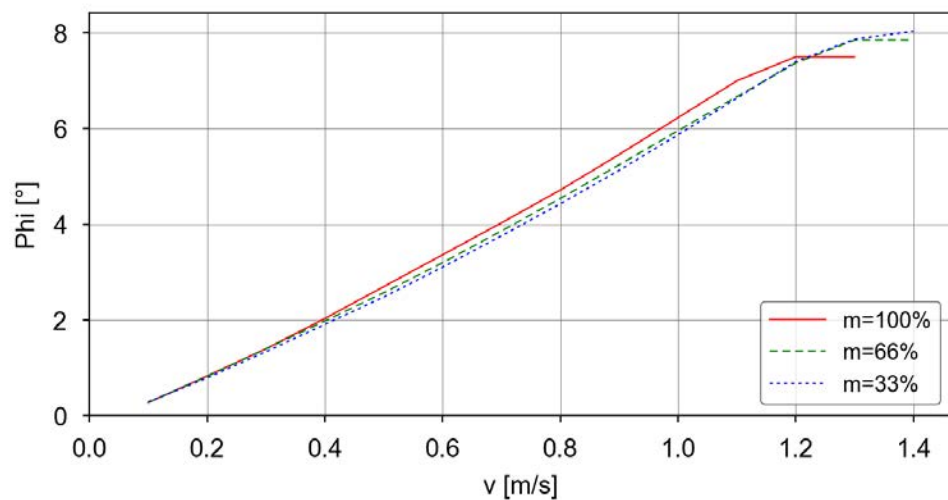
14.1 IRB 460 2.4 m 110 kg

Continued

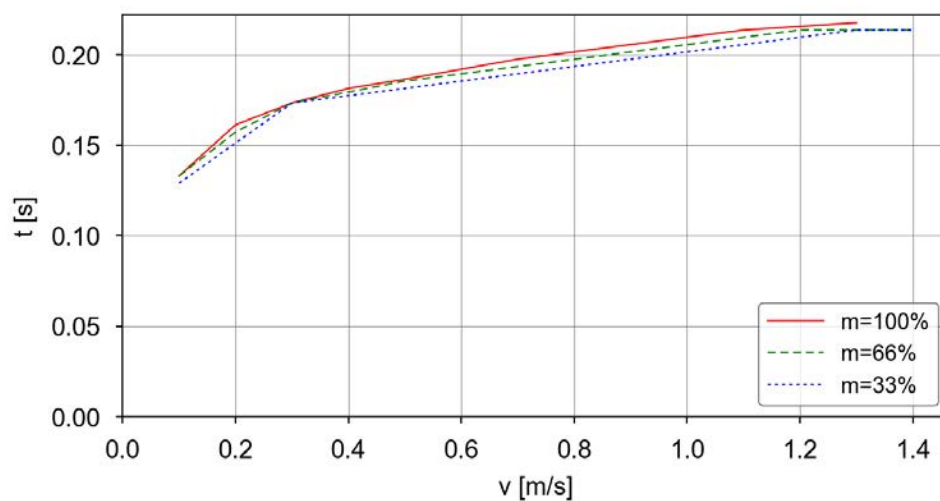


Category 1, Axis 3

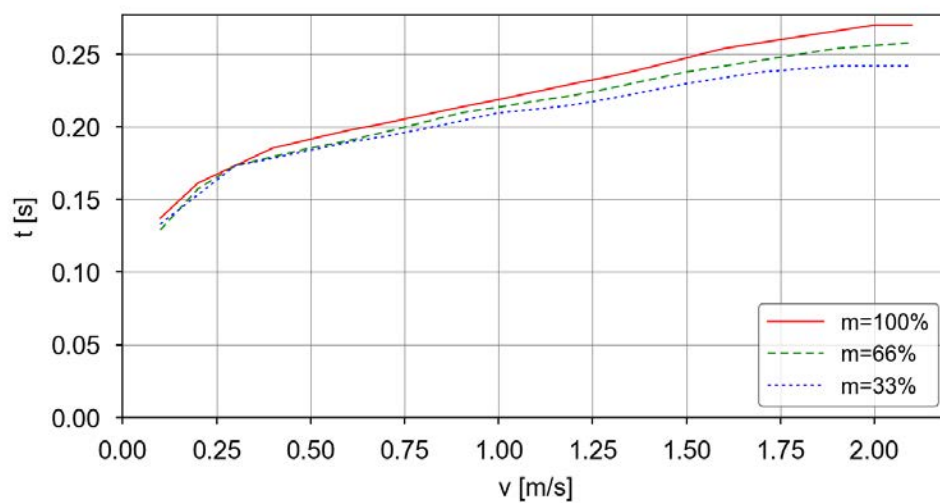
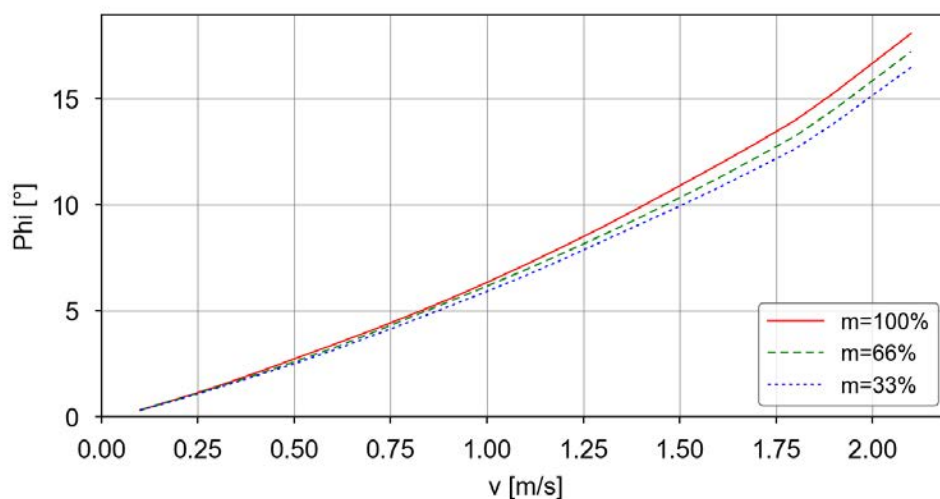
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



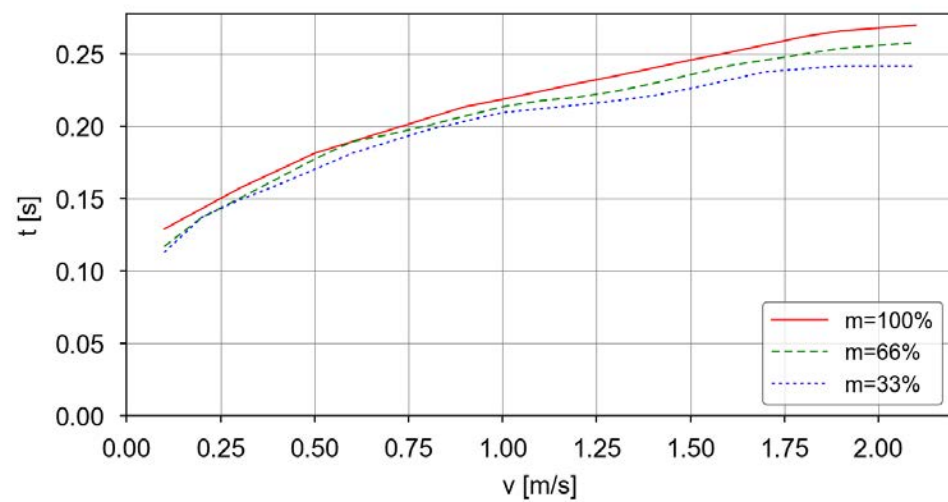
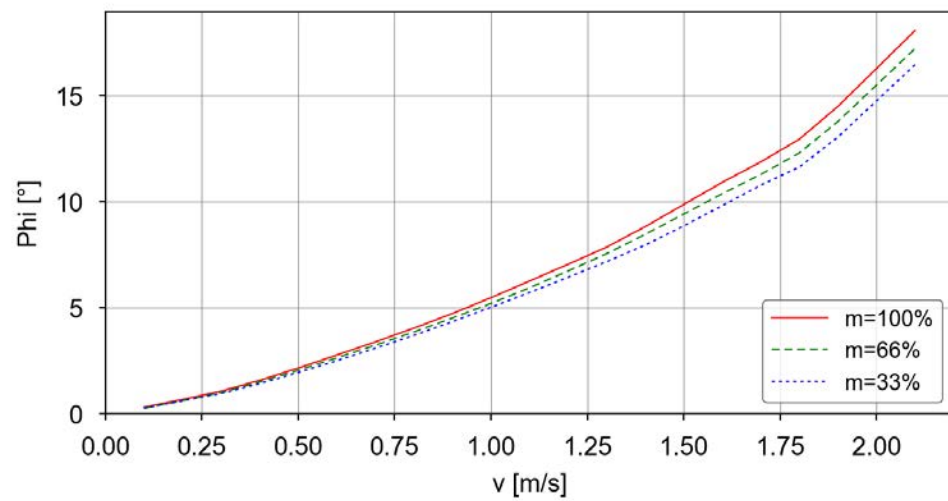
Continues on next page

14 IRB 460

14.1 IRB 460 2.4 m 110 kg

Continued

Extension zone 2, stopping distance and stopping time



15 IRB 660

15.1 IRB 660 3.15 m 180 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	64.4	0.9
2	32.6	0.39
3	27.0	0.29

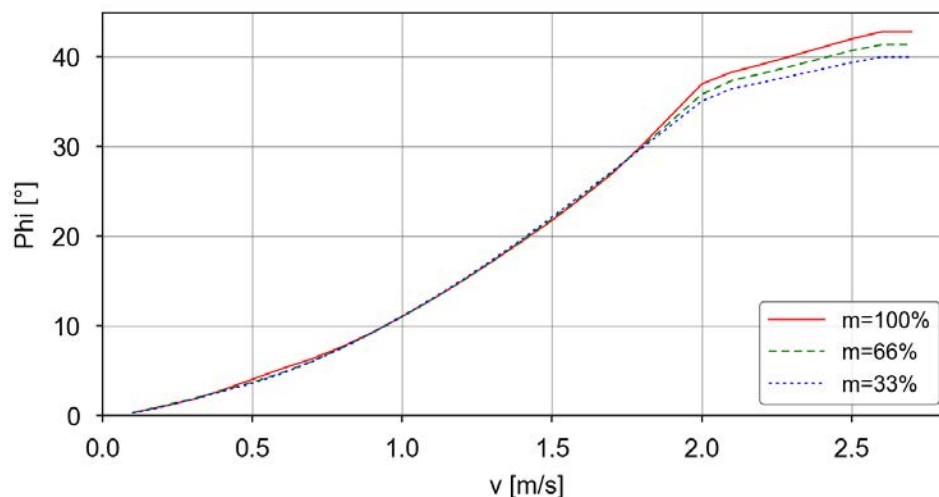
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.148
1	1.148	2.297
2	2.297	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

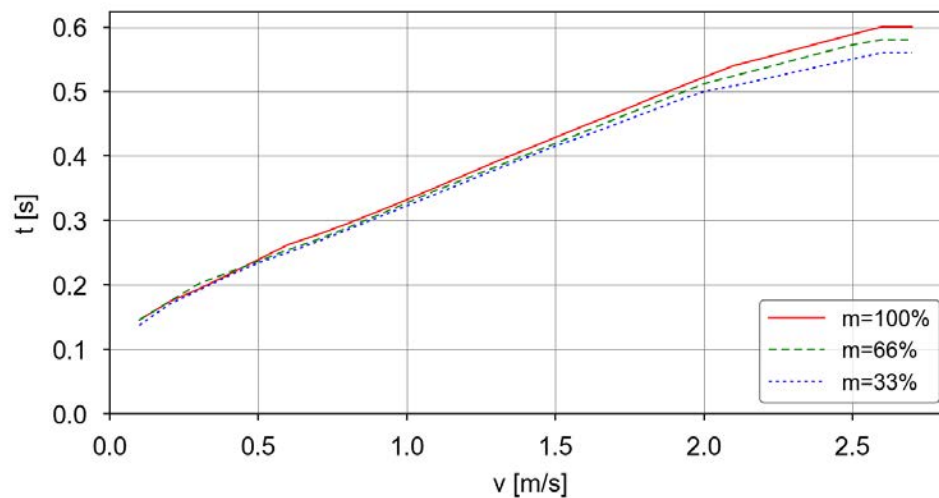


Continues on next page

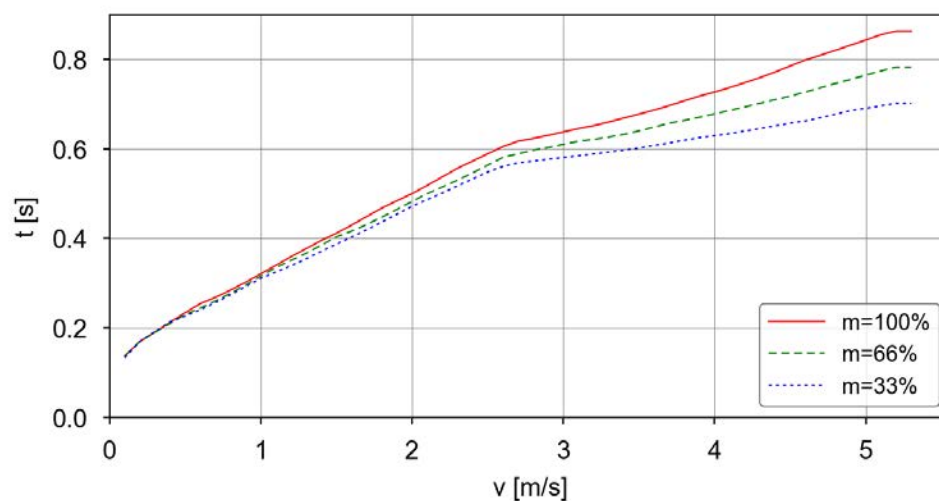
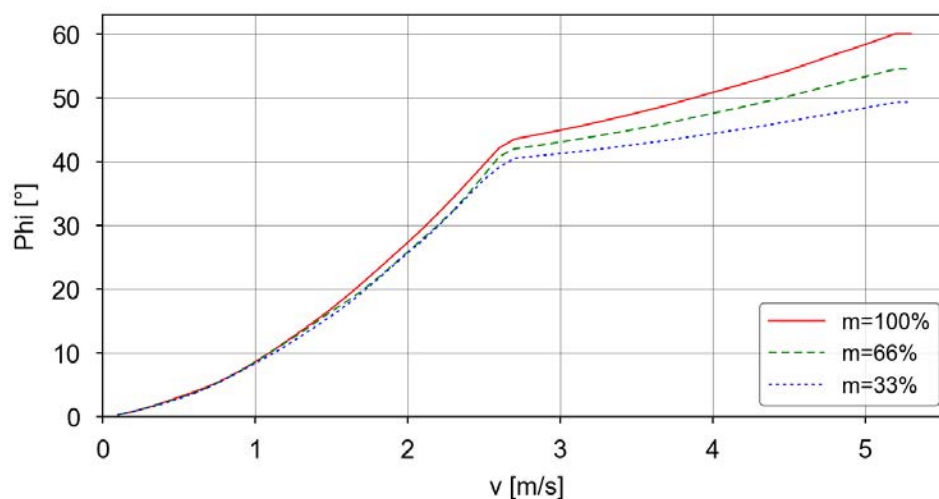
15 IRB 660

15.1 IRB 660 3.15 m 180 kg

Continued

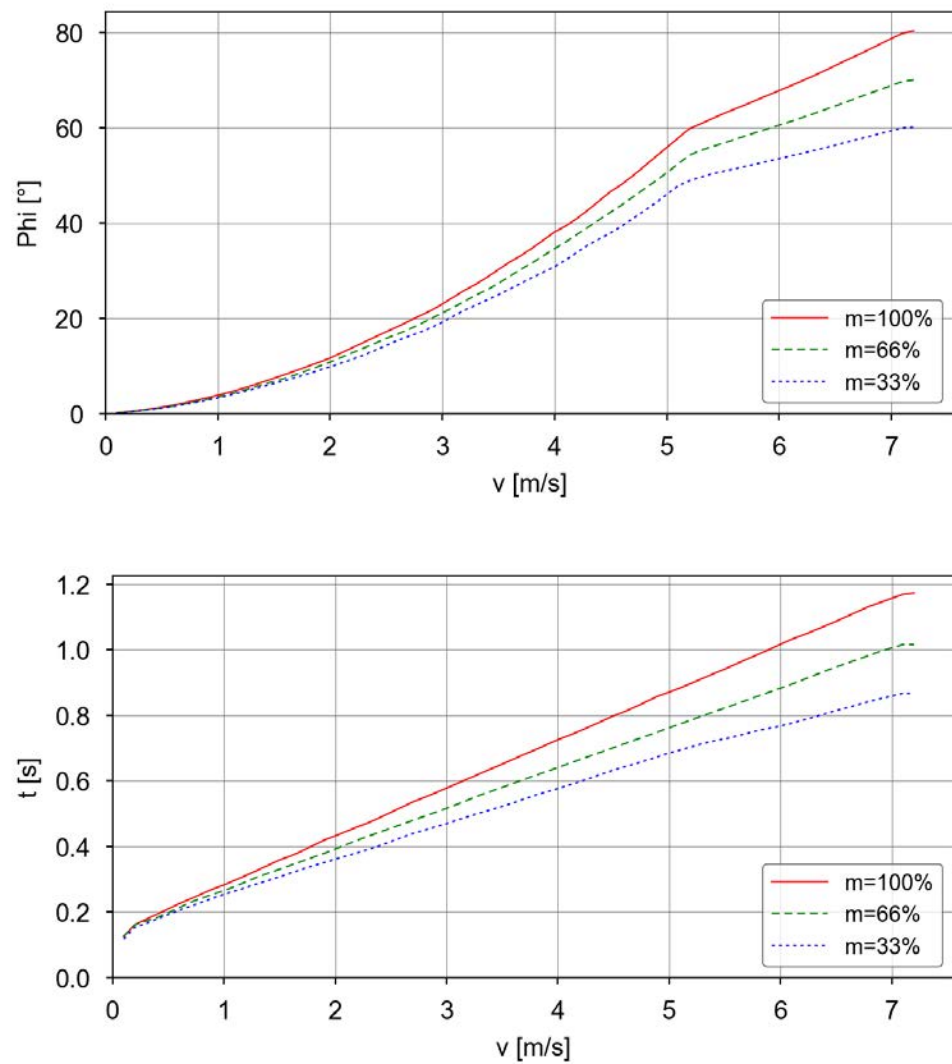


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

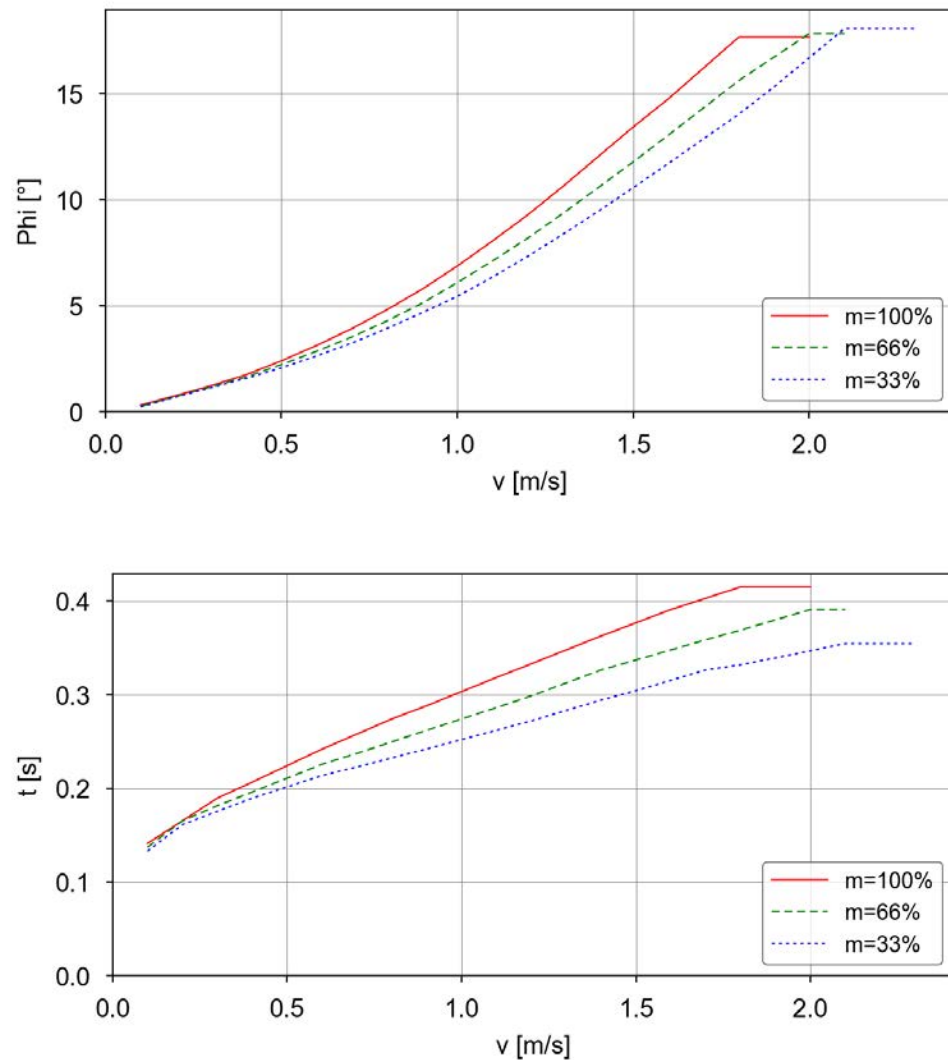
15 IRB 660

15.1 IRB 660 3.15 m 180 kg

Continued

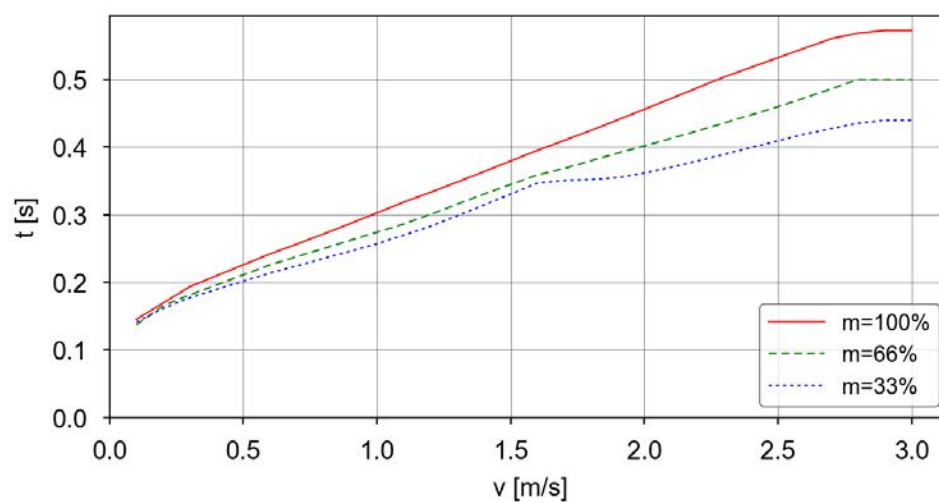
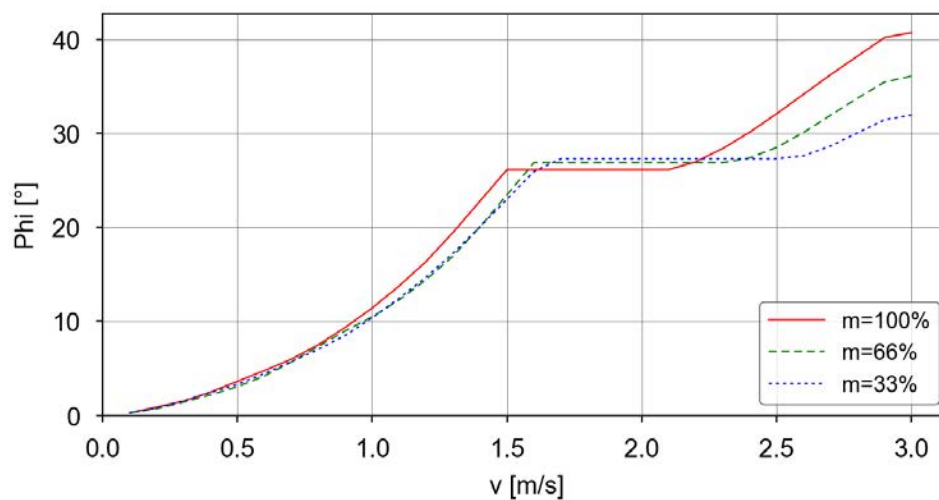
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

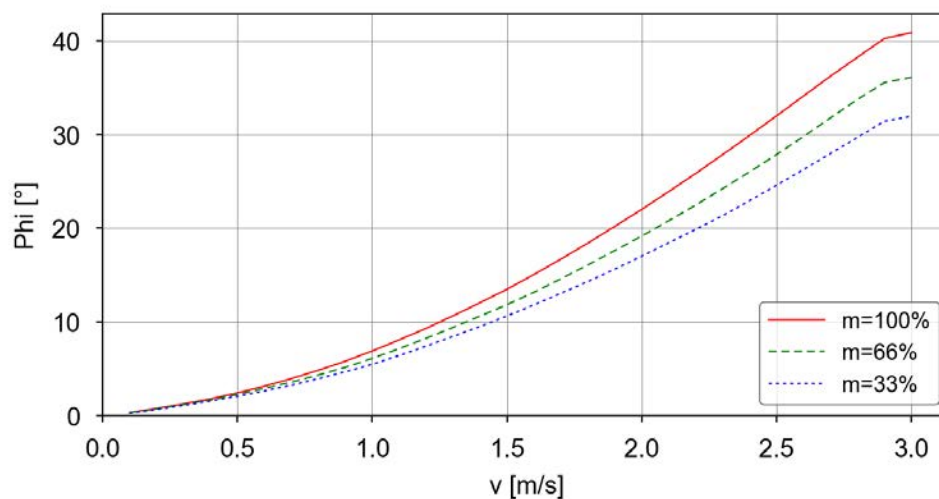


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

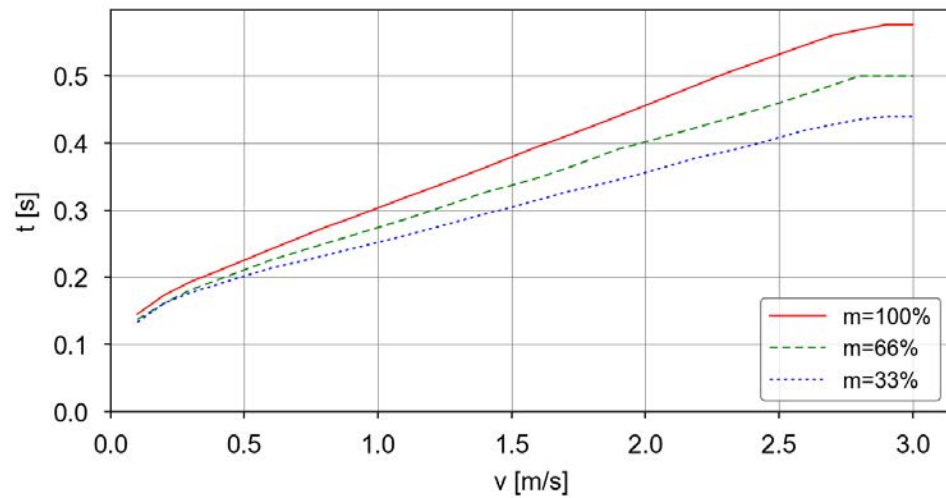


Continues on next page

15 IRB 660

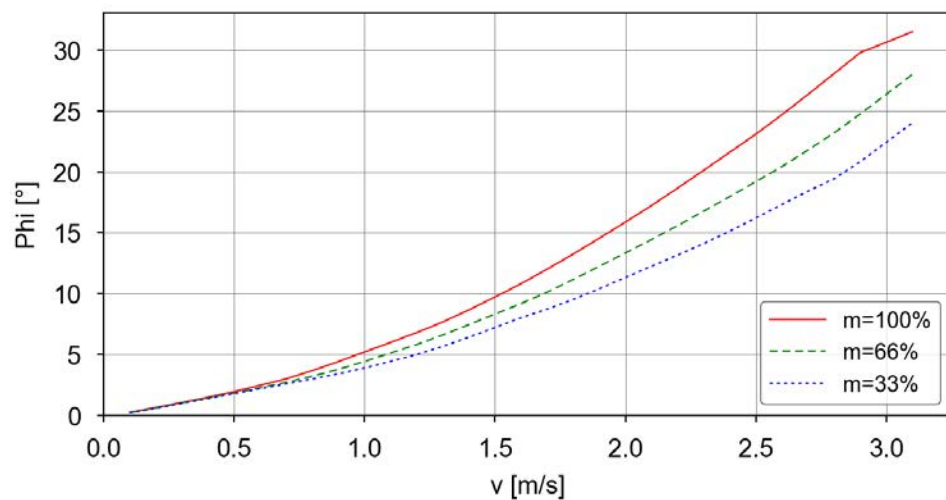
15.1 IRB 660 3.15 m 180 kg

Continued

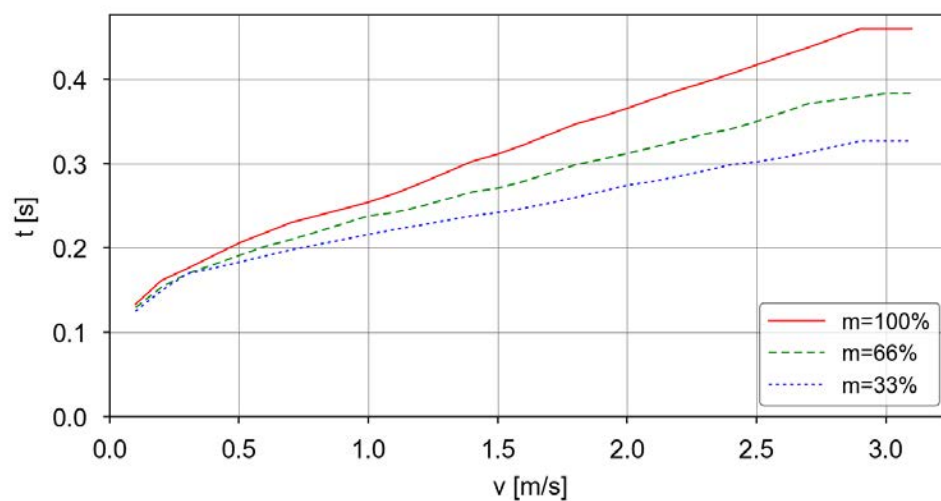


Category 1, Axis 3

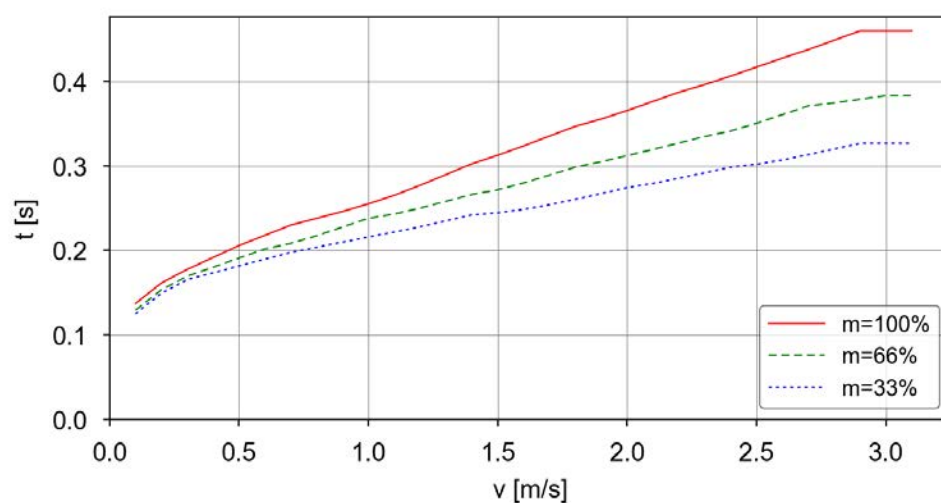
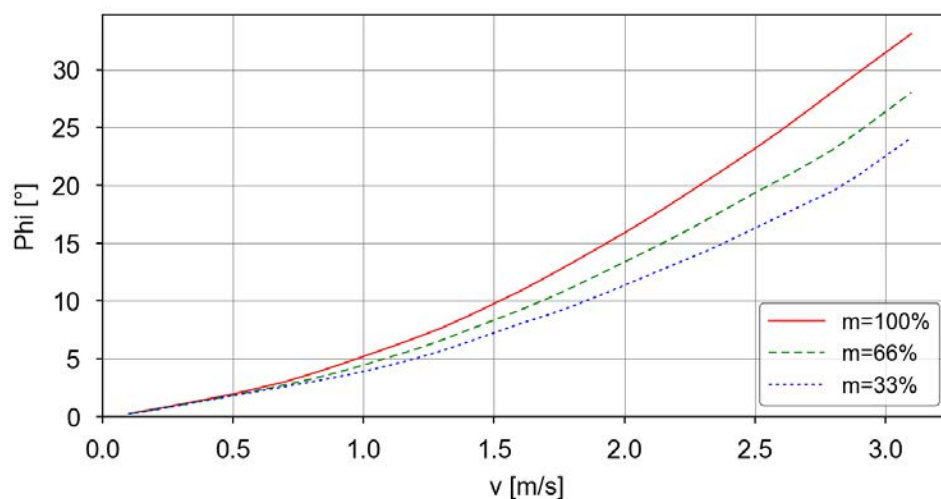
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



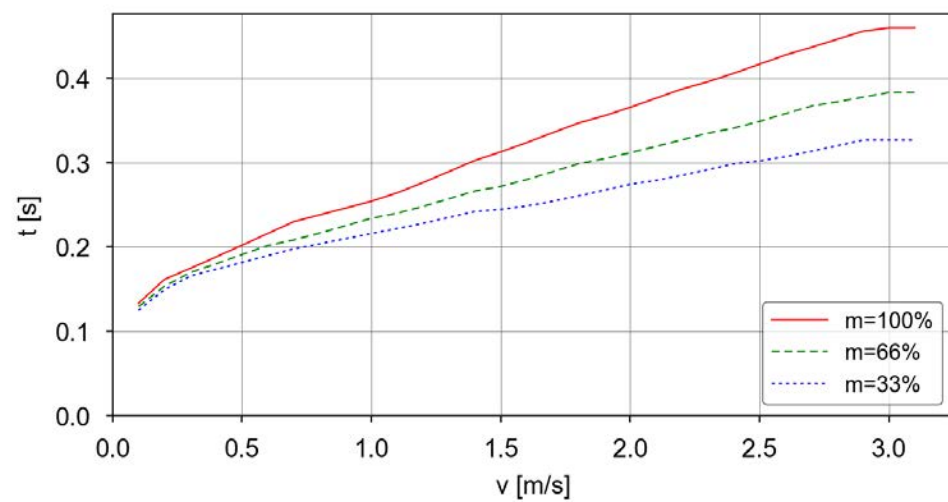
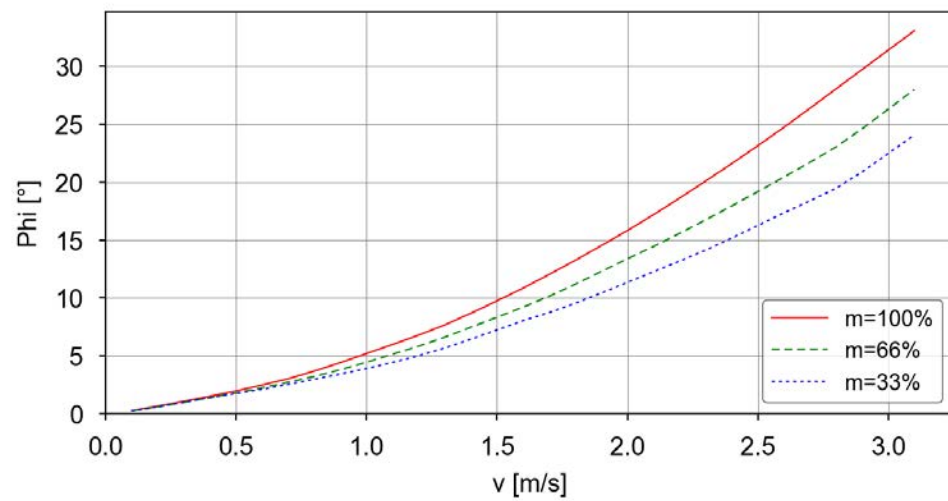
Continues on next page

15 IRB 660

15.1 IRB 660 3.15 m 180 kg

Continued

Extension zone 2, stopping distance and stopping time



15.2 IRB 660 3.15 m 250 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	43.1	0.78
2	23.2	0.37
3	21.6	0.32

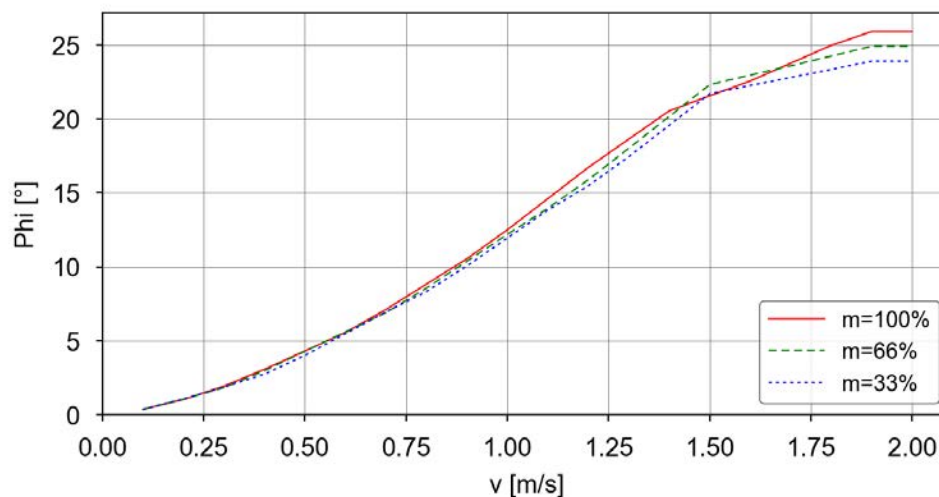
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.148
1	1.148	2.297
2	2.297	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

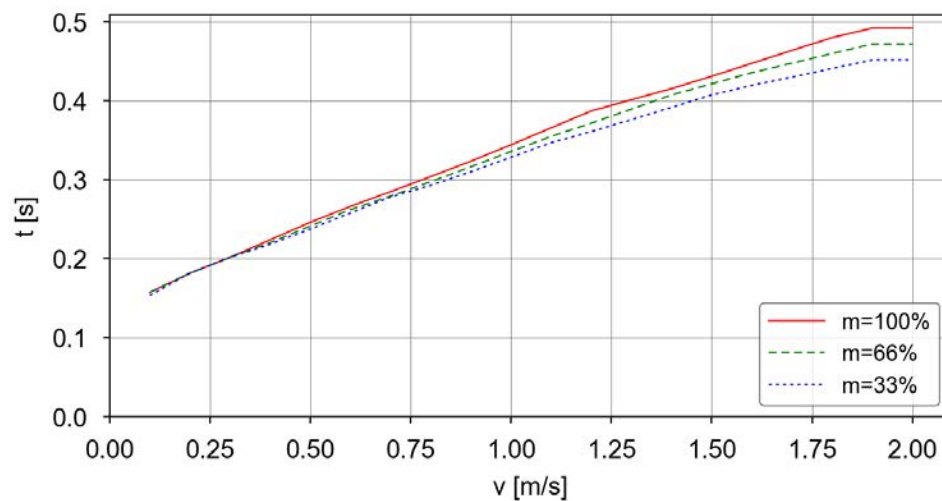


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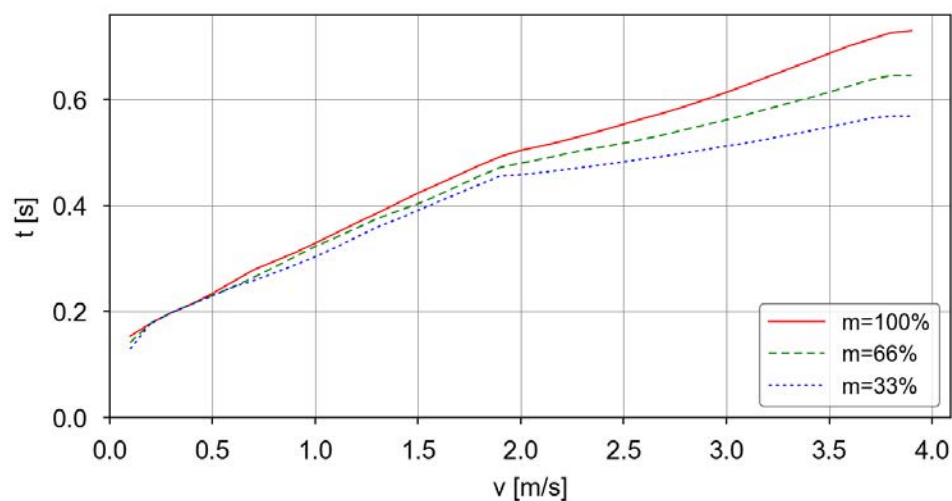
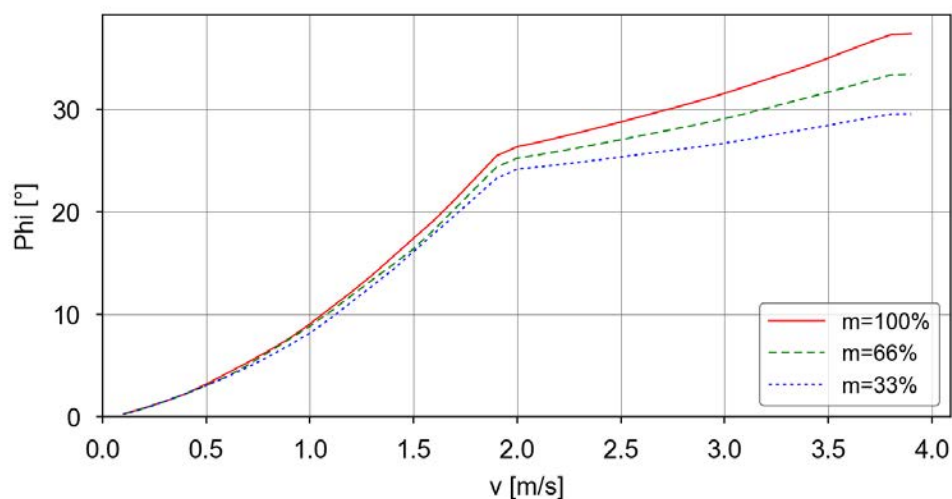
15 IRB 660

15.2 IRB 660 3.15 m 250 kg

Continued

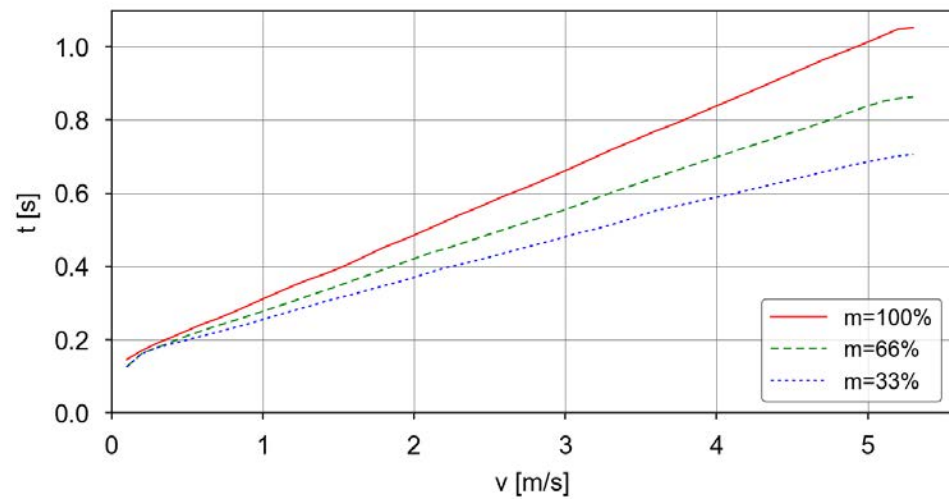
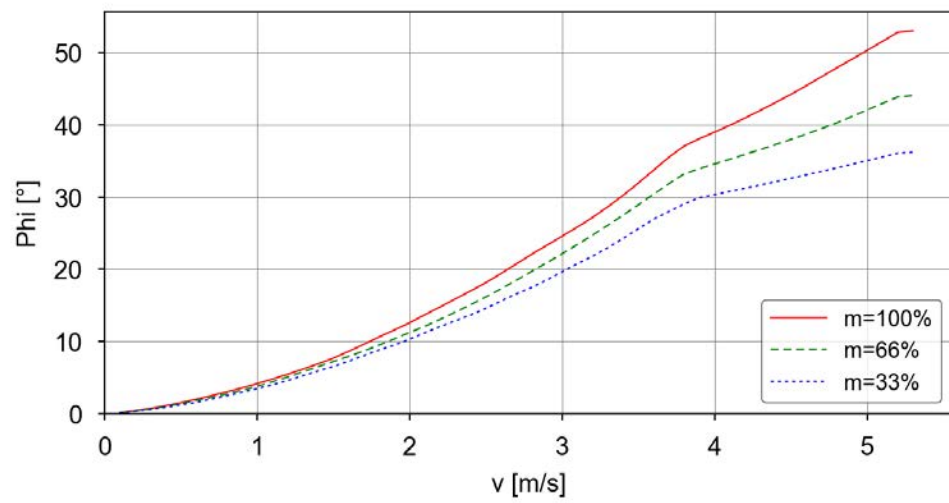


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

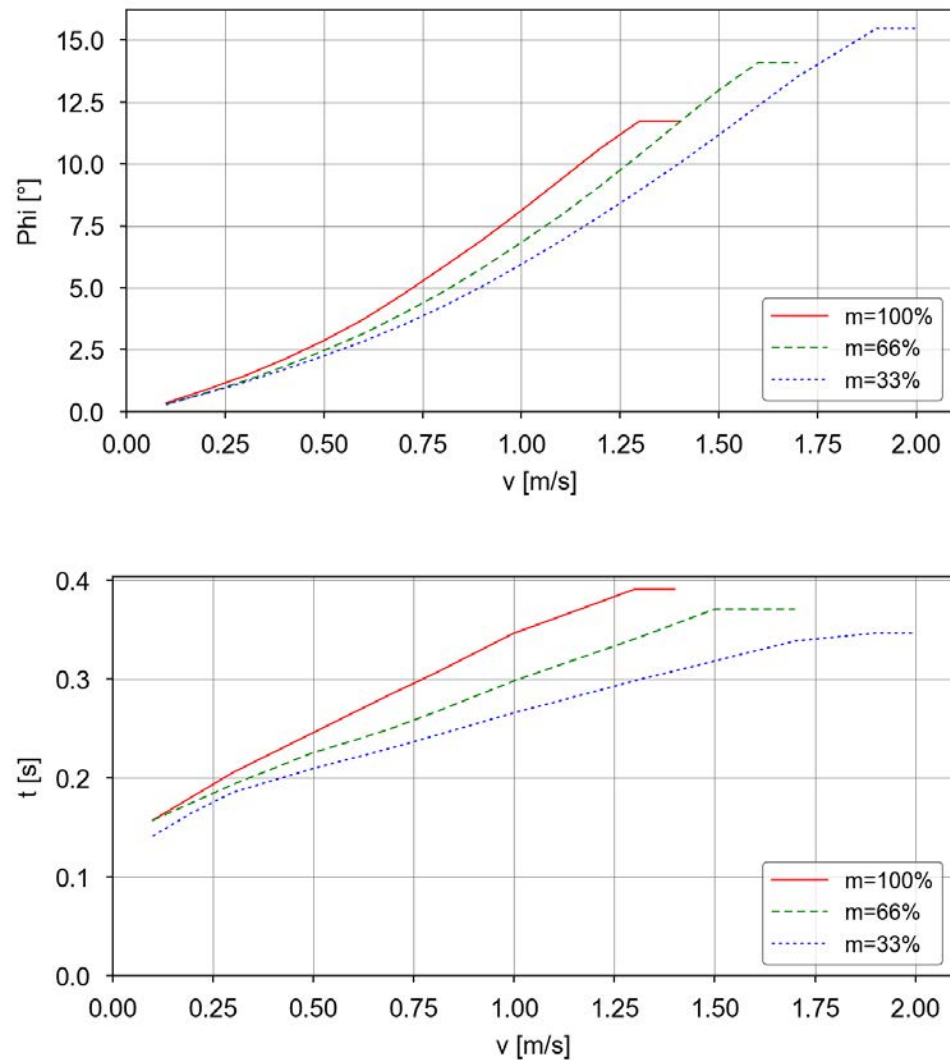
15 IRB 660

15.2 IRB 660 3.15 m 250 kg

Continued

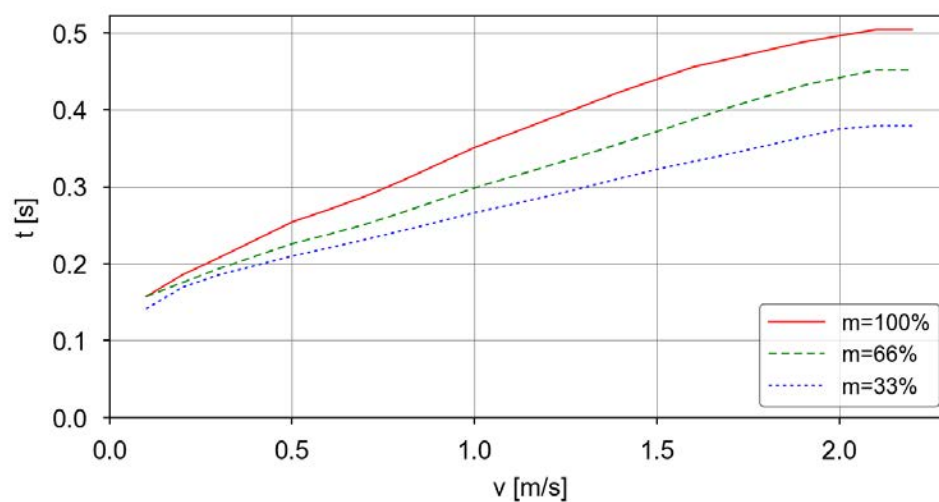
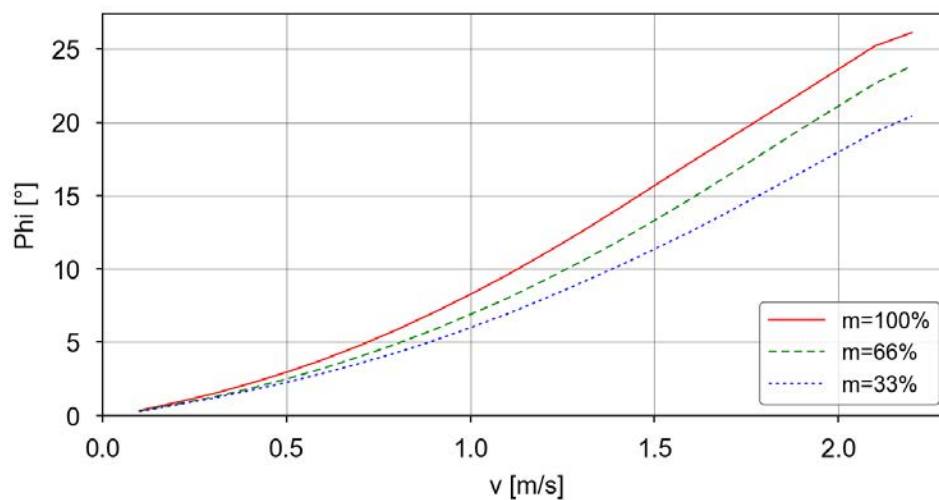
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

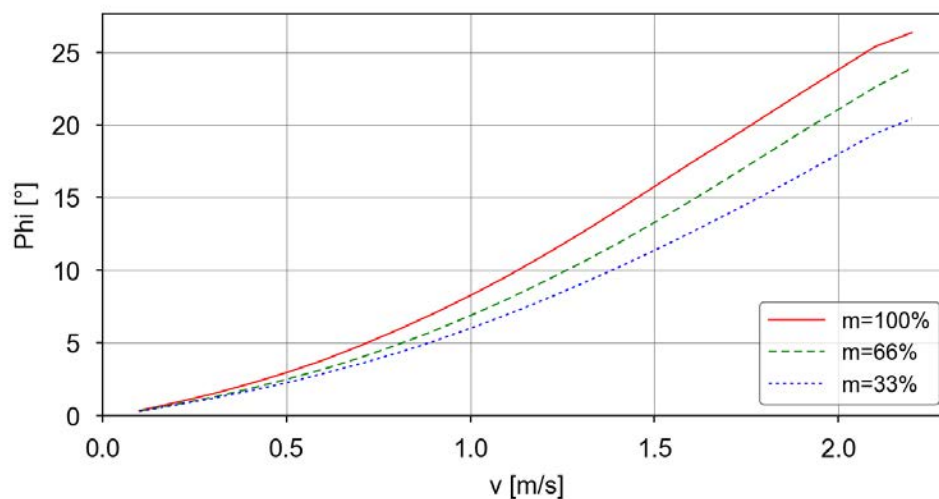


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

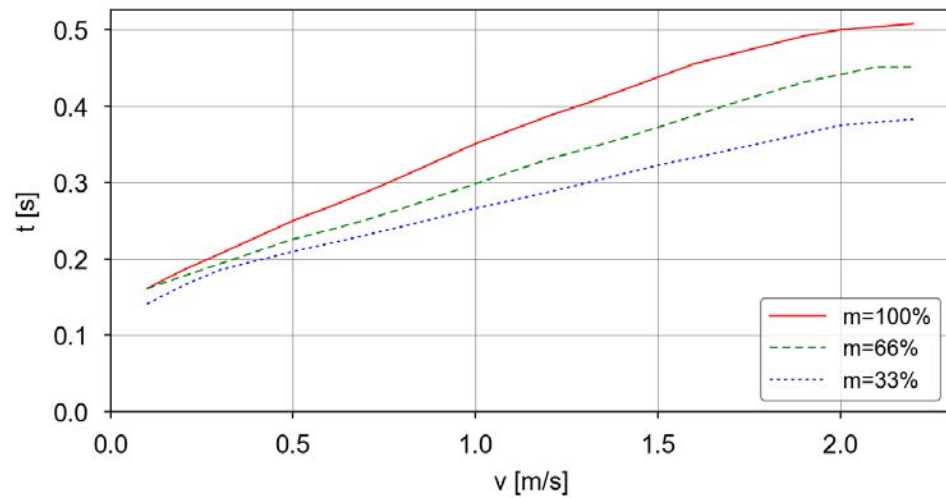


Continues on next page

15 IRB 660

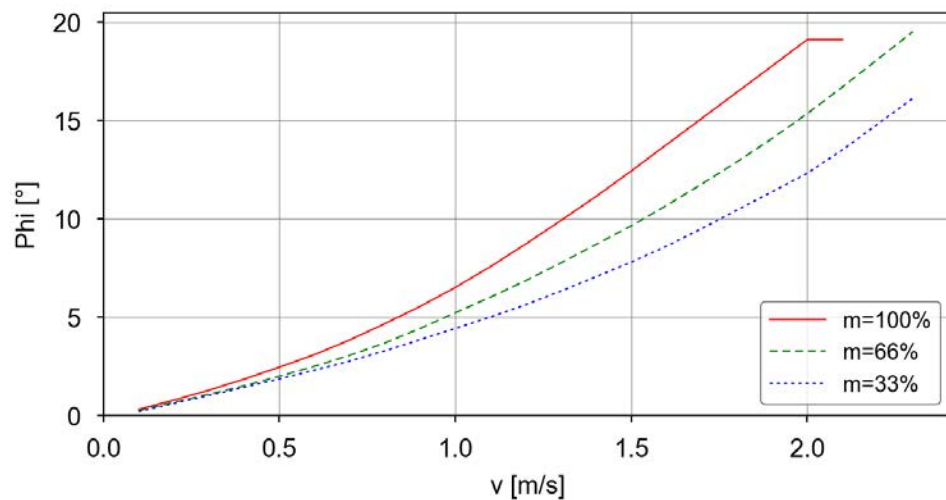
15.2 IRB 660 3.15 m 250 kg

Continued

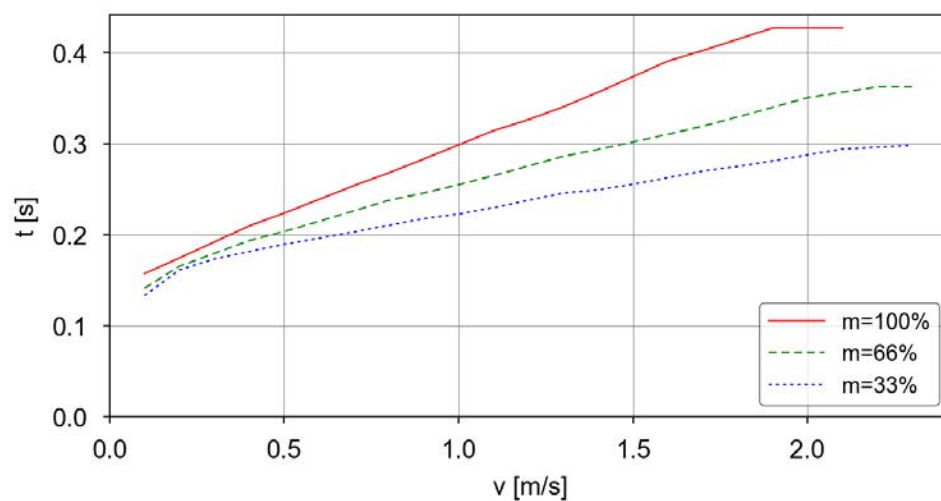


Category 1, Axis 3

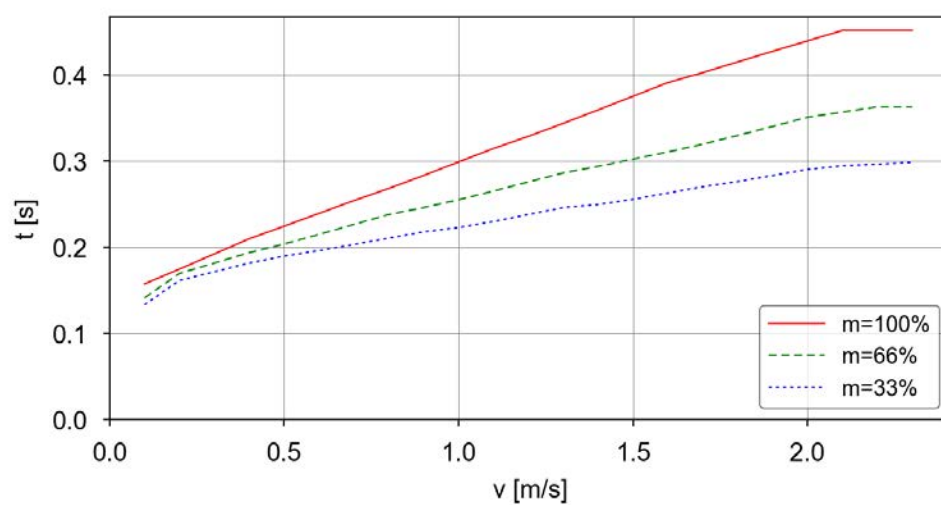
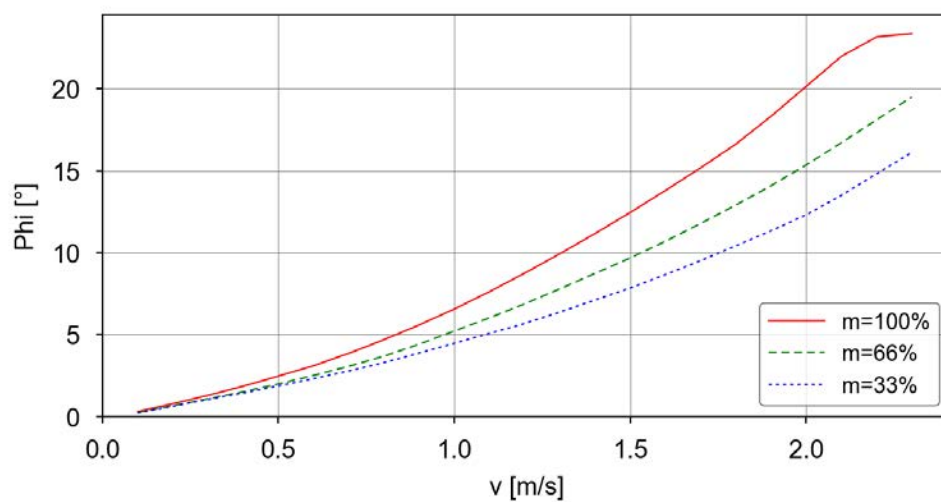
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



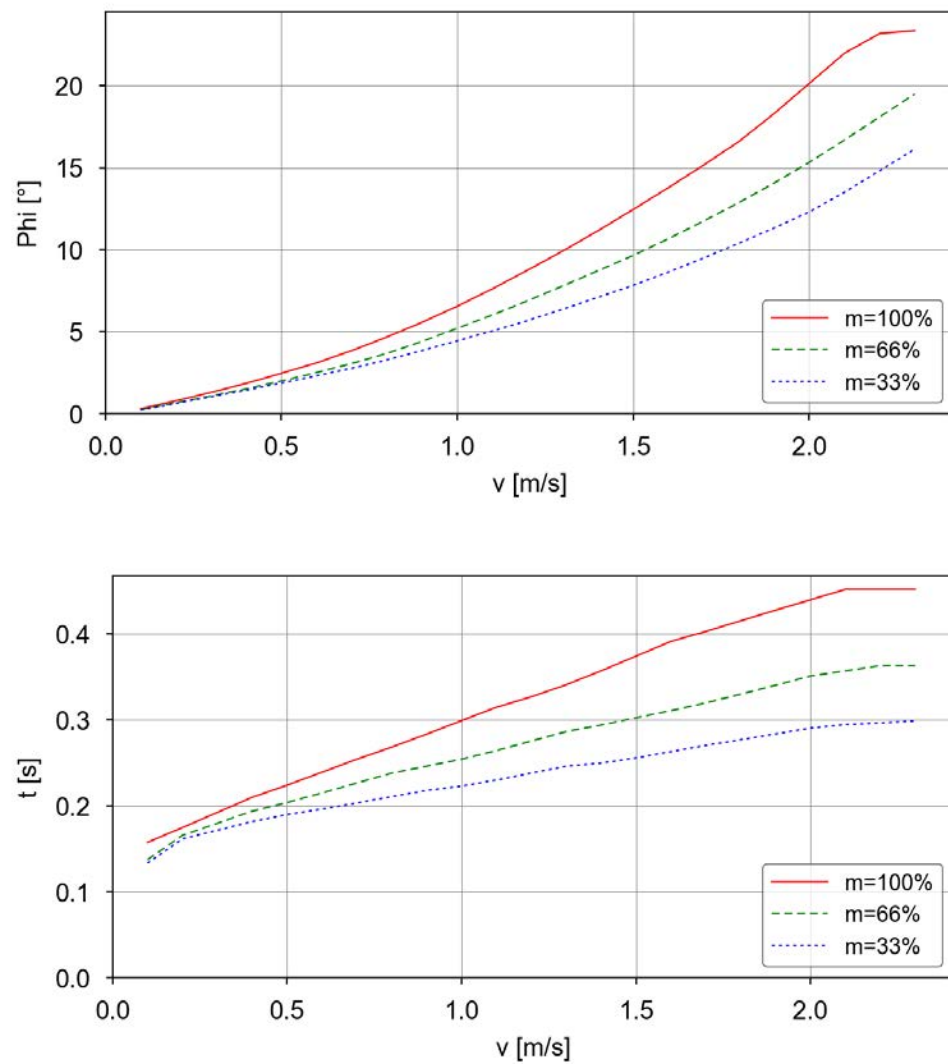
Continues on next page

15 IRB 660

15.2 IRB 660 3.15 m 250 kg

Continued

Extension zone 2, stopping distance and stopping time



16 IRB 760

16.1 IRB 760 3.2 m 445 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	40.7	0.89
2	24.4	0.54
3	26.9	0.56

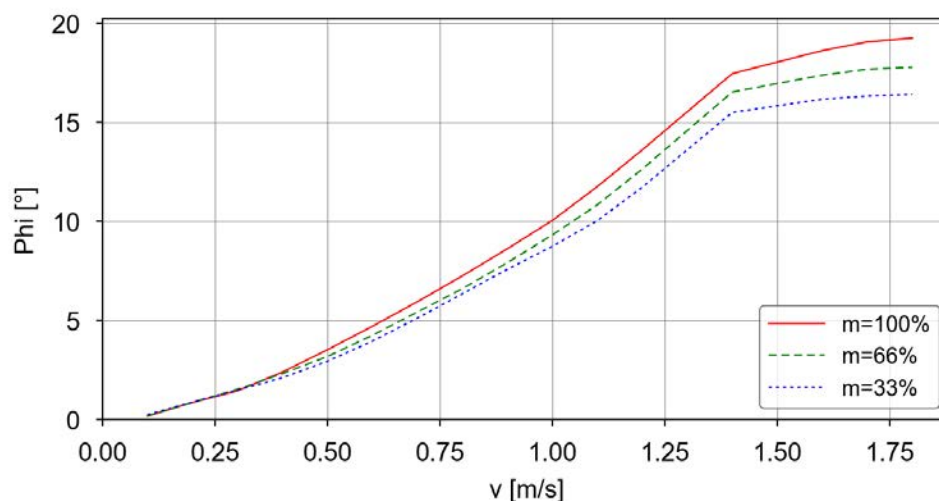
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.17
1	1.17	2.34
2	2.34	max reach

Category 1, Axis A1

Extension zone 0, stopping distance and stopping time

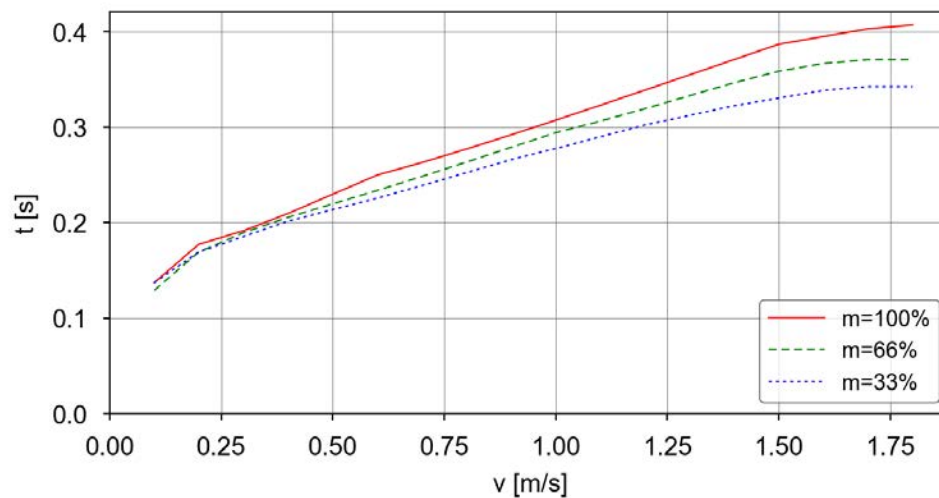


Continues on next page

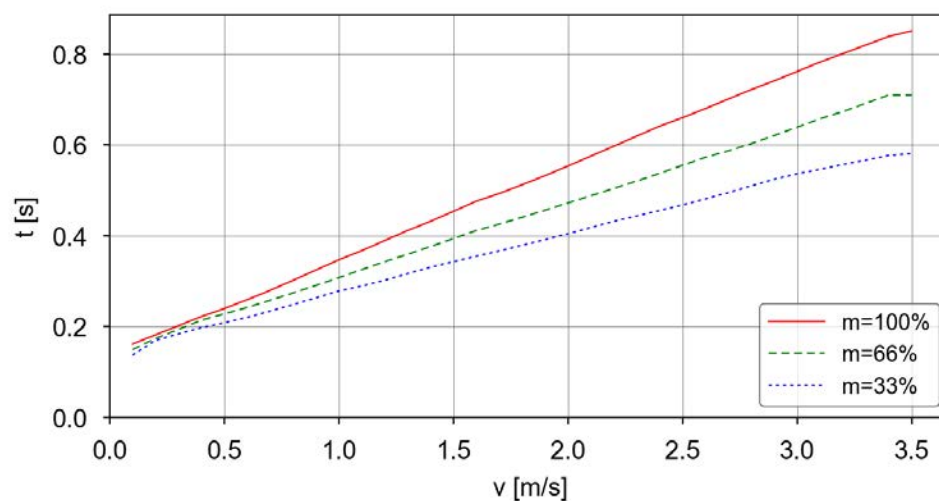
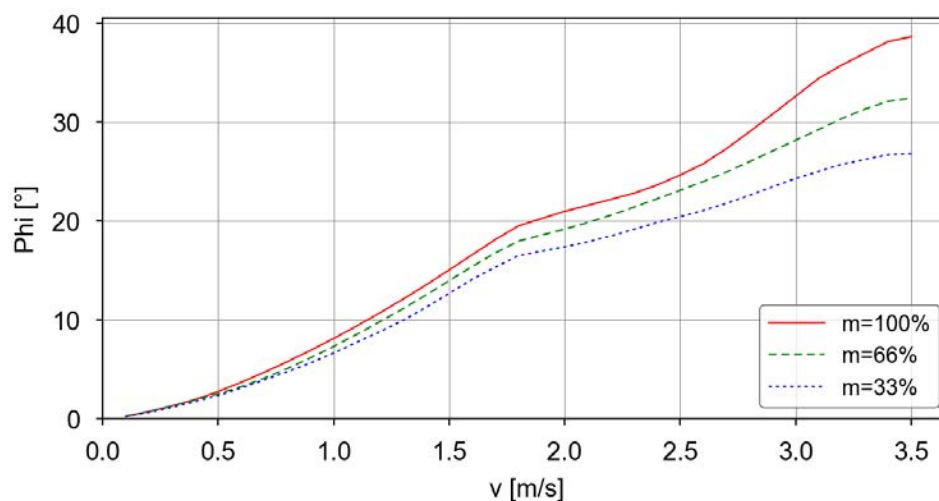
16 IRB 760

16.1 IRB 760 3.2 m 445 kg

Continued

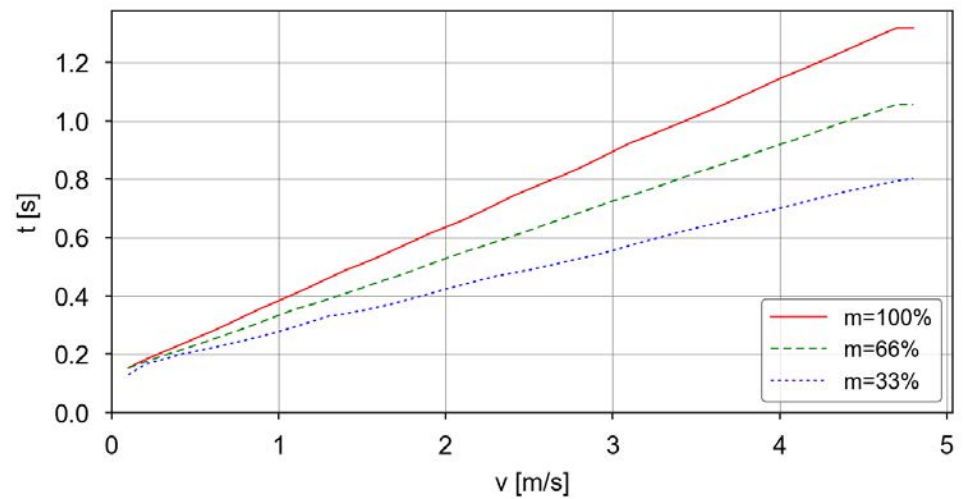
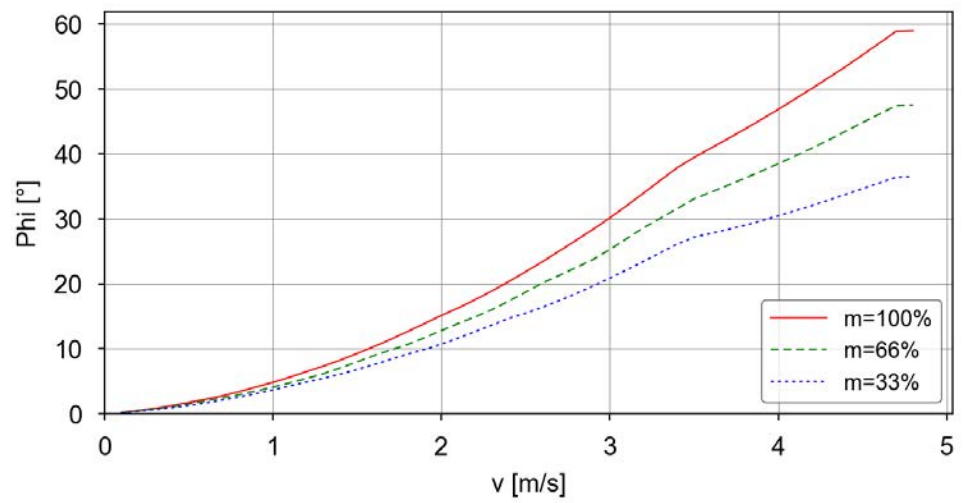


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

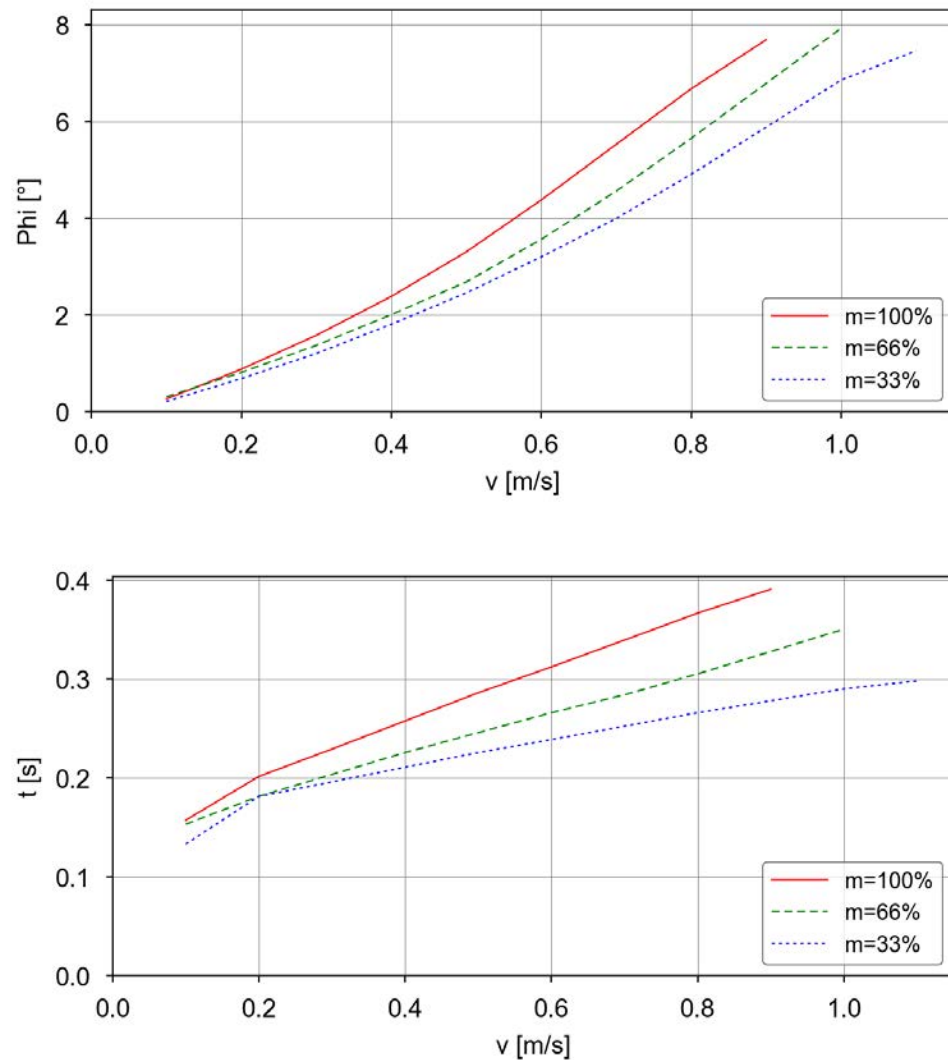
16 IRB 760

16.1 IRB 760 3.2 m 445 kg

Continued

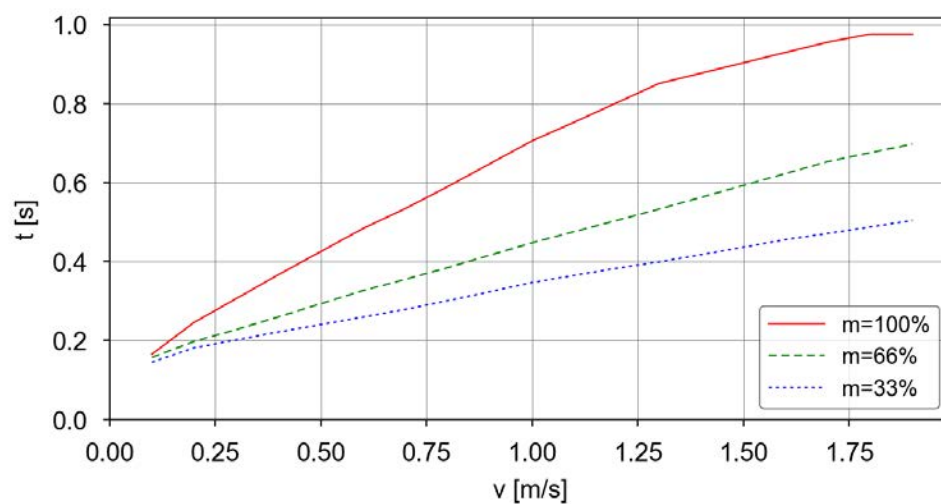
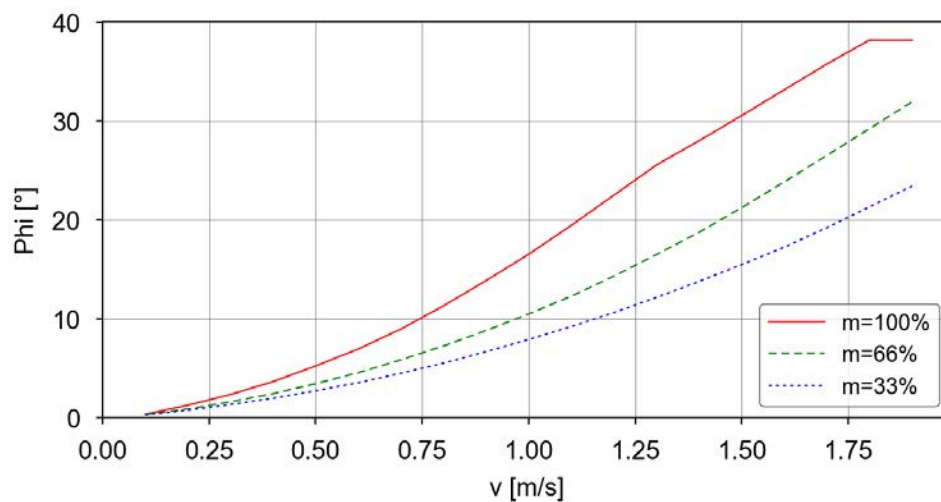
Category 1, Axis A2

Extension zone 0, stopping distance and stopping time

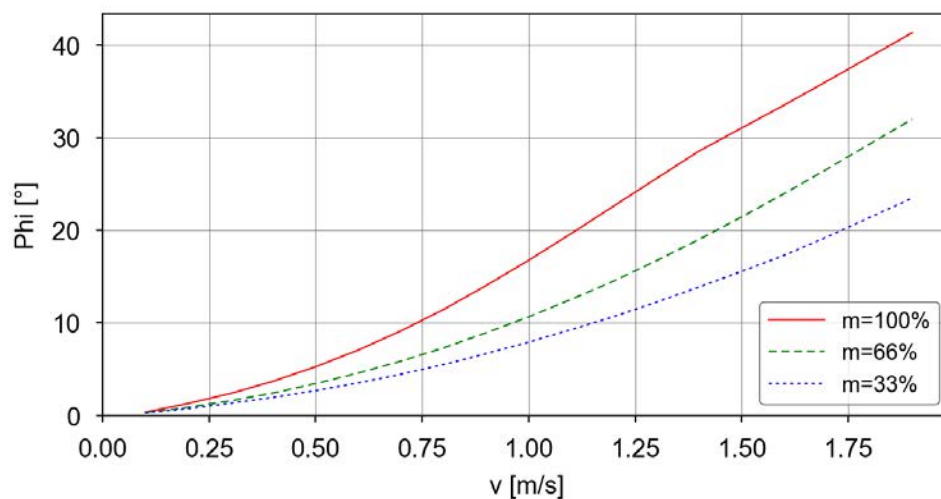


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

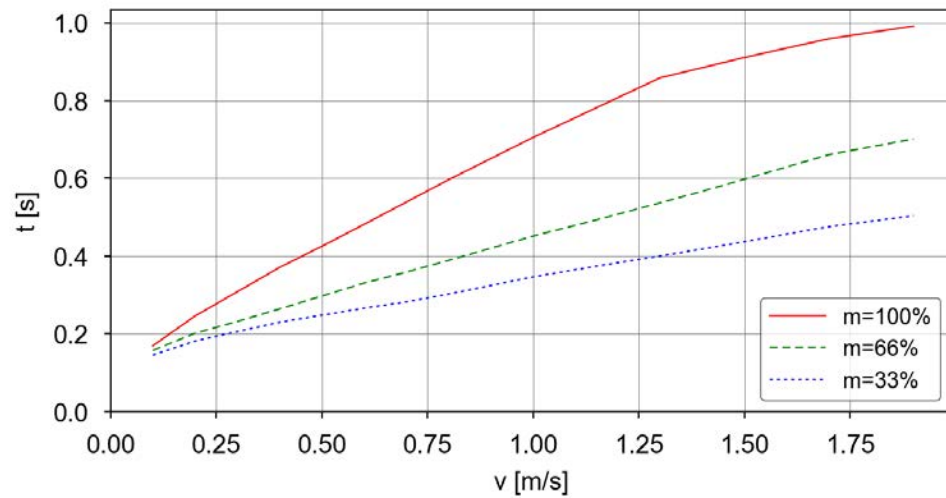


Continues on next page

16 IRB 760

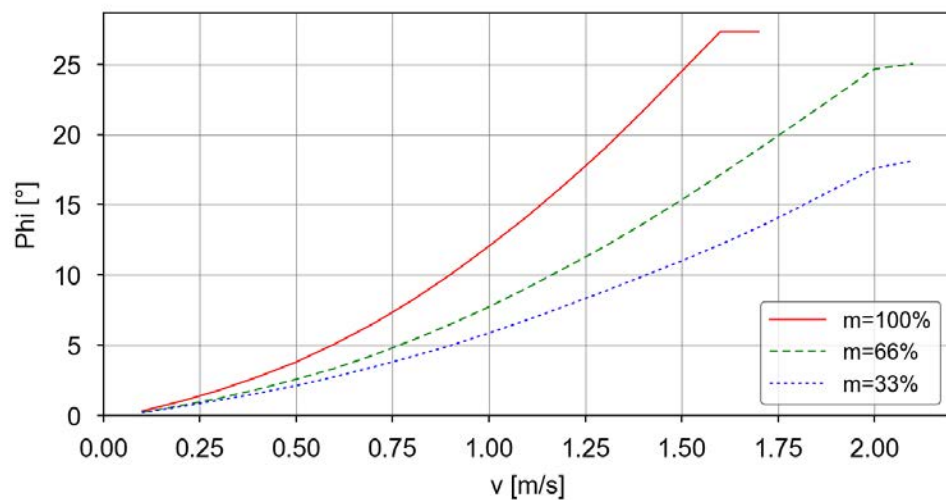
16.1 IRB 760 3.2 m 445 kg

Continued

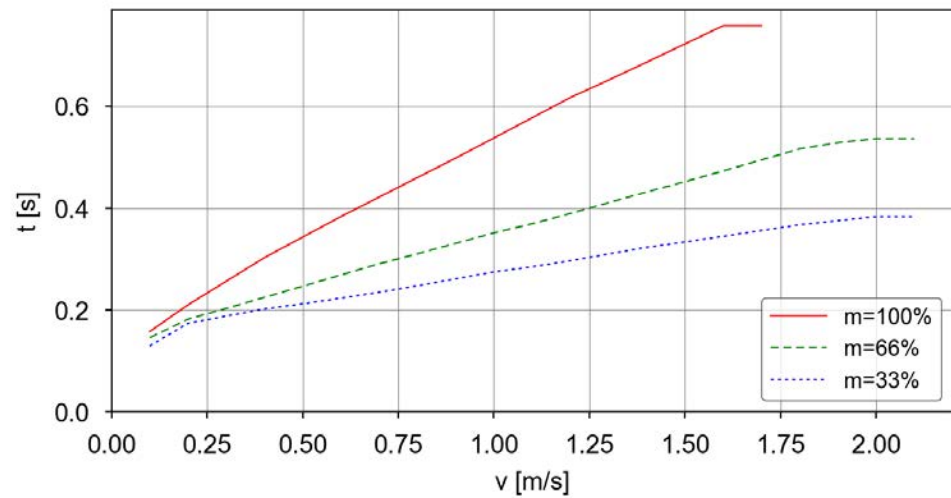


Category 1, Axis A3

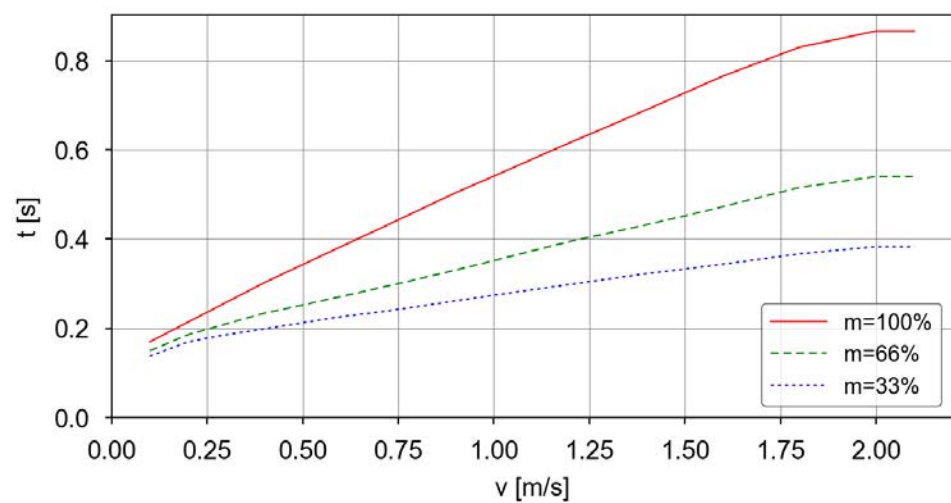
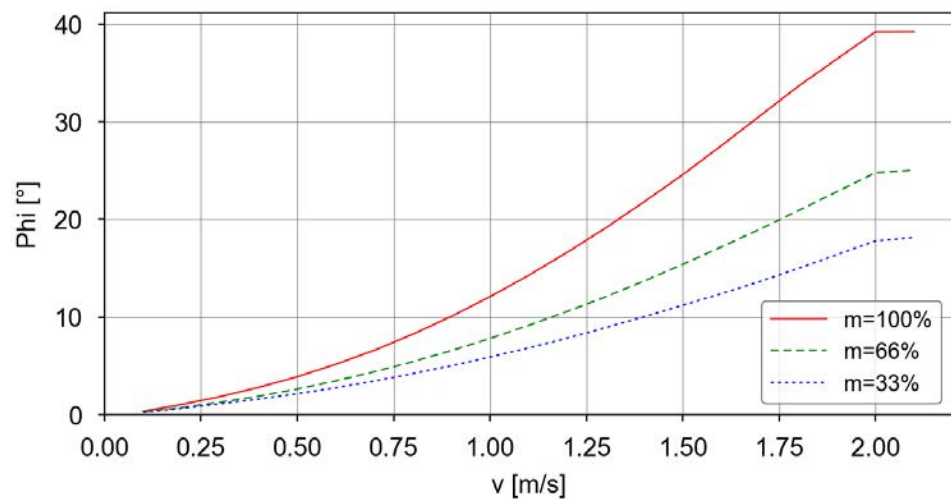
Extension zone 0, stopping distance and stopping time



Continues on next page



Extension zone 1, stopping distance and stopping time



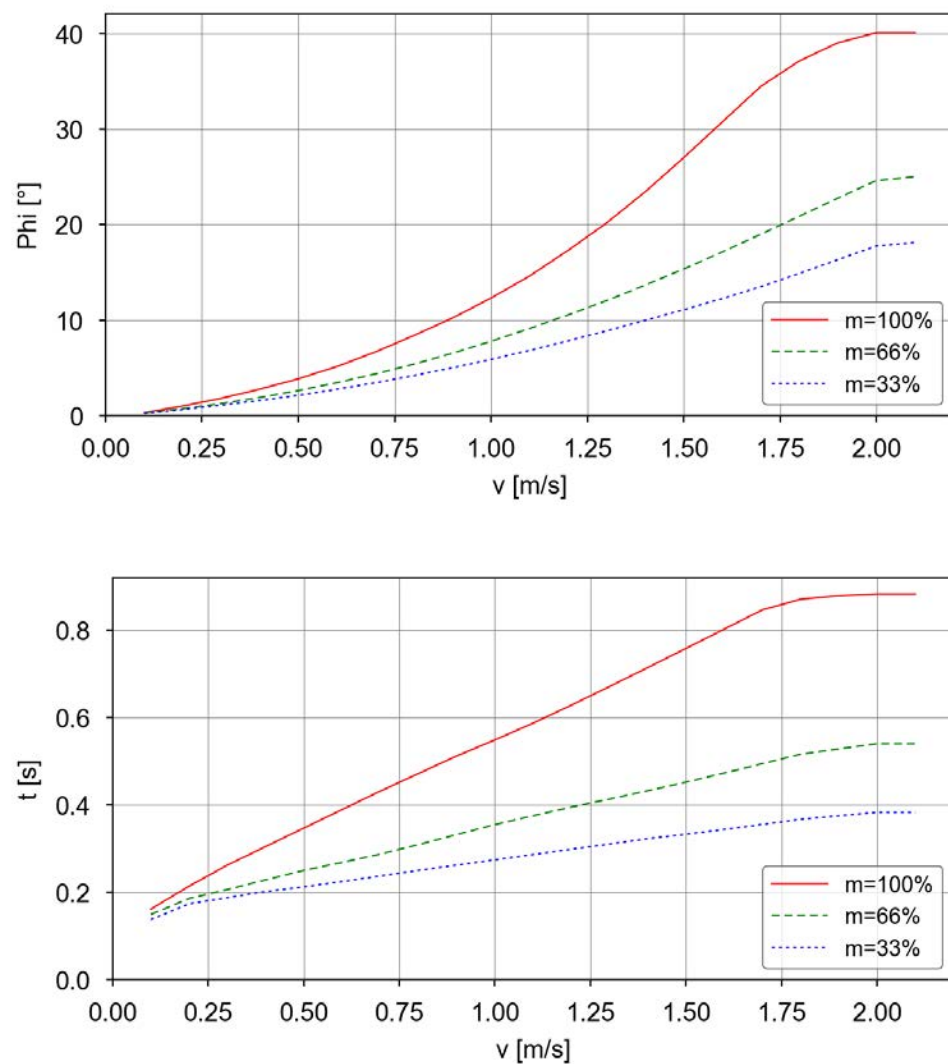
Continues on next page

16 IRB 760

16.1 IRB 760 3.2 m 445 kg

Continued

Extension zone 2, stopping distance and stopping time



16.2 IRB 760 3.2 m 450 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	40.2	0.83
2	0.0	0.0
3	26.4	0.49

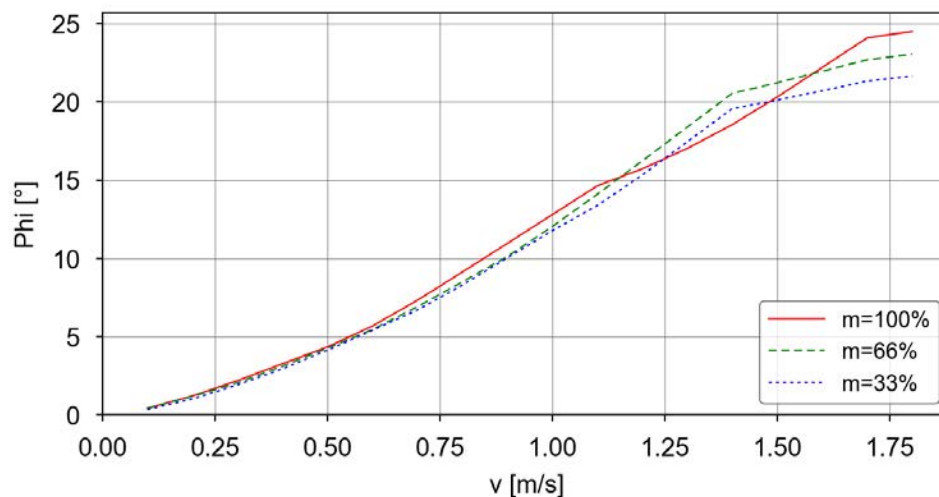
Category 1, extension zones

For definitions of the zones, see [Extension zones for articulated robots on page 14](#).

Zone	wcp min (m)	wcp max (m)
0	0	1.168
1	1.168	2.337
2	2.337	max reach

Category 1, Axis 1

Extension zone 0, stopping distance and stopping time

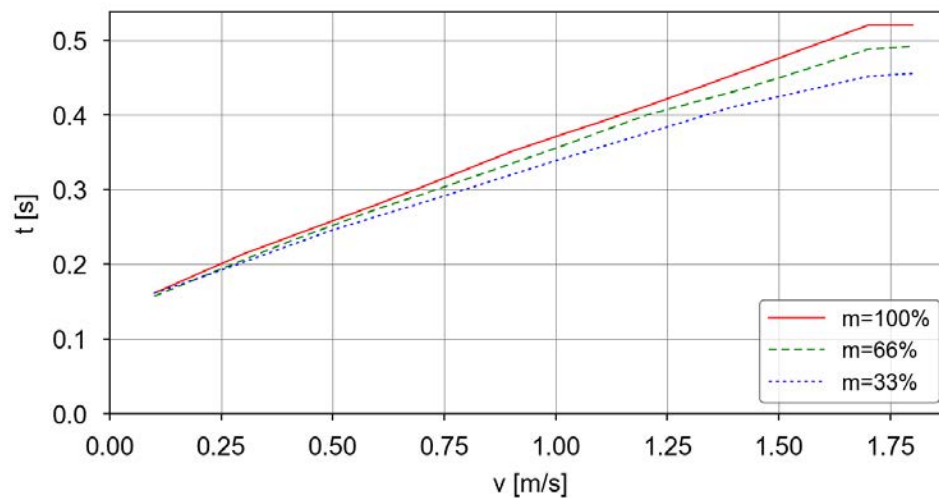


Continues on next page

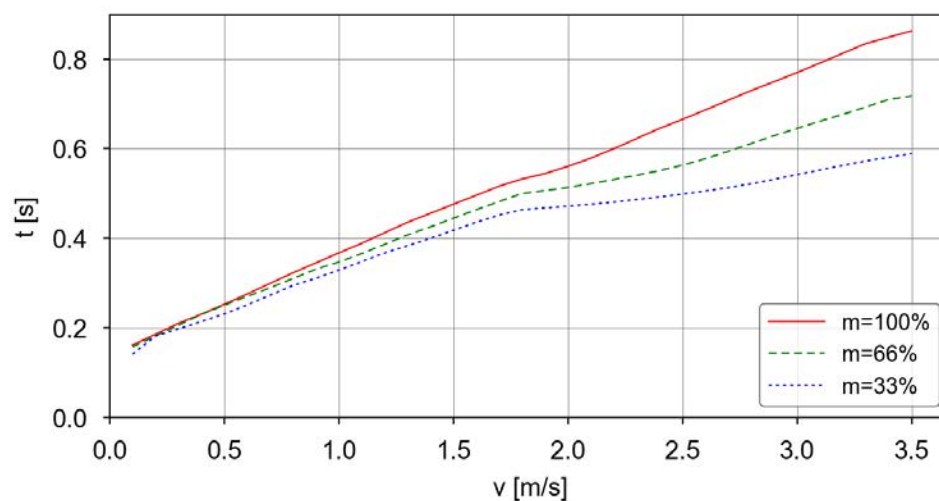
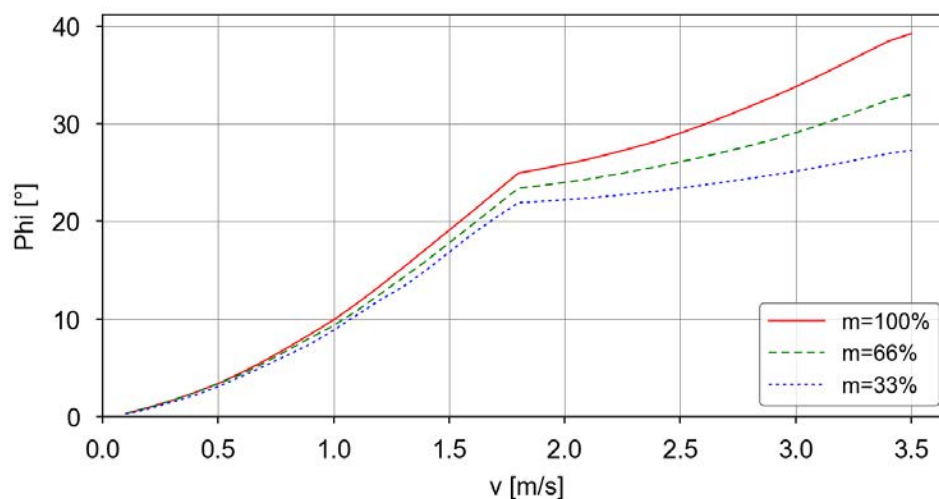
16 IRB 760

16.2 IRB 760 3.2 m 450 kg

Continued

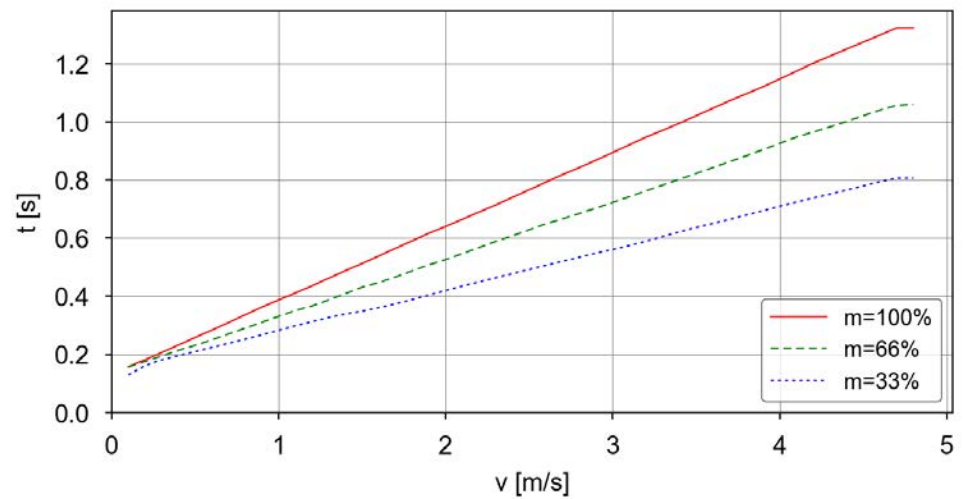
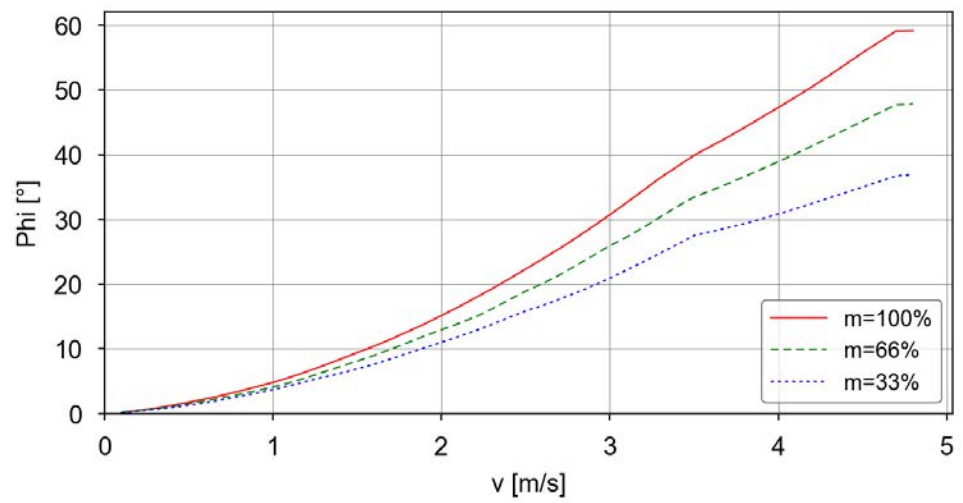


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



Continues on next page

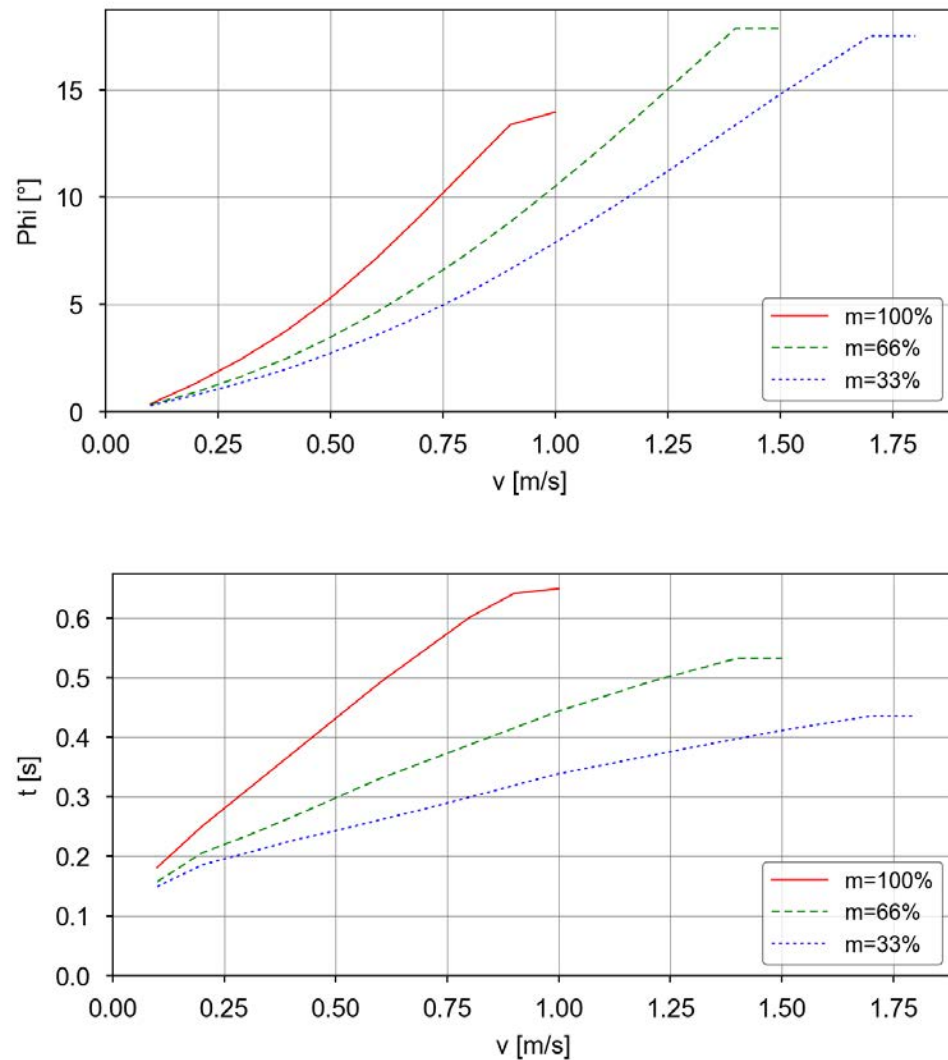
16 IRB 760

16.2 IRB 760 3.2 m 450 kg

Continued

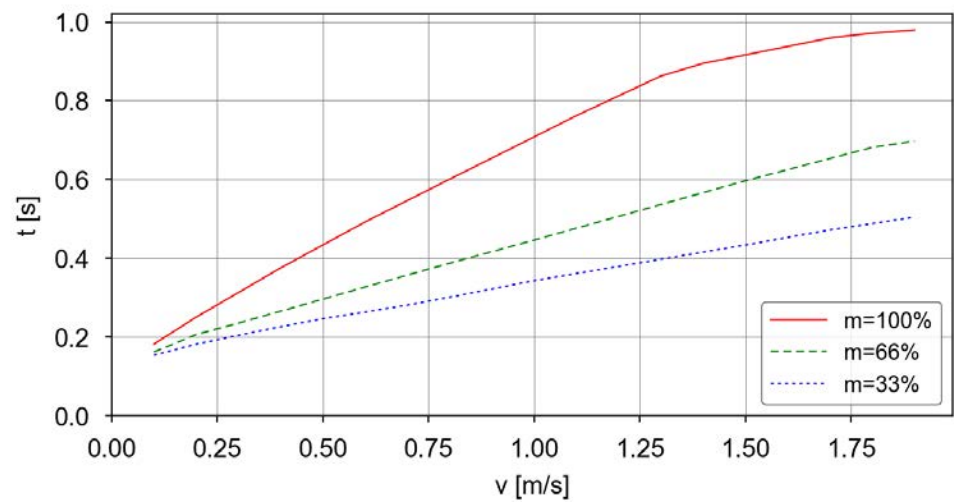
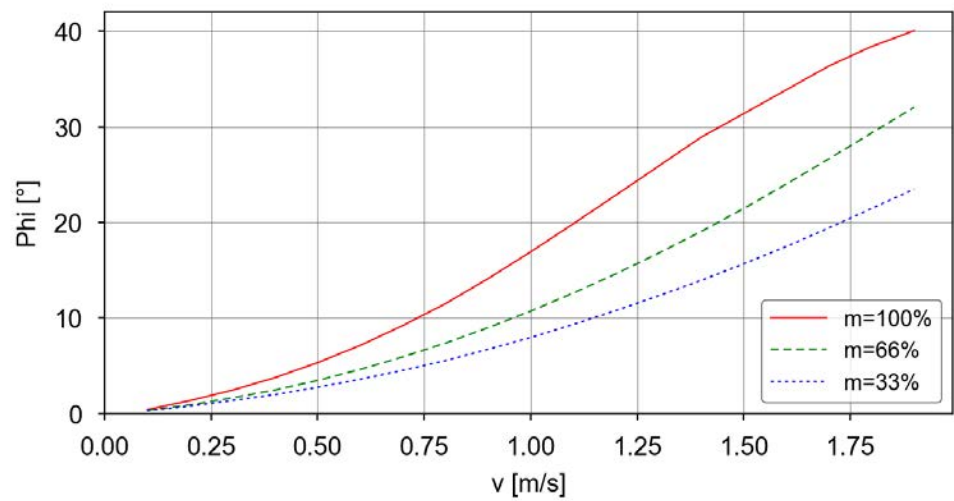
Category 1, Axis 2

Extension zone 0, stopping distance and stopping time

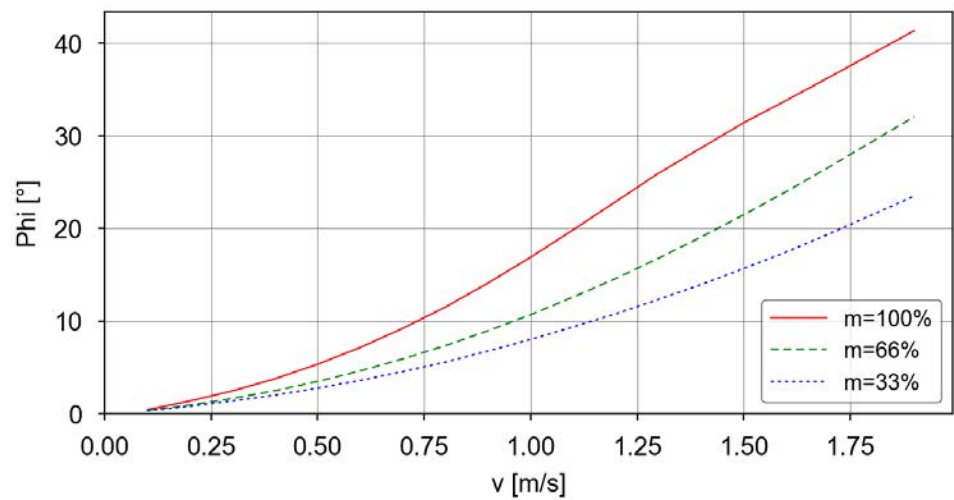


Continues on next page

Extension zone 1, stopping distance and stopping time



Extension zone 2, stopping distance and stopping time

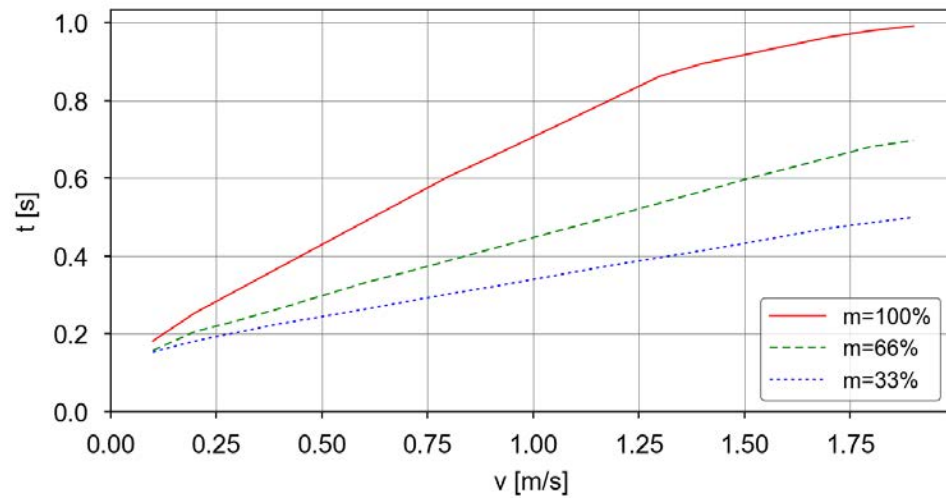


Continues on next page

16 IRB 760

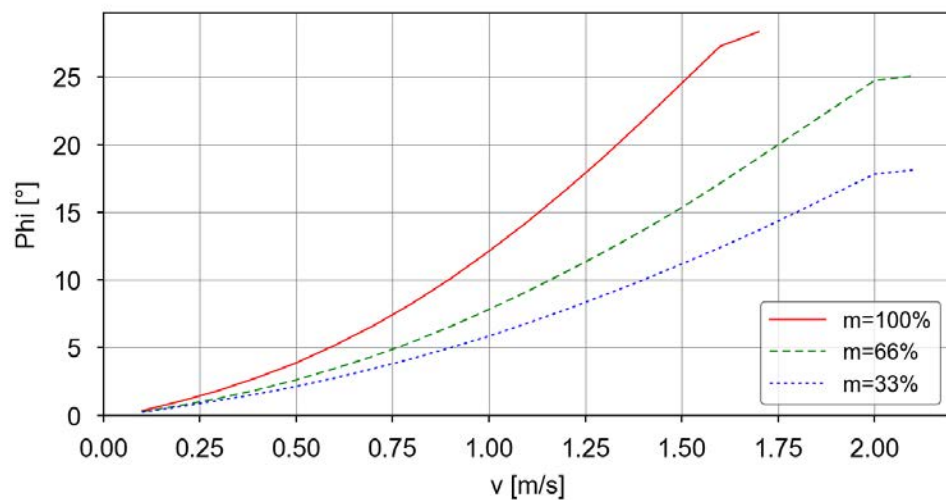
16.2 IRB 760 3.2 m 450 kg

Continued

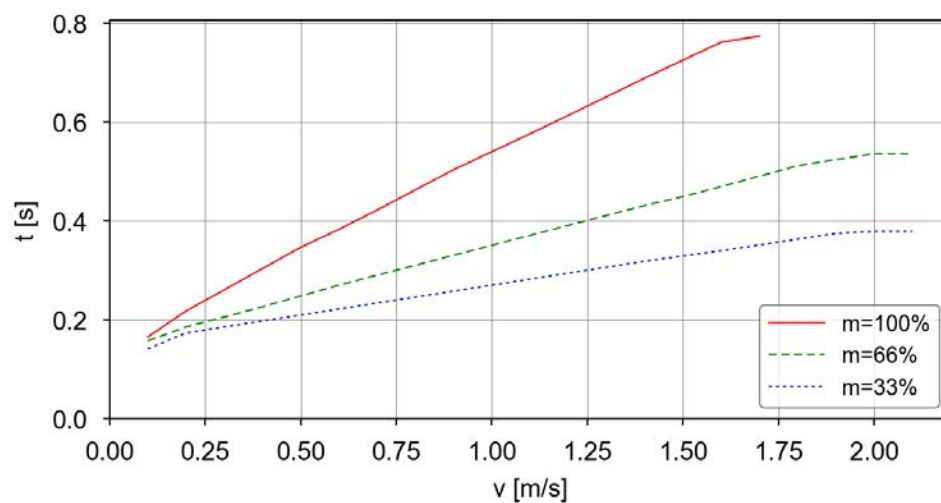


Category 1, Axis 3

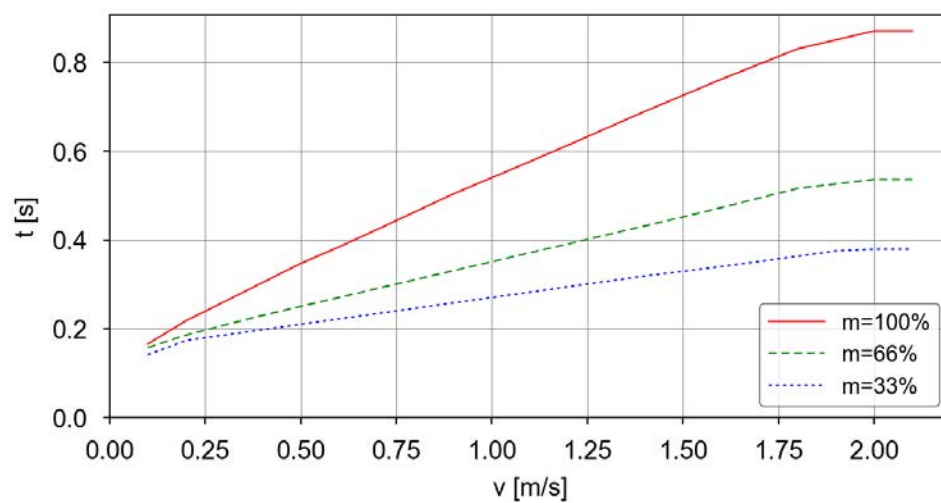
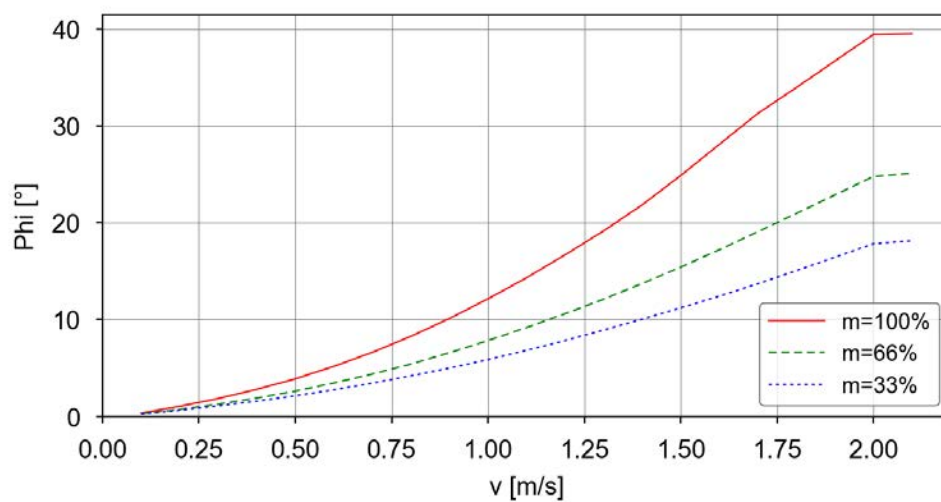
Extension zone 0, stopping distance and stopping time



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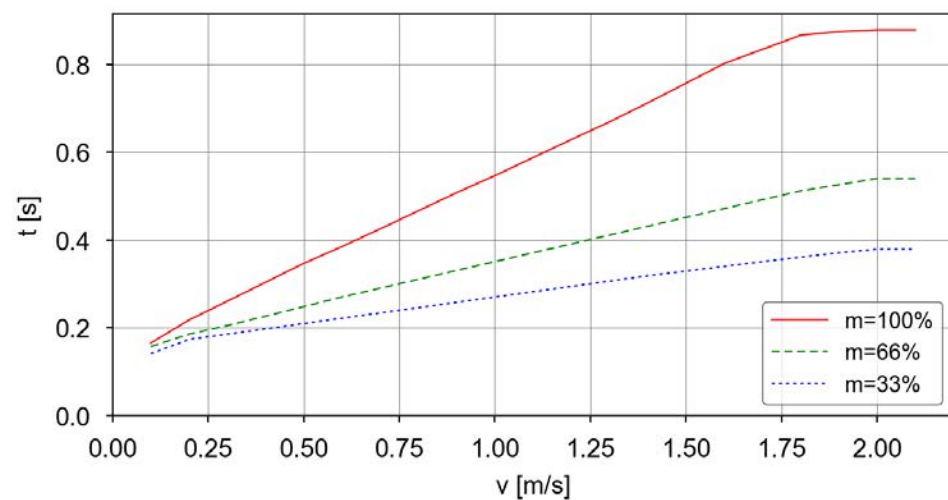
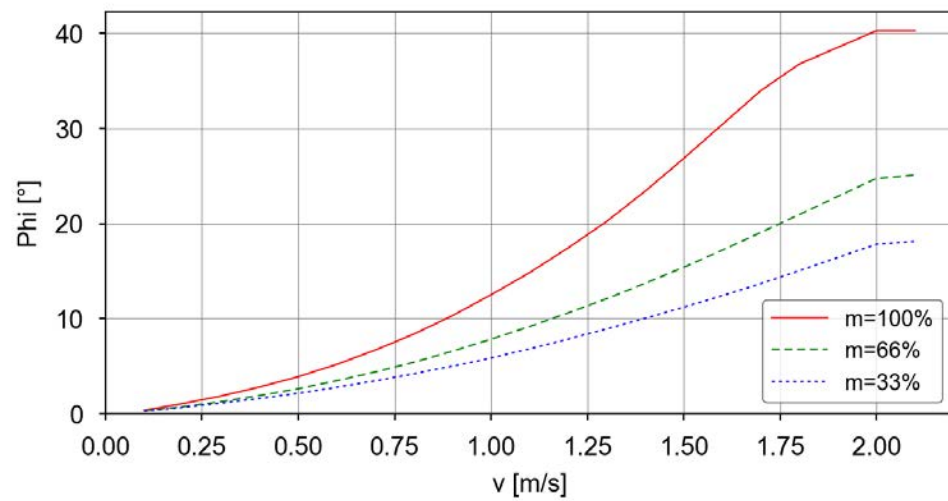


Extension zone 1, stopping distance and stopping time



Continues on next page

Extension zone 2, stopping distance and stopping time



17 IRB 360

17.1 IRB 360 0.8 m 1 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.57	0.18
Wash down	0.56	0.18
3AXES	0.57	0.17

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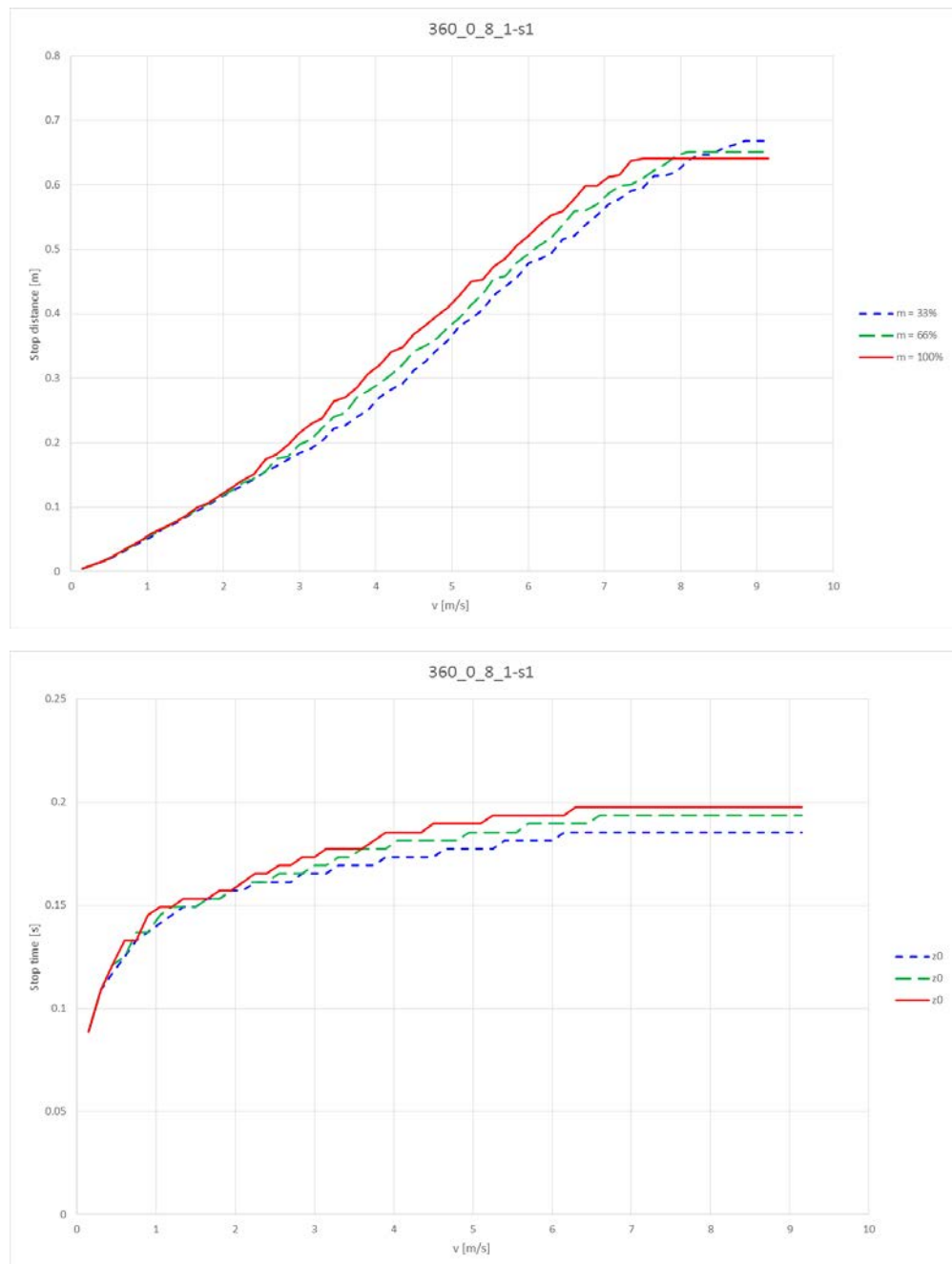
17 IRB 360

17.1 IRB 360 0.8 m 1 kg

Continued

Category 1, Standard

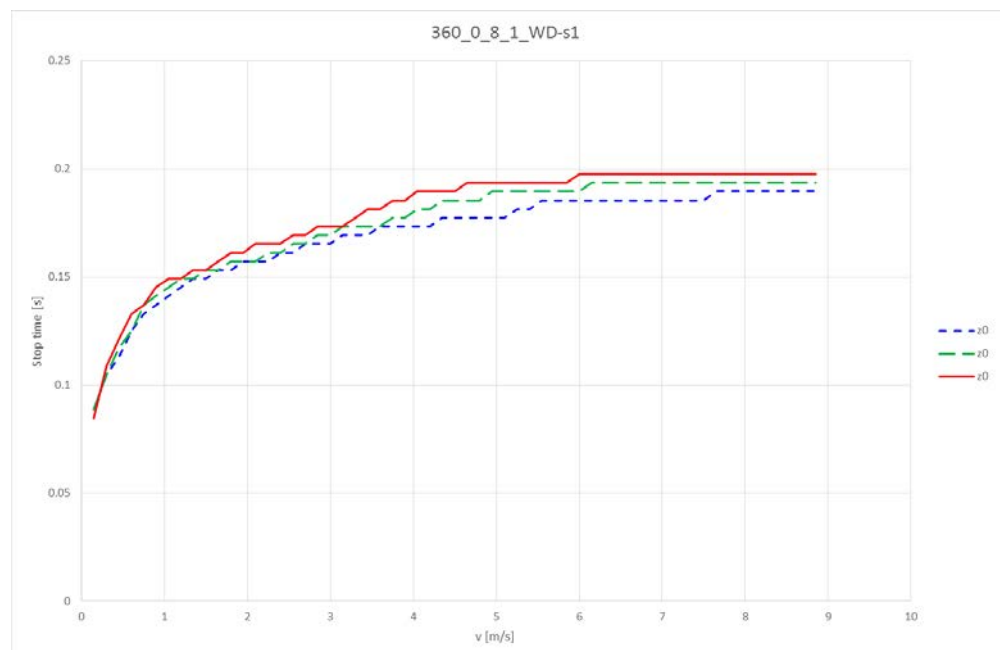
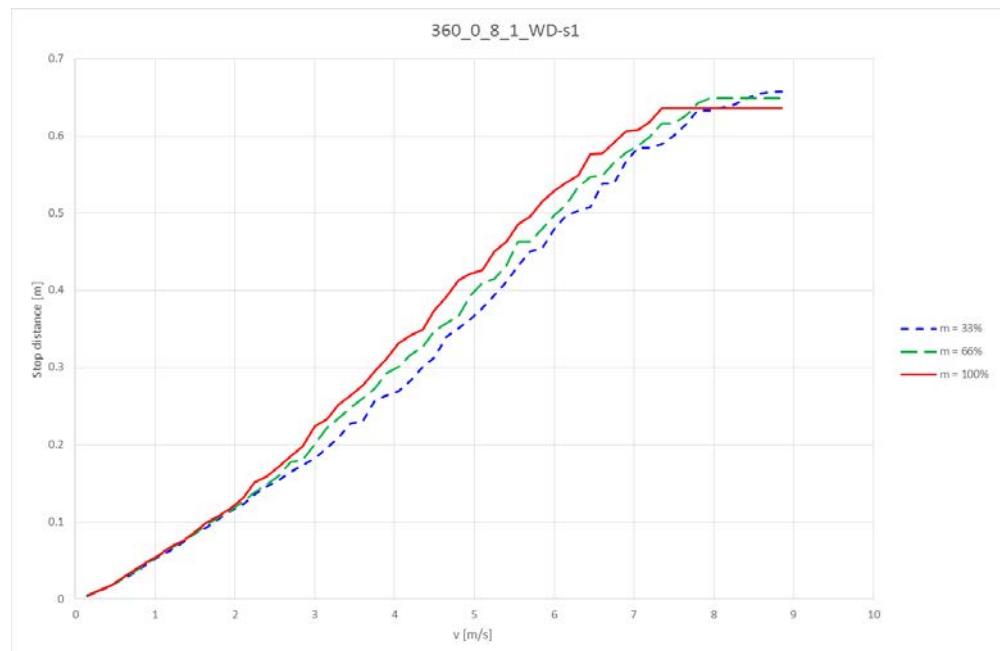
Stopping distance and stopping time



Continues on next page

Category 1, Wash Down

Stopping distance and stopping time



Continues on next page

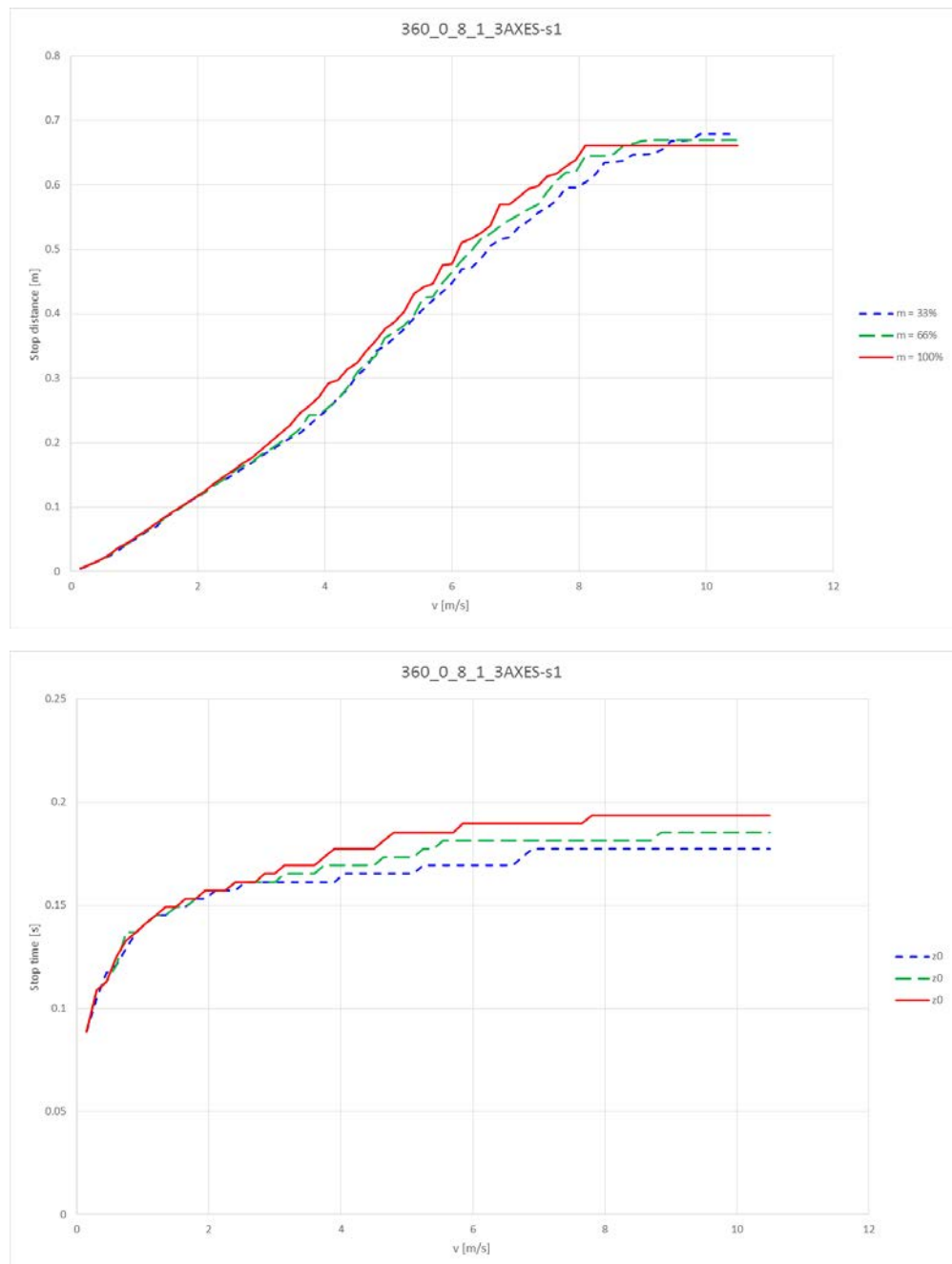
17 IRB 360

17.1 IRB 360 0.8 m 1 kg

Continued

Category 1, 3AXES

Stopping distance and stopping time



17.2 IRB 360 1.13 m 1 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.69	0.19
Wash down	0.69	0.19
3AXES	0.73	0.18
Stainless	0.67	0.19

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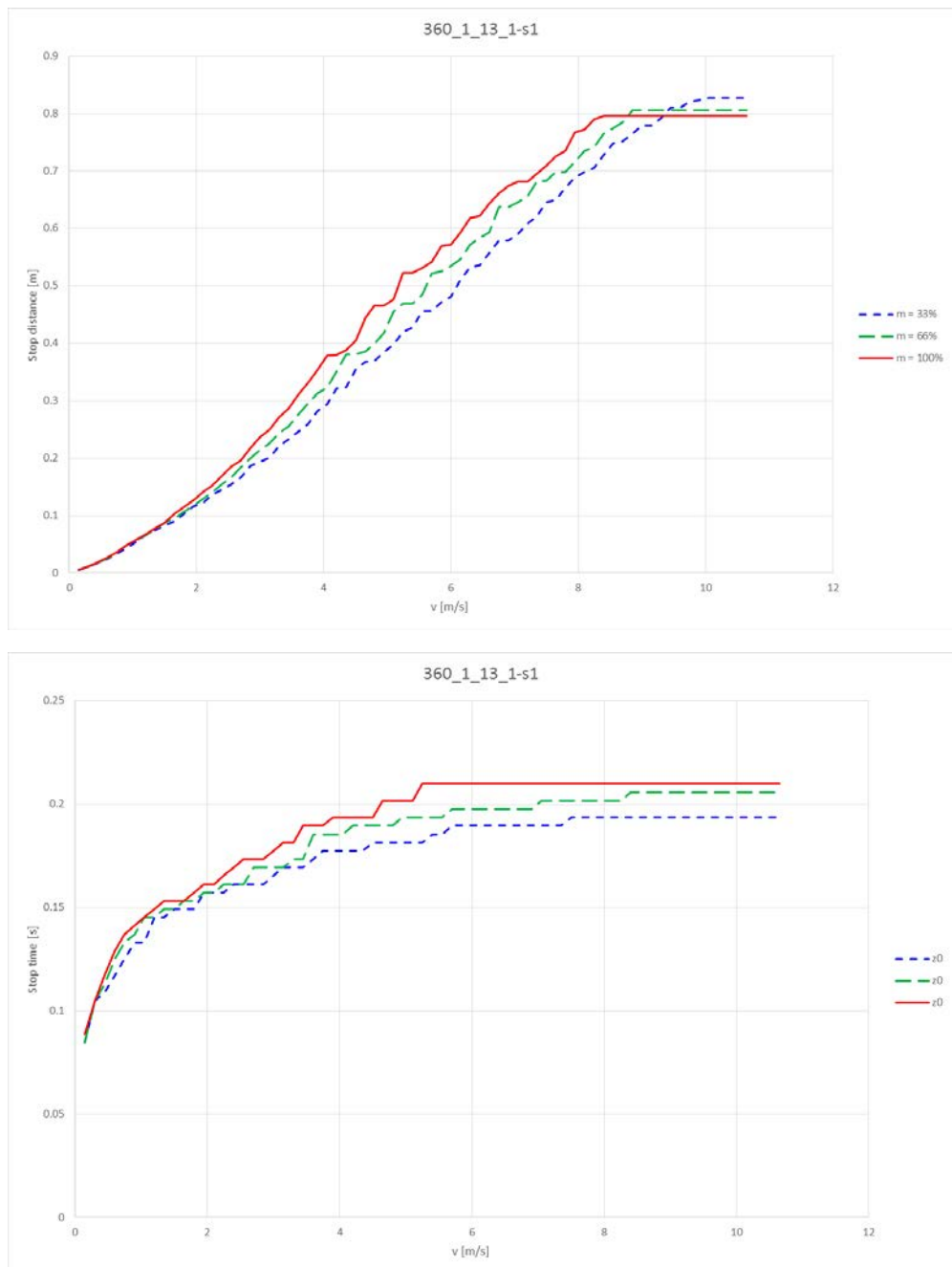
17 IRB 360

17.2 IRB 360 1.13 m 1 kg

Continued

Category 1, Standard

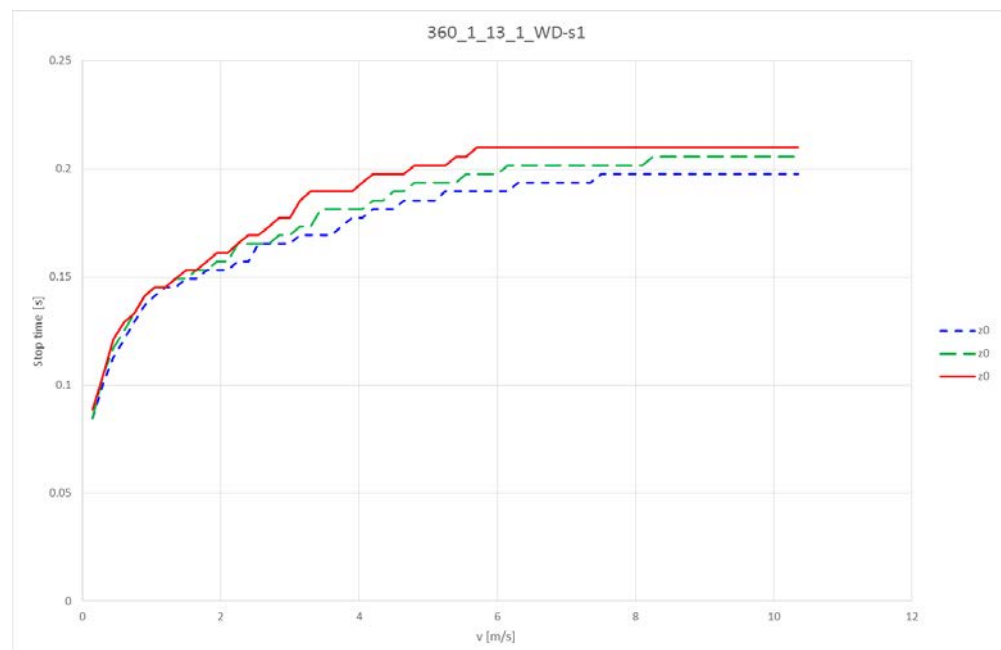
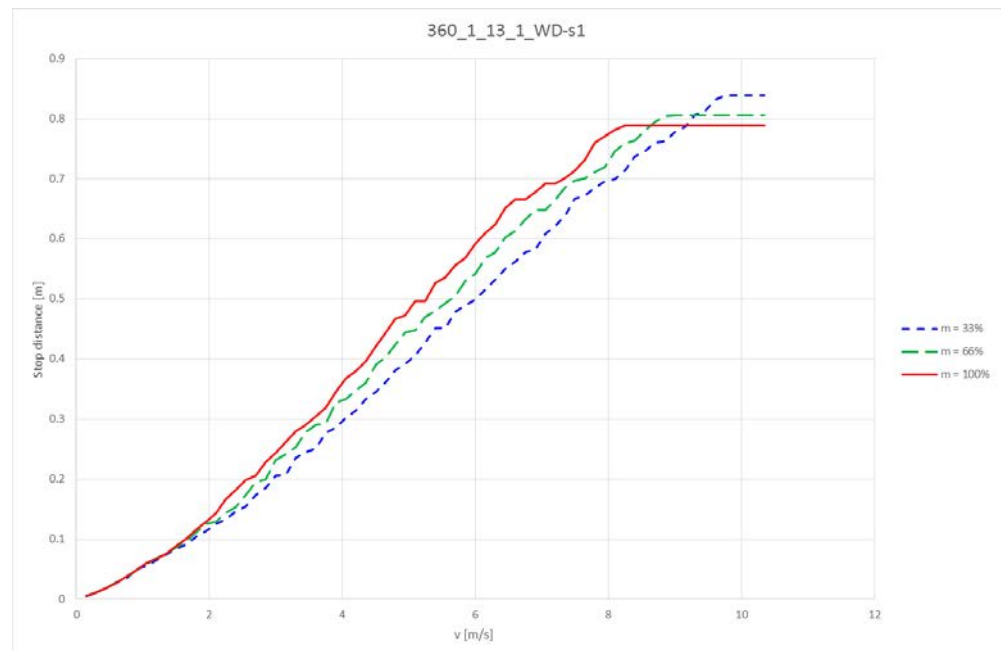
Stopping distance and stopping time



Continues on next page

Category 1, Wash Down

Stopping distance and stopping time



Continues on next page

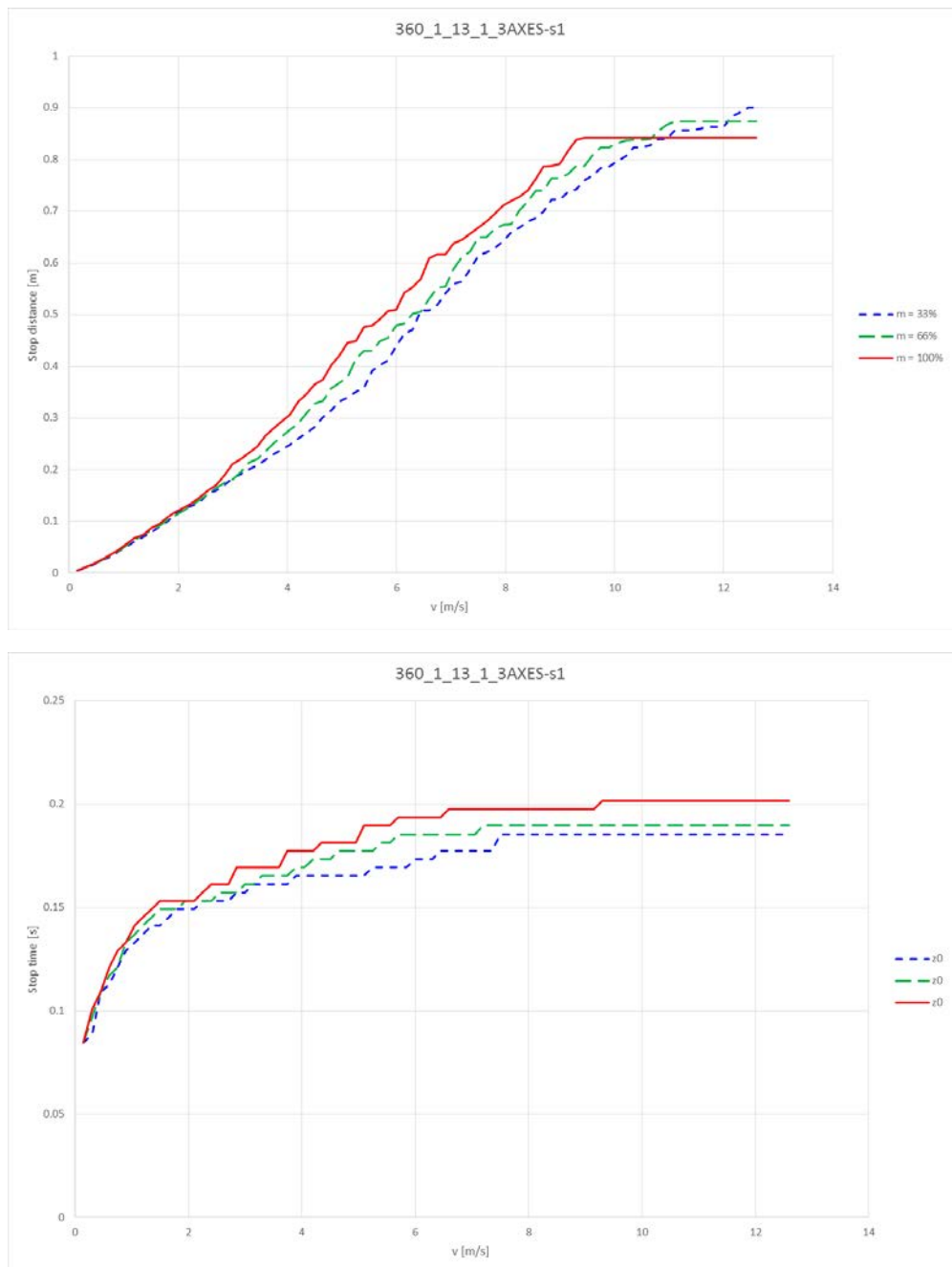
17 IRB 360

17.2 IRB 360 1.13 m 1 kg

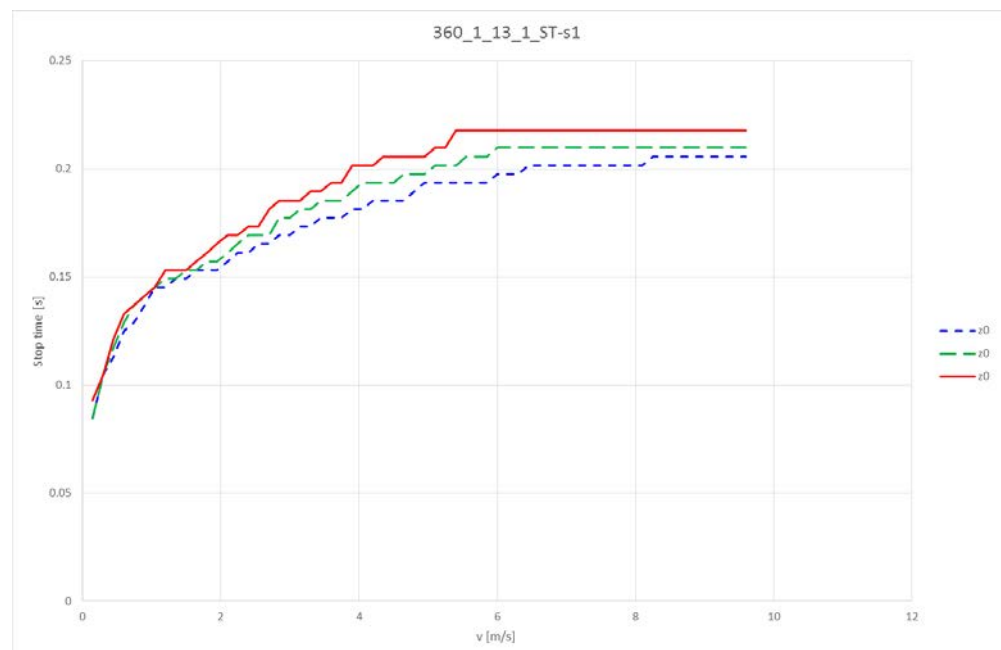
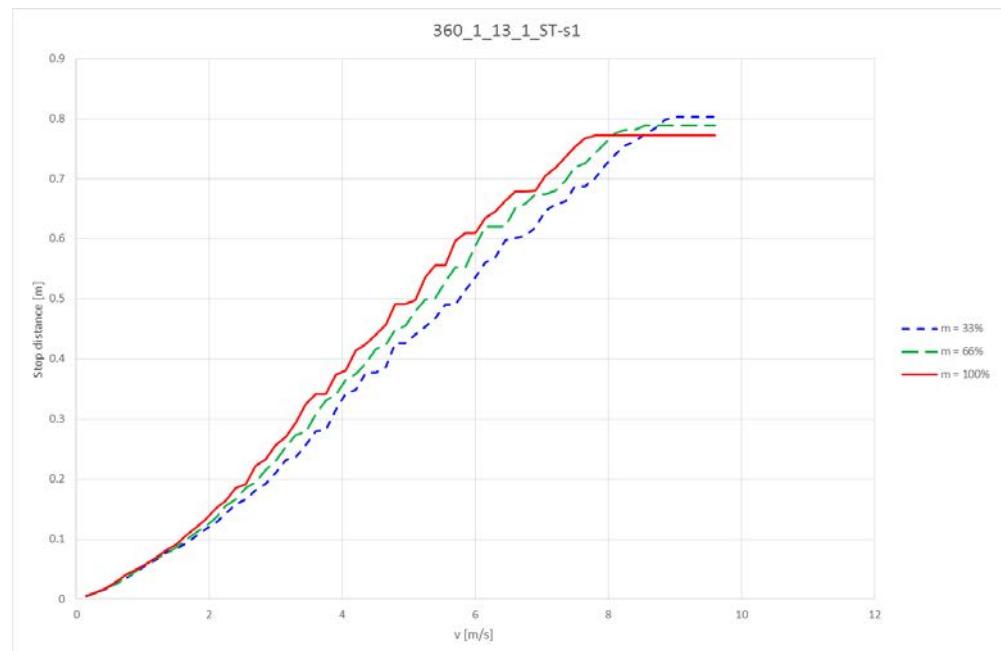
Continued

Category 1, 3AXES

Stopping distance and stopping time



Continues on next page

Category 1, Stainless**Stopping distance and stopping time**

17 IRB 360

17.3 IRB 360 1.13 m 3 kg

17.3 IRB 360 1.13 m 3 kg

Category 0

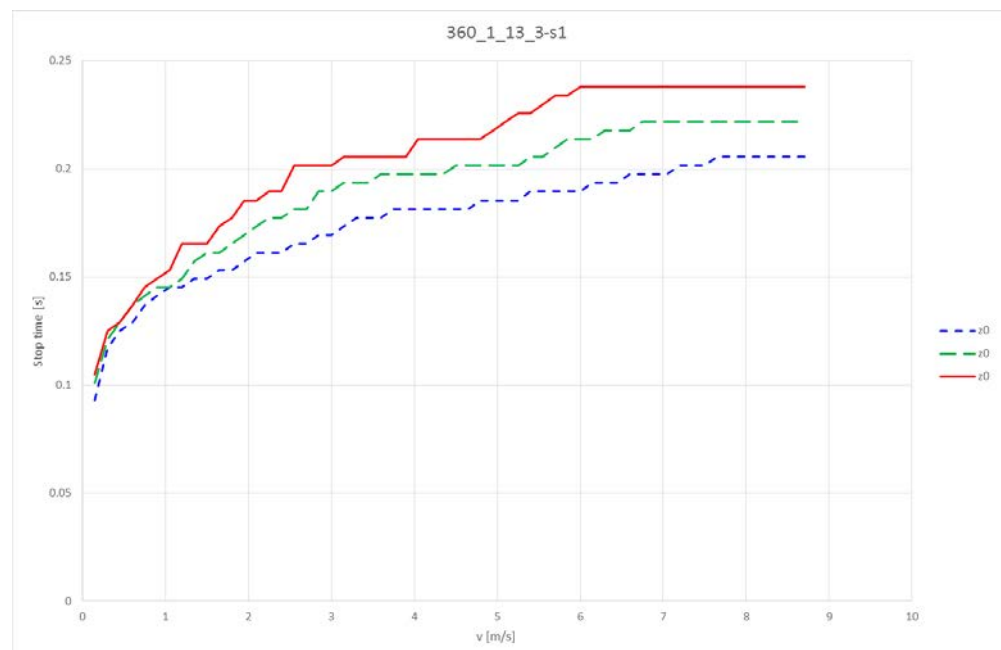
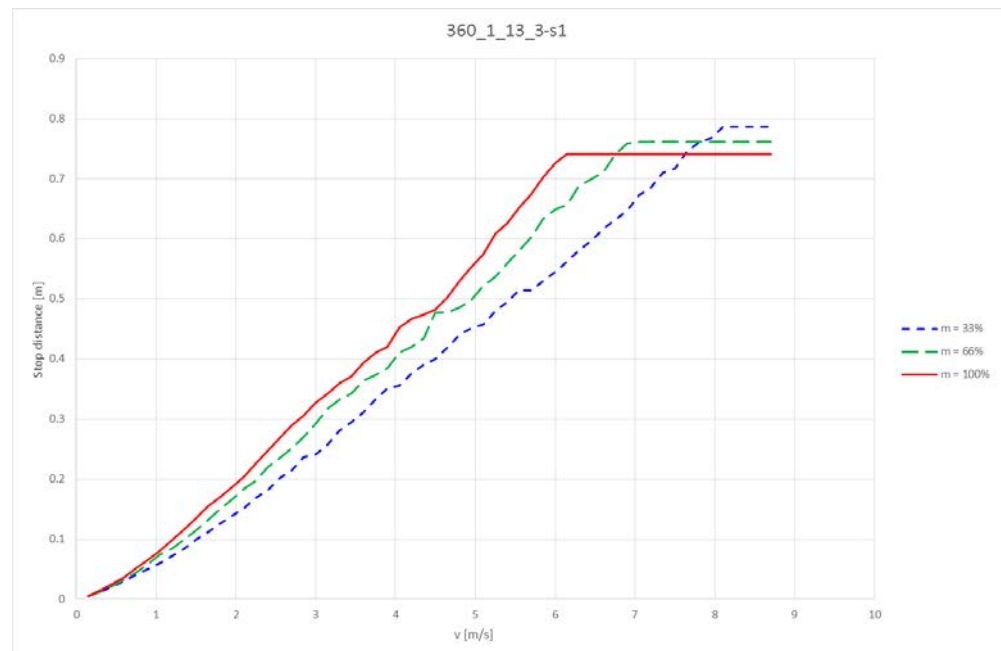
The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.65	0.21
Wash down	0.65	0.21
3AXES	0.62	0.20
Stainless	0.64	0.22

Continues on next page

Category 1, Standard

Stopping distance and stopping time



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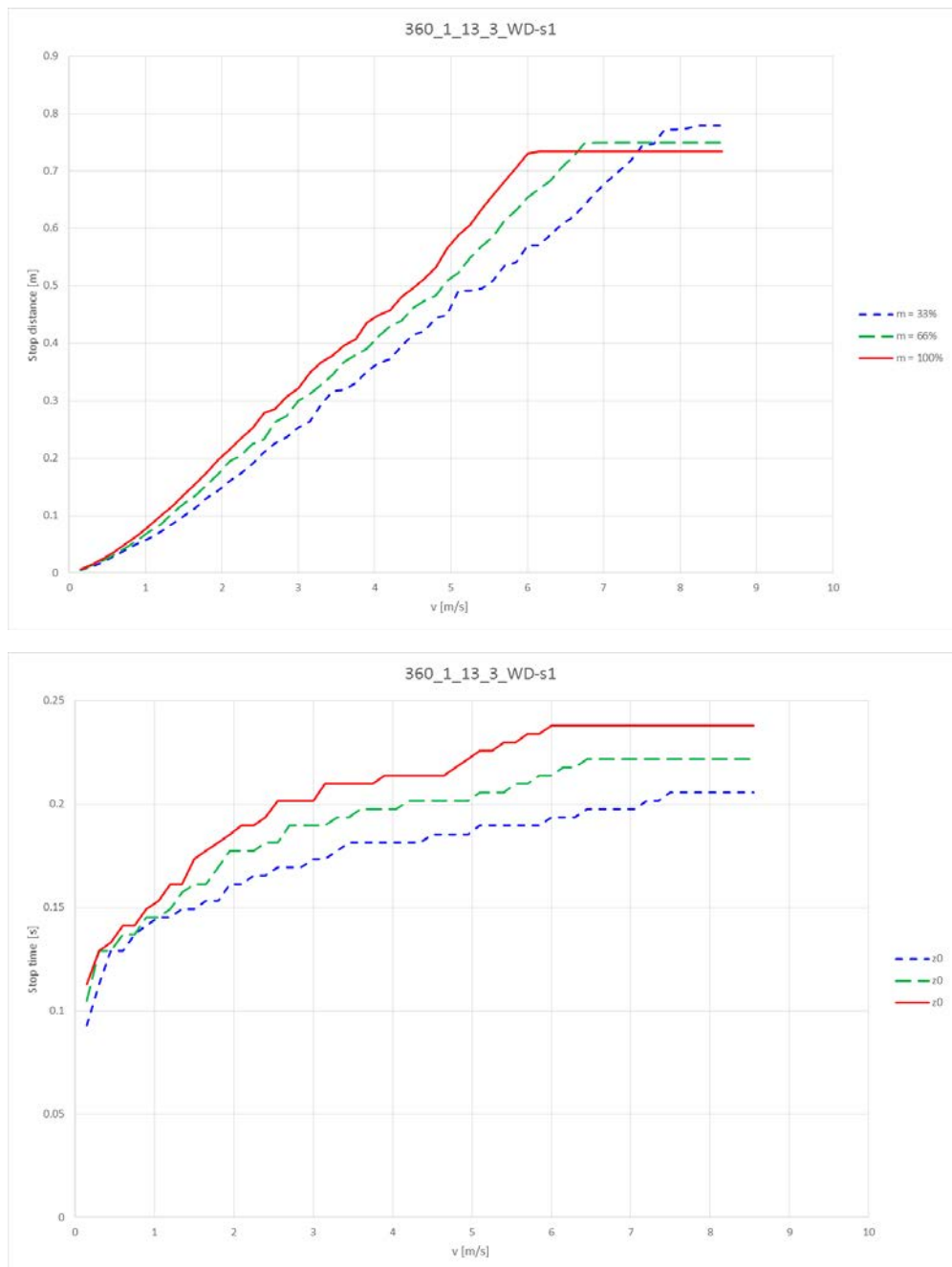
17 IRB 360

17.3 IRB 360 1.13 m 3 kg

Continued

Category 1, Wash Down

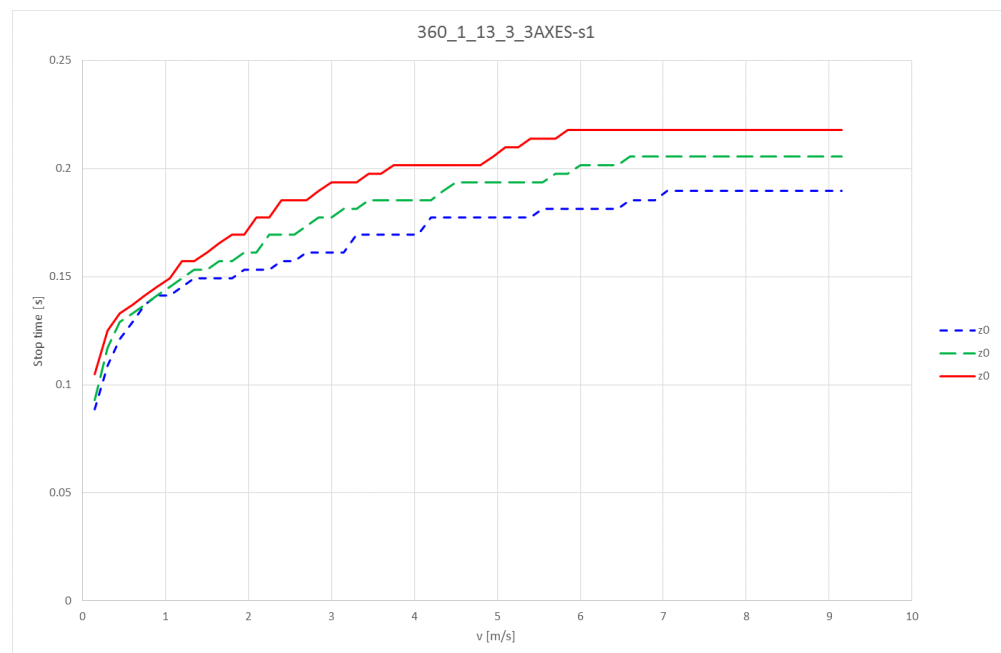
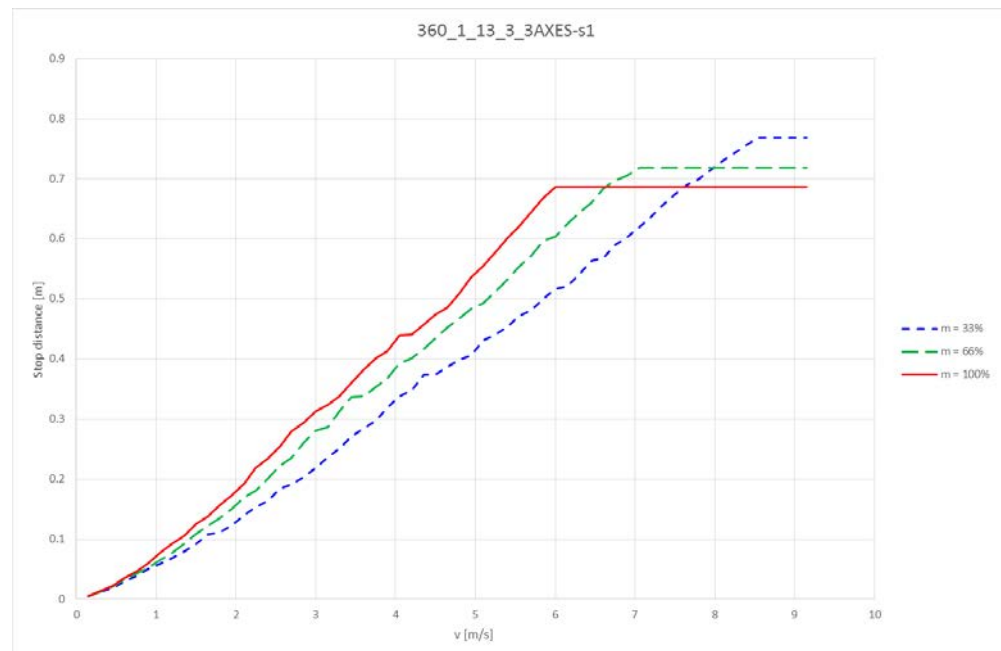
Stopping distance and stopping time



Continues on next page

Category 1, 3AXES

Stopping distance and stopping time



Continues on next page

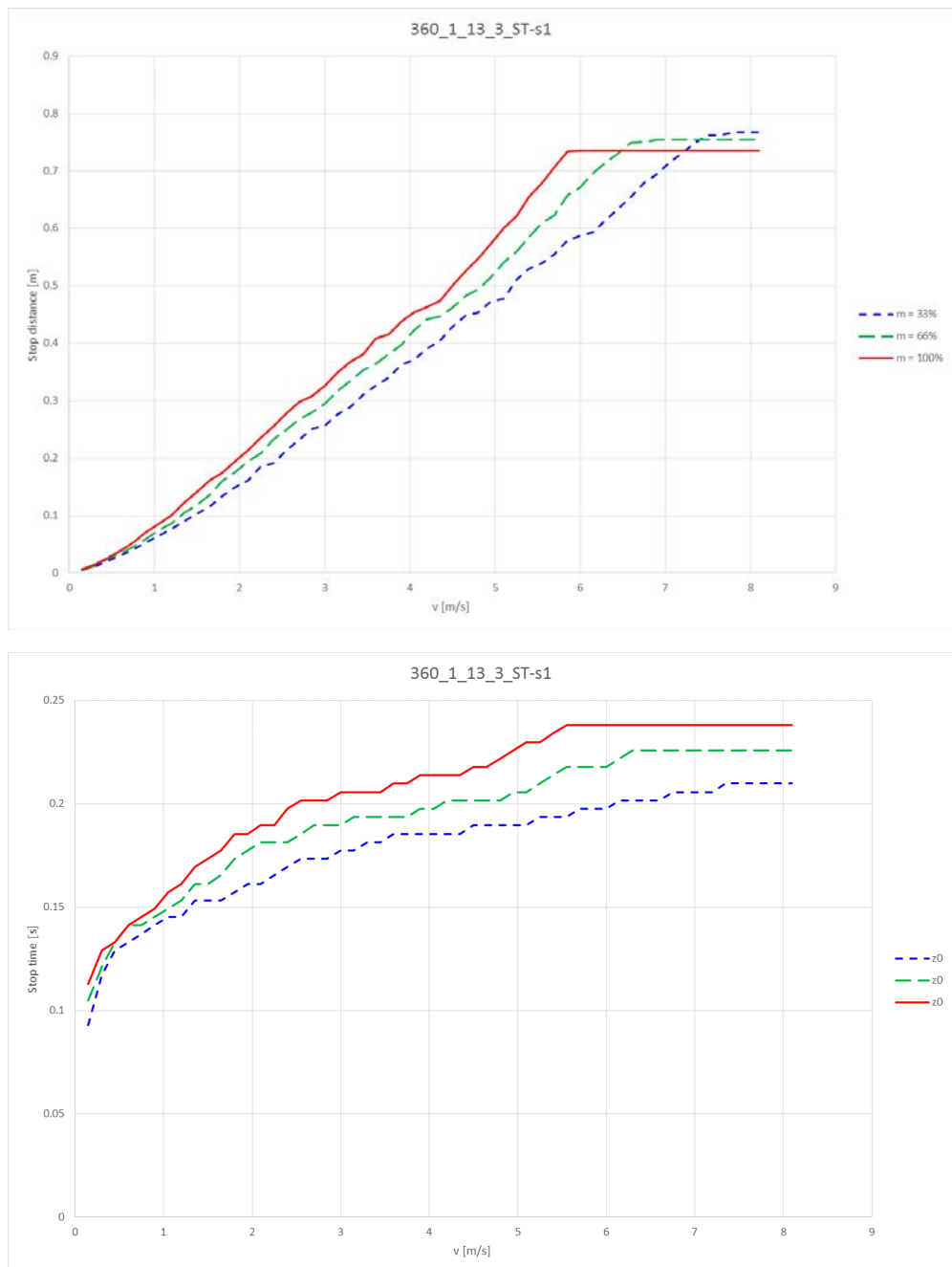
17 IRB 360

17.3 IRB 360 1.13 m 3 kg

Continued

Category 1, Stainless

Stopping distance and stopping time



17.4 IRB 360 1.13 m 8 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.65	0.33

Continues on next page

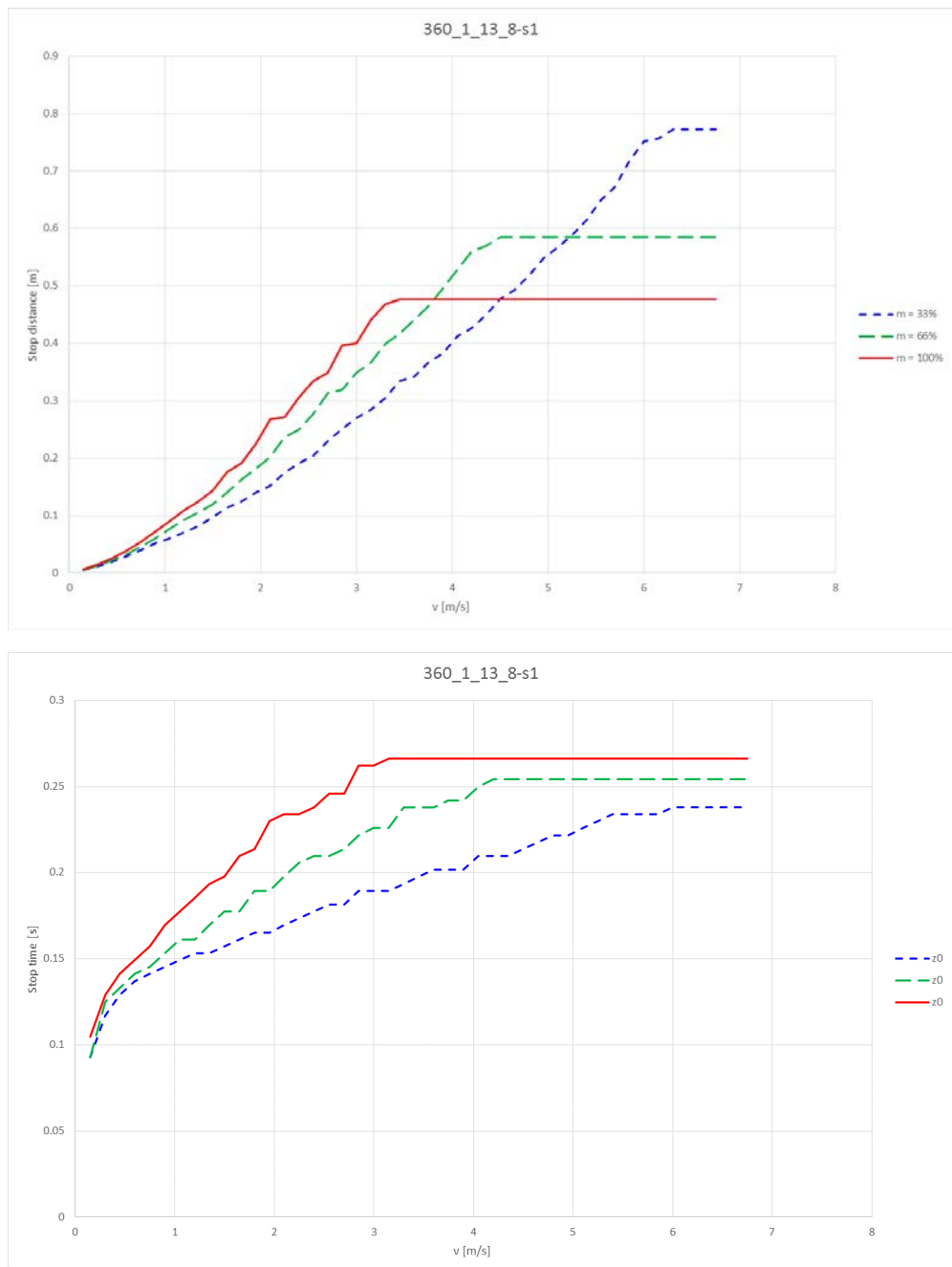
17 IRB 360

17.4 IRB 360 1.13 m 8 kg

Continued

Category 1, Standard

Stopping distance and stopping time



17.5 IRB 360 1.6 m 1 kg**Category 0**

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.90	0.22

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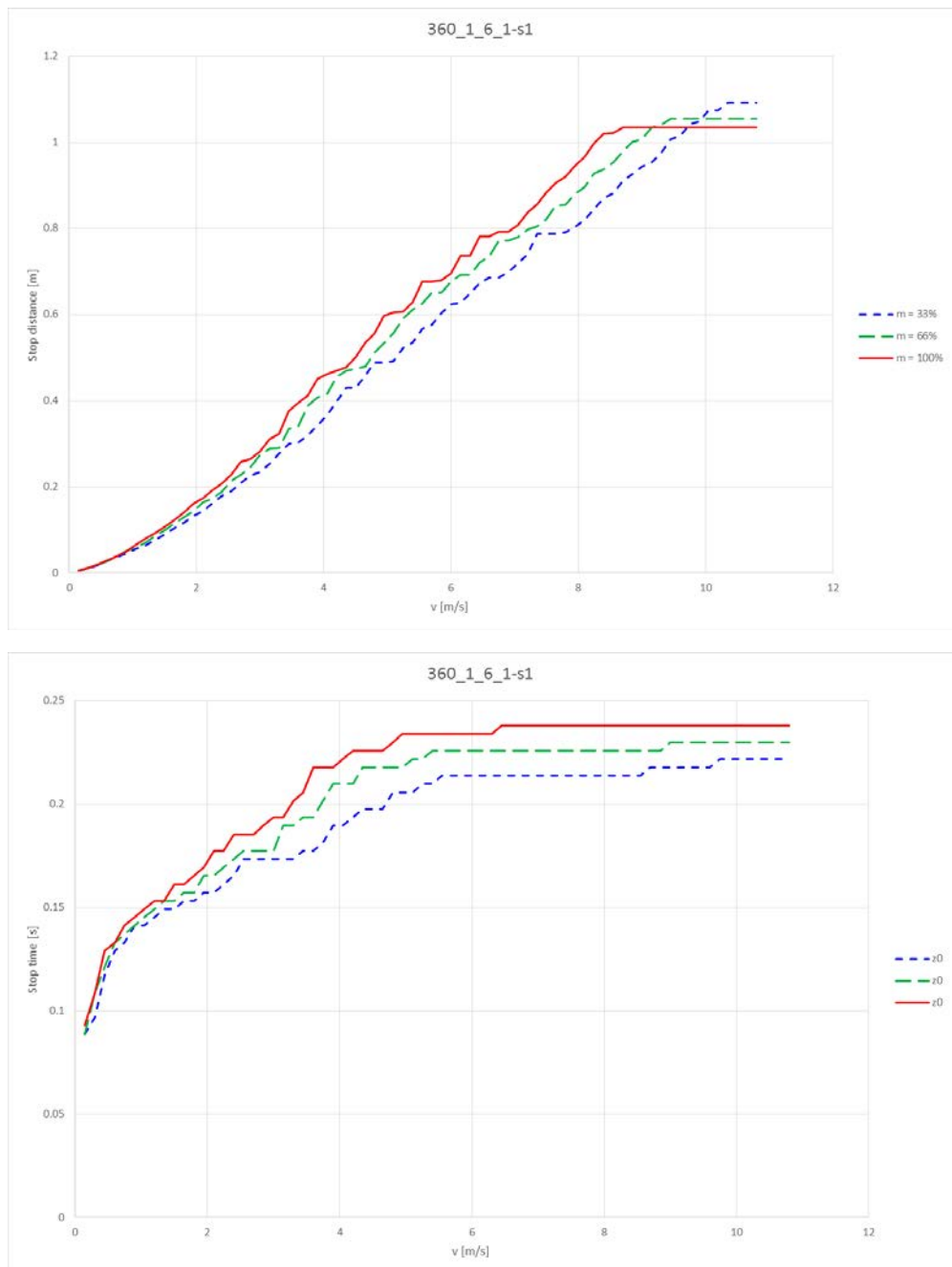
17 IRB 360

17.5 IRB 360 1.6 m 1 kg

Continued

Category 1, Standard

Stopping distance and stopping time



17.6 IRB 360 1.6 m 6 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.93	0.36

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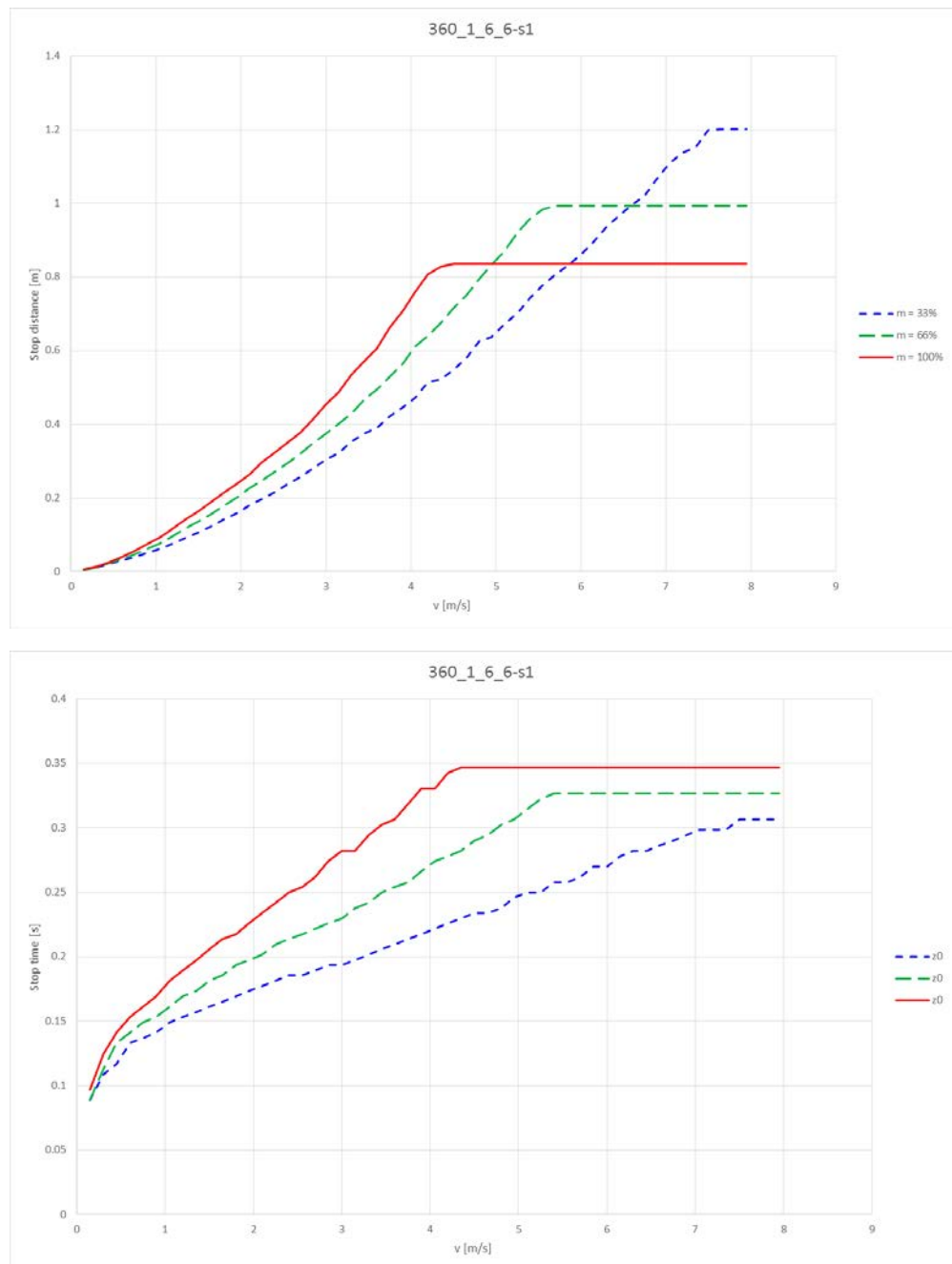
17 IRB 360

17.6 IRB 360 1.6 m 6 kg

Continued

Category 1, Standard

Stopping distance and stopping time



18 IRB 365

18.1 IRB 365 0.8 m 1.5 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.55	0.25

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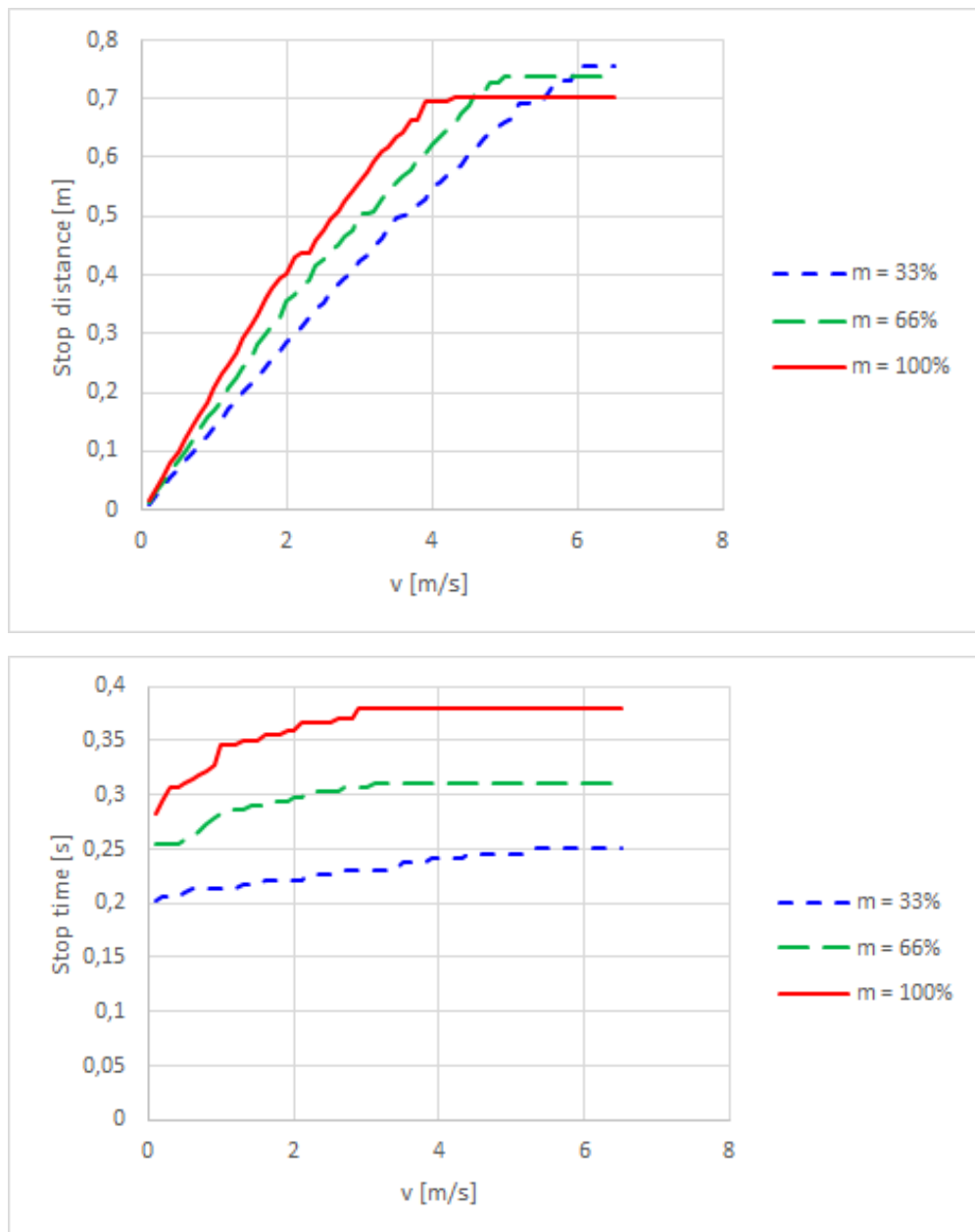
18 IRB 365

18.1 IRB 365 0.8 m 1.5 kg

Continued

Category 1, Standard

Stopping distance and stopping time



18.2 IRB 365 1.1 m 1.5 kg

Category 0

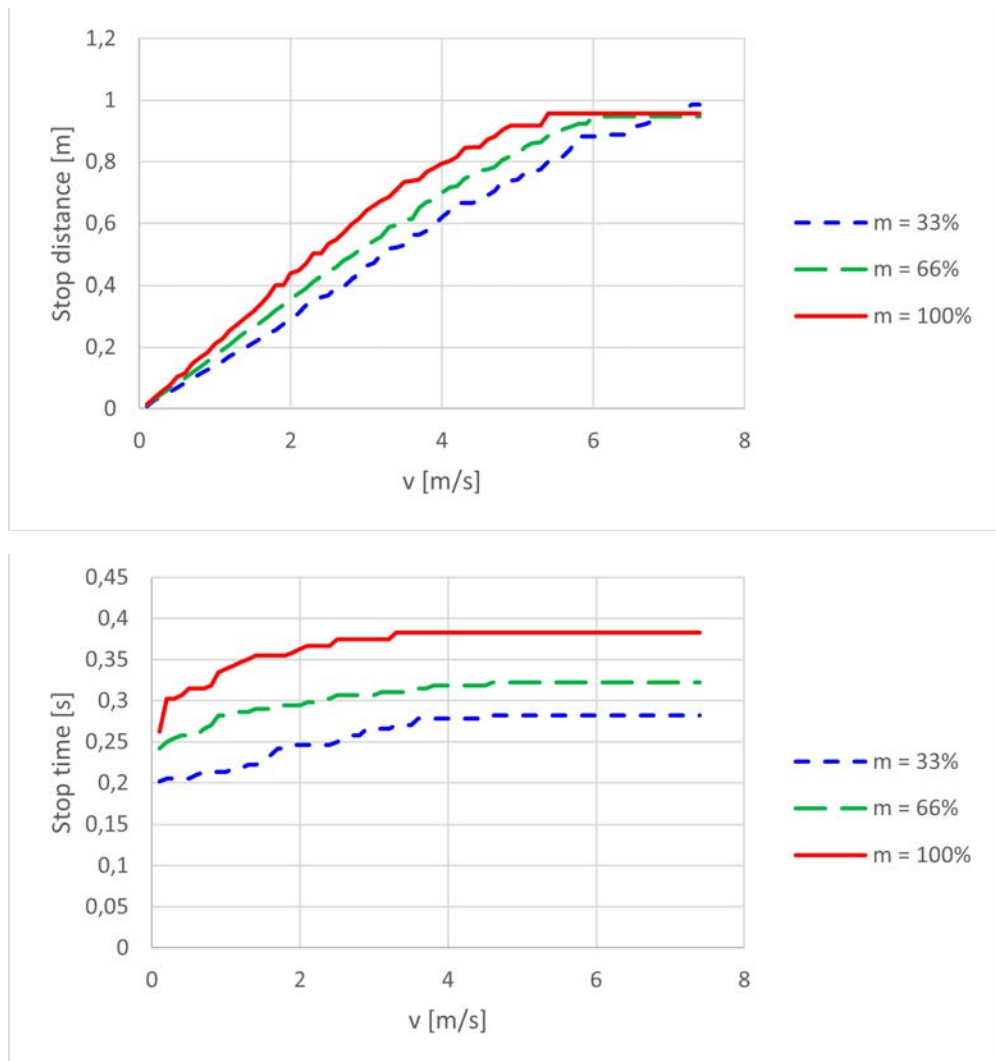
The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.41	0.29

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Category 1, Standard

Stopping distance and stopping time



18.3 IRB 365 1.3 m 1.5 kg

Category 0

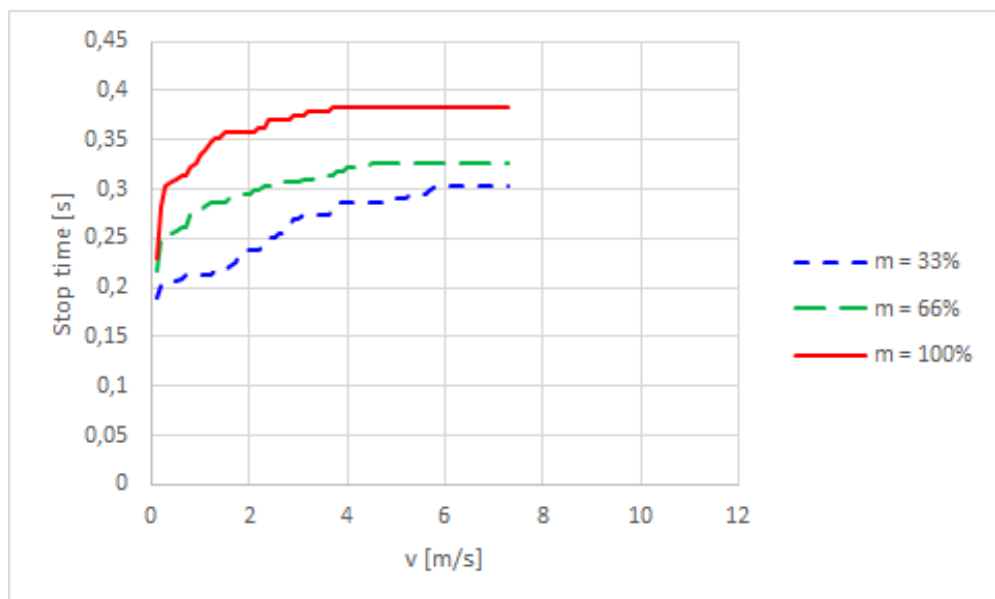
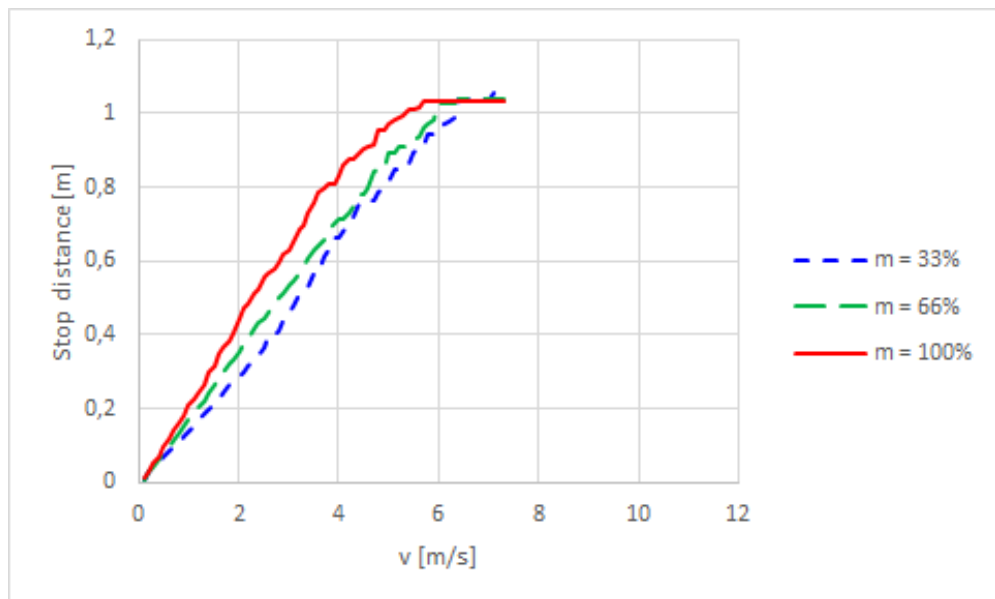
The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.73	0.26

Continues on next page

Category 1, Standard

Stopping distance and stopping time



19 IRB 390

19.1 IRB 390 1.3 m 10 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.71	0.29

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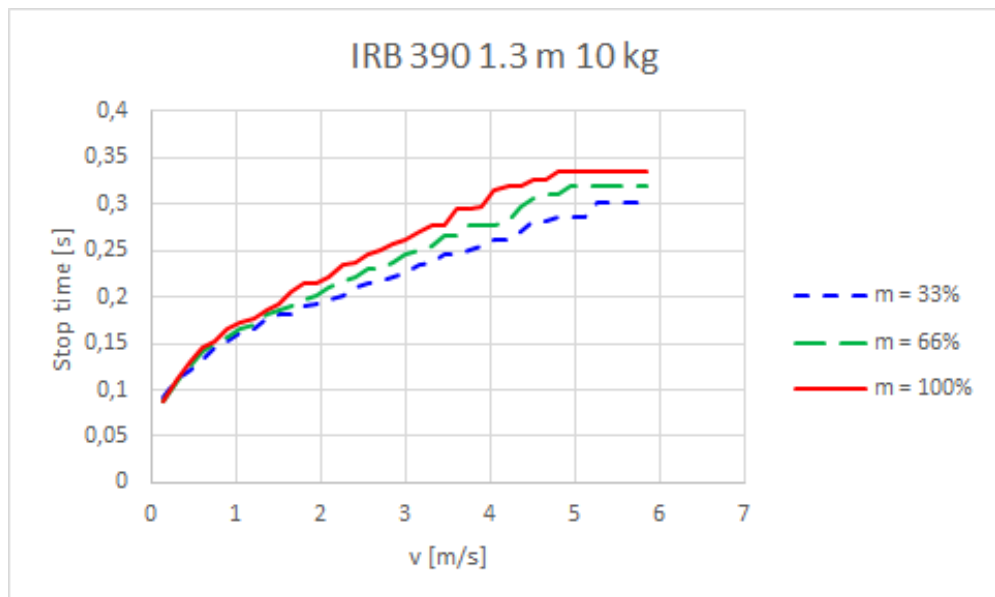
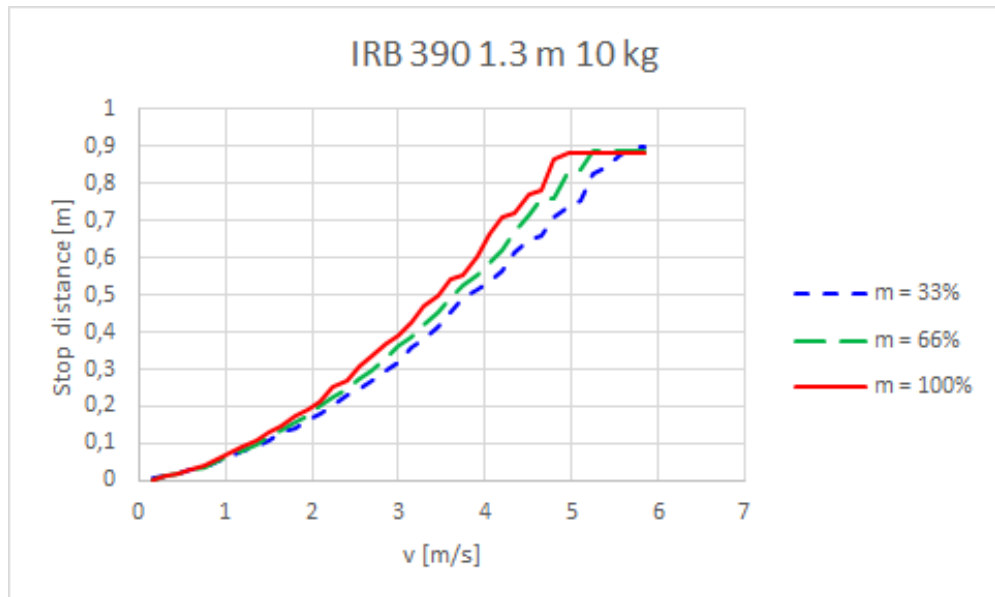
19 IRB 390

19.1 IRB 390 1.3 m 10 kg

Continued

Category 1, Standard

Stopping distance and stopping time



19.2 IRB 390 1.3 m 15 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load.

Protection type/variant	Distance (meters)	Stop time (s)
Standard	0.72	0.28

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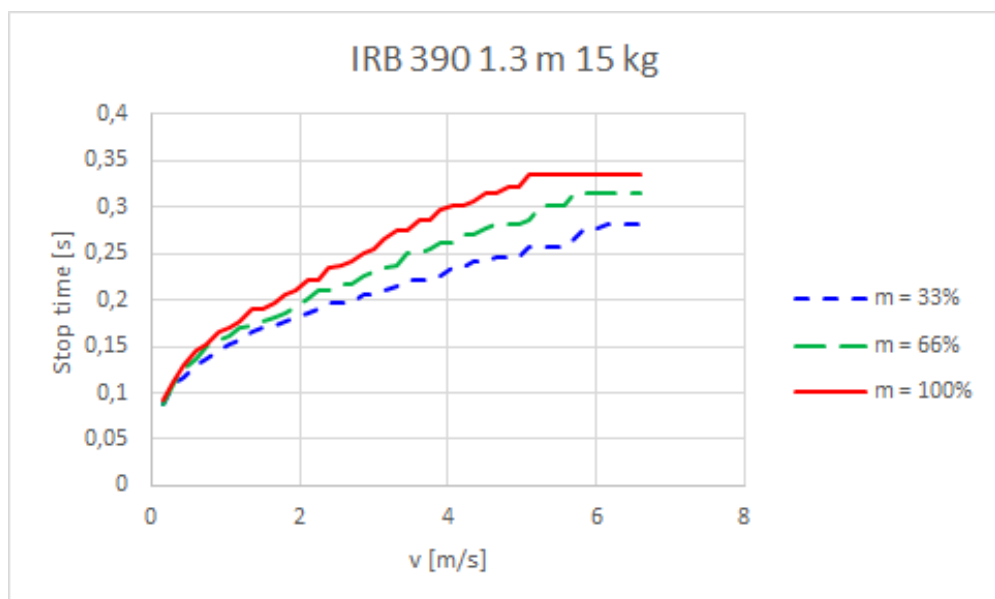
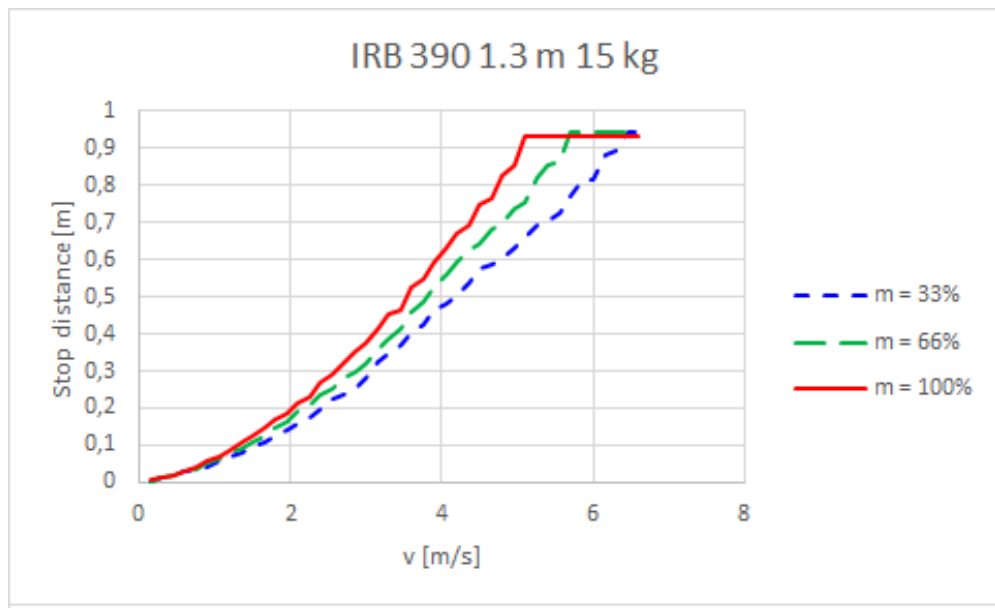
19 IRB 390

19.2 IRB 390 1.3 m 15 kg

Continued

Category 1, Standard

Stopping distance and stopping time

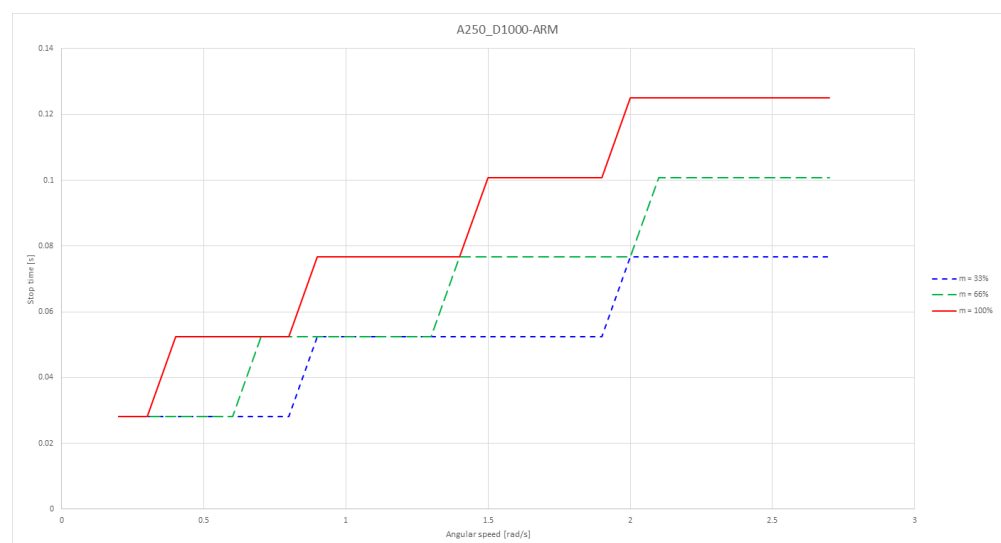
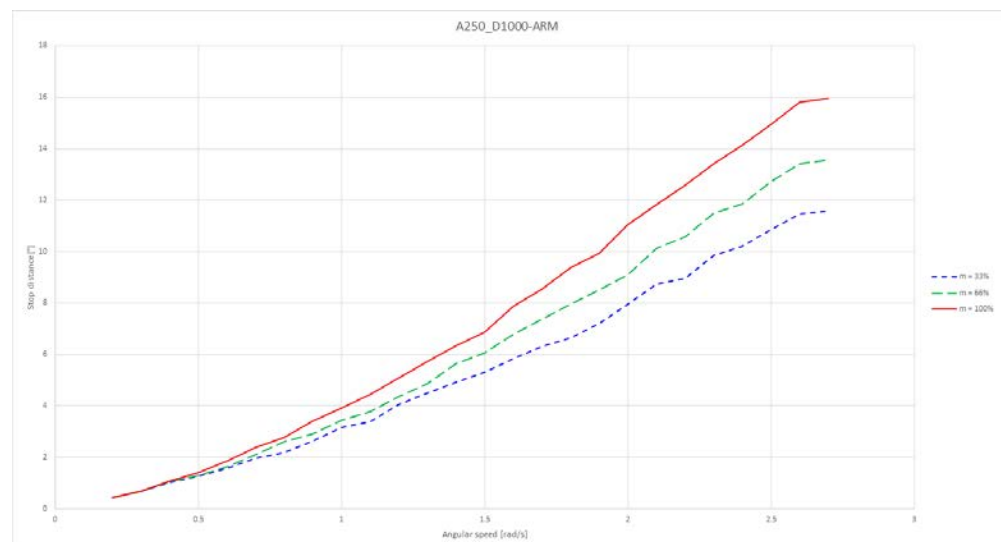


20 IRBP A

20.1 A250_D1000

Category 0, ARM

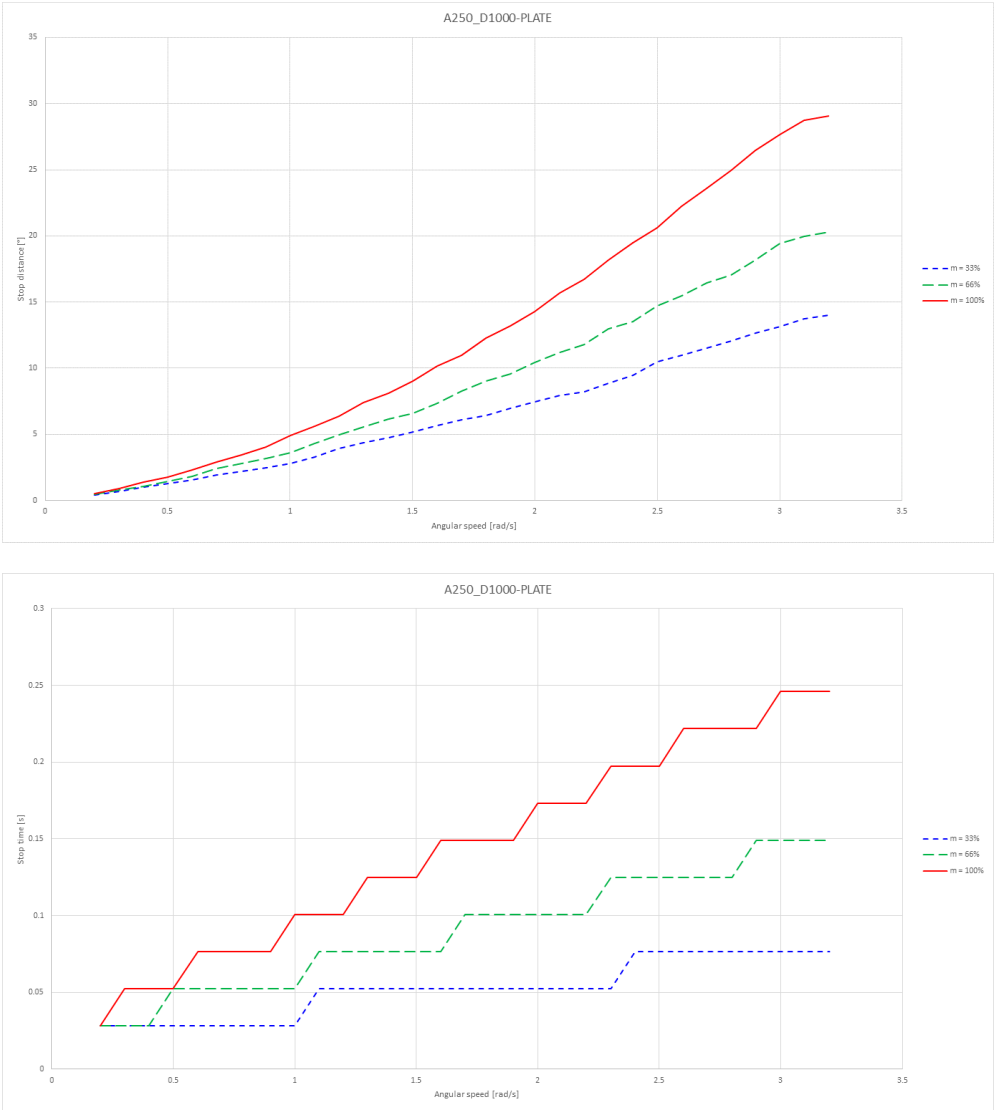
Stopping distance and stopping time



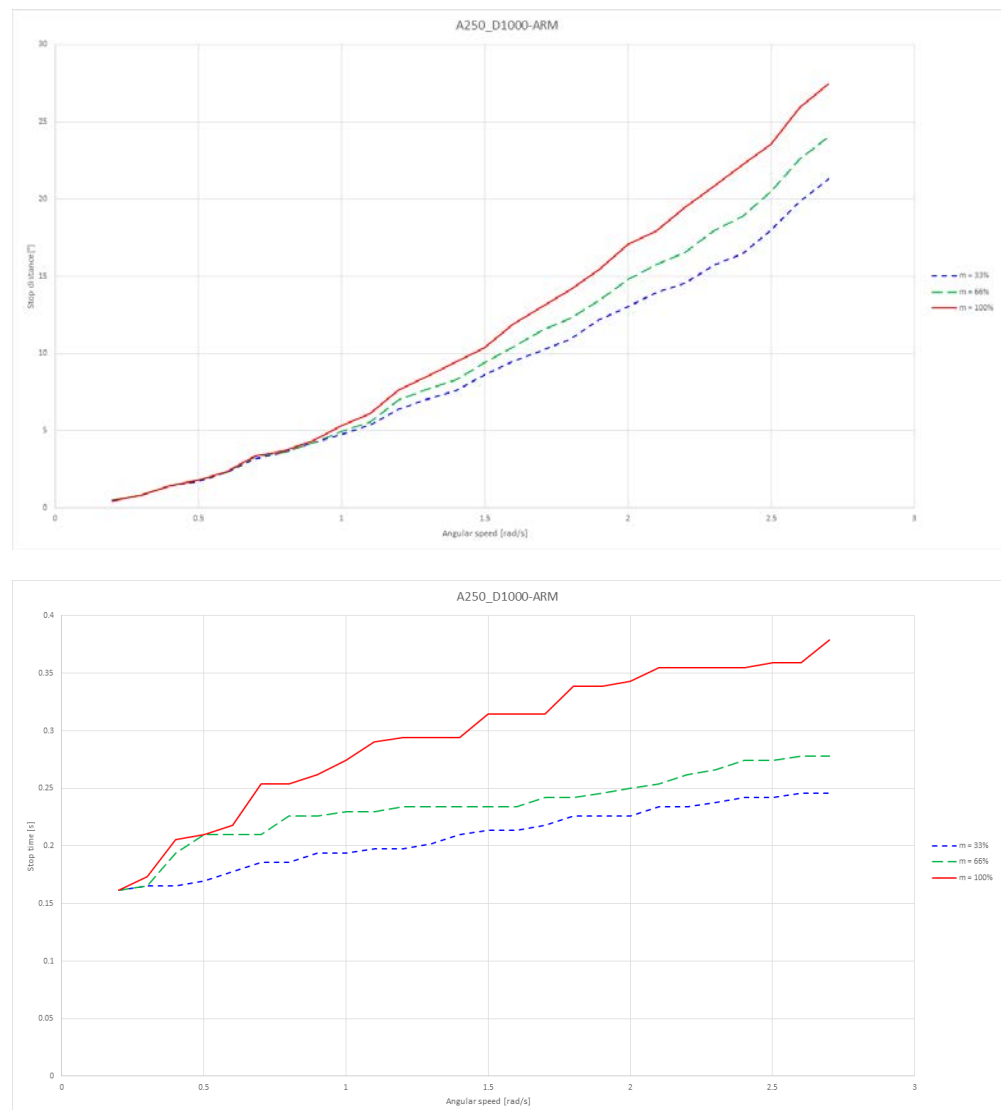
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Category 0, PLATE

Stopping distance and stopping time

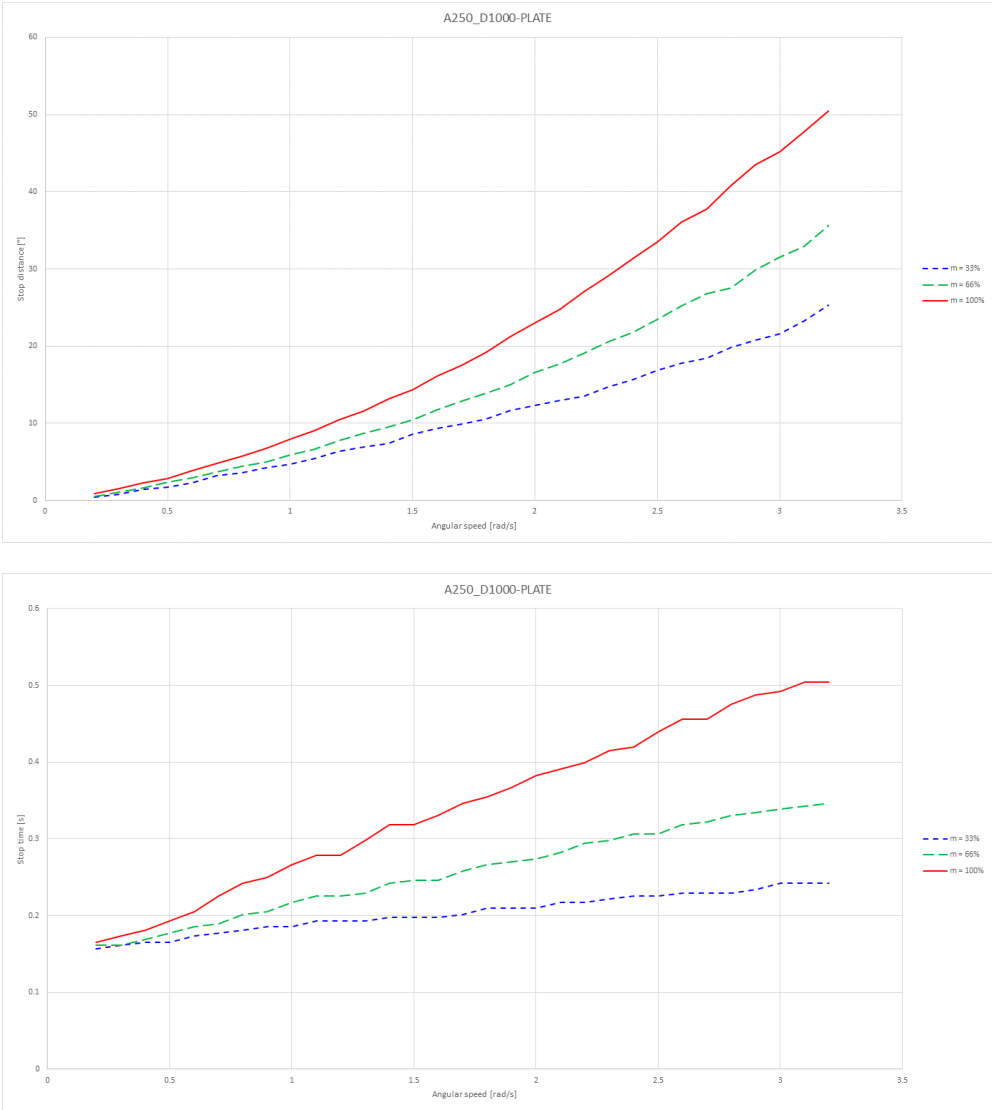


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Category 1, ARM**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

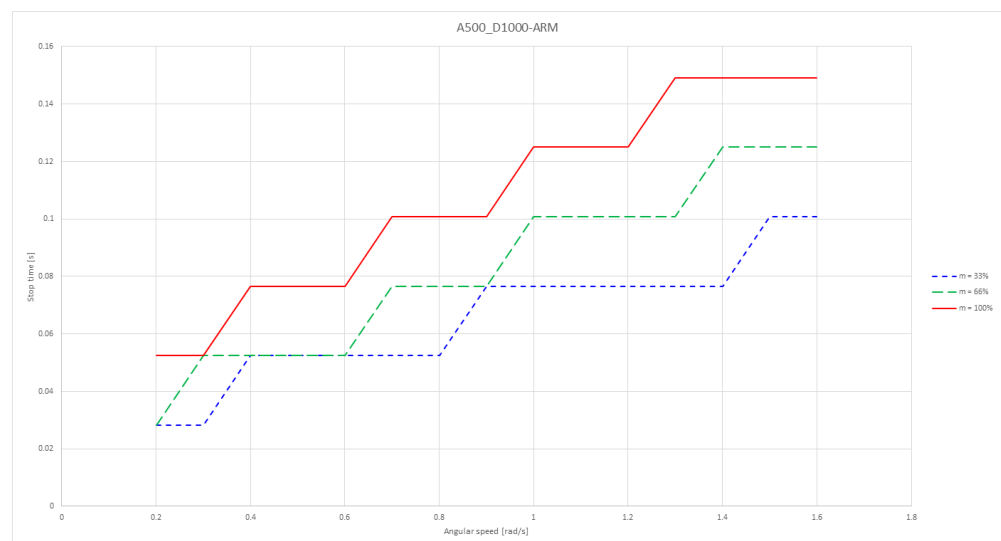
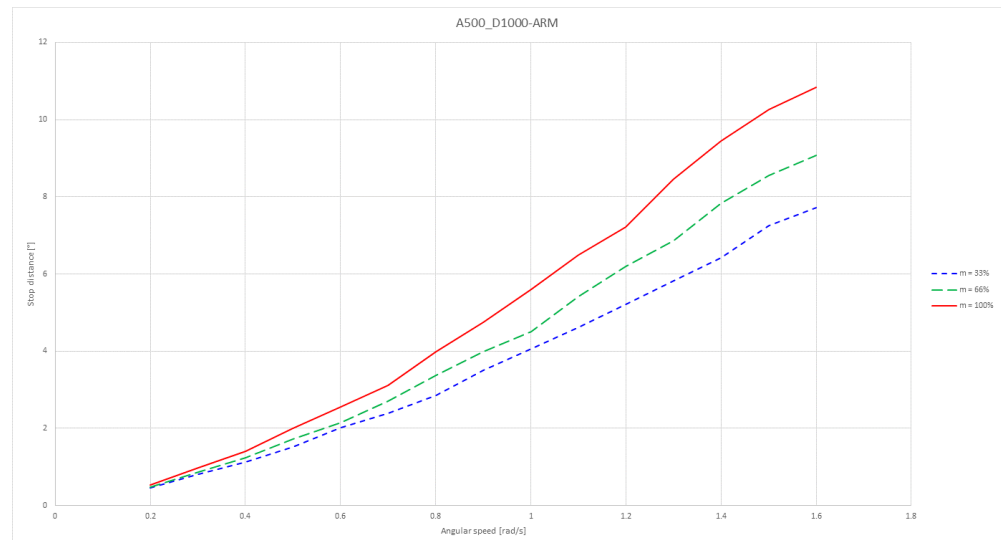
Stopping distance and stopping time



20.2 A500_D1000

Category 0, ARM

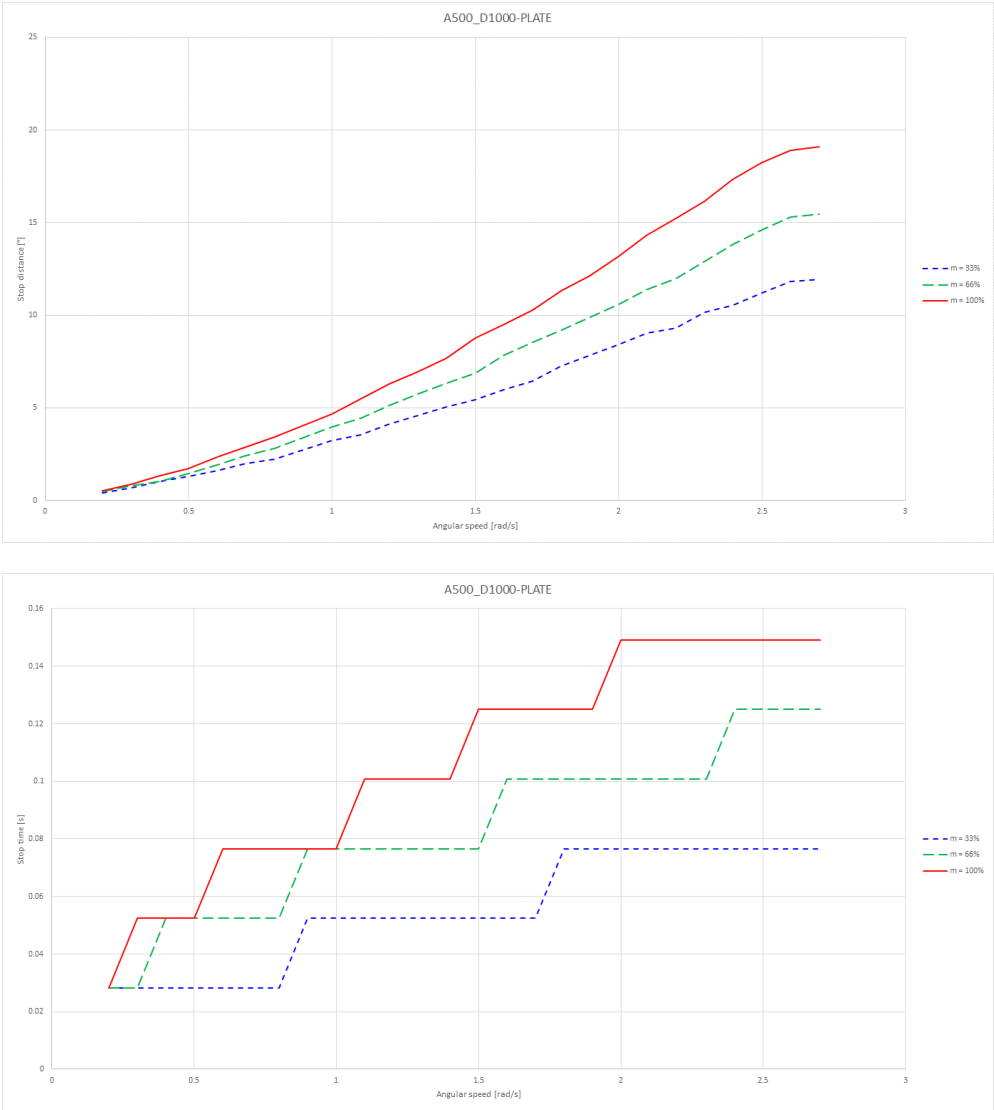
Stopping distance and stopping time



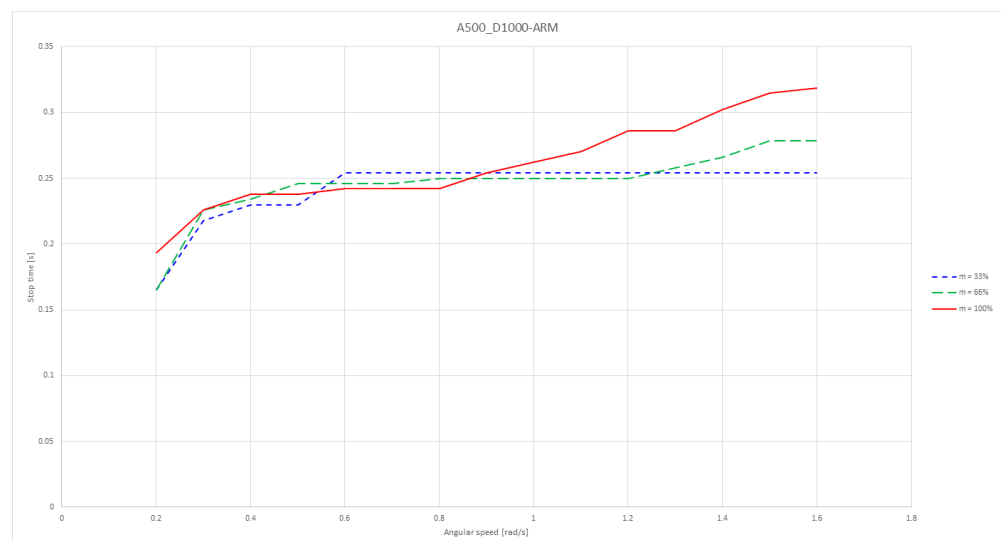
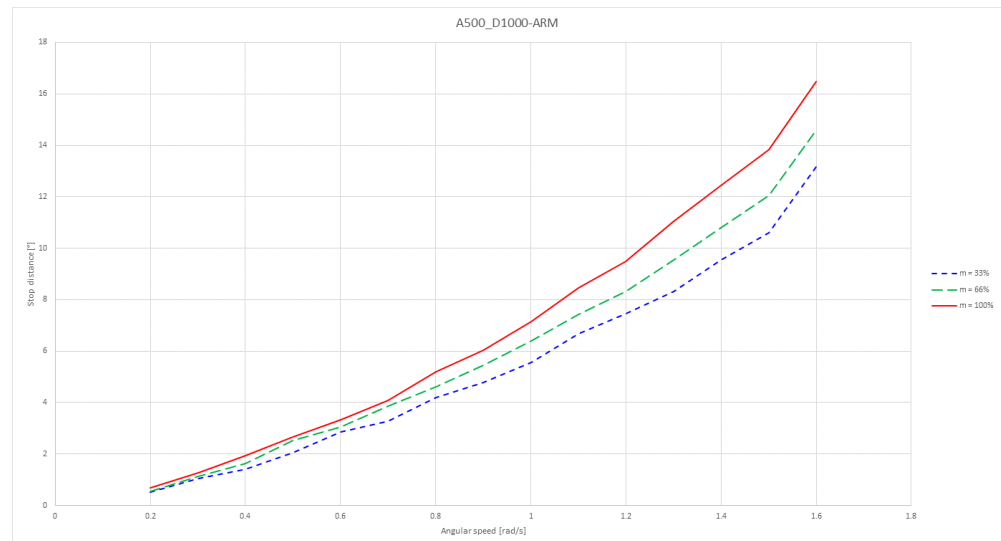
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Category 0, PLATE

Stopping distance and stopping time

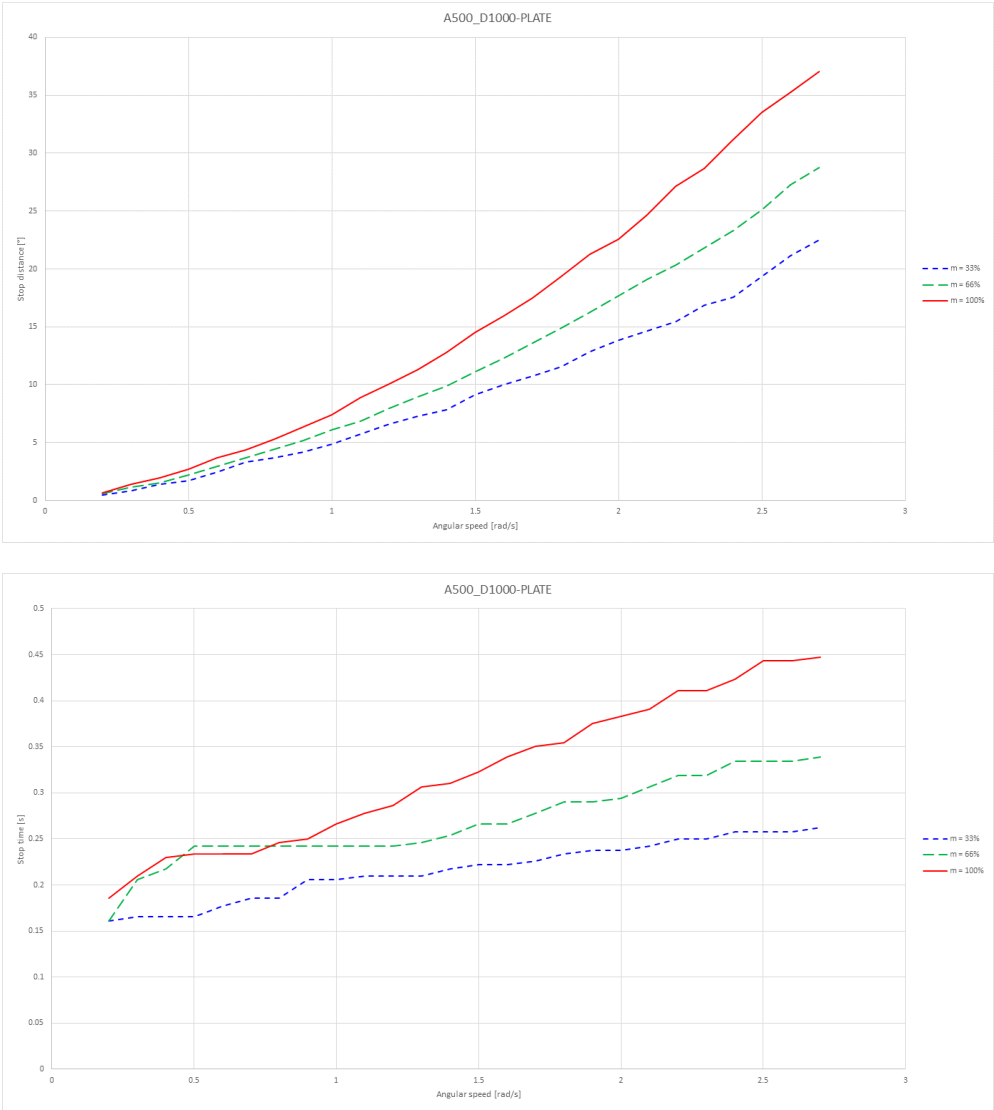


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Category 1, ARM**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

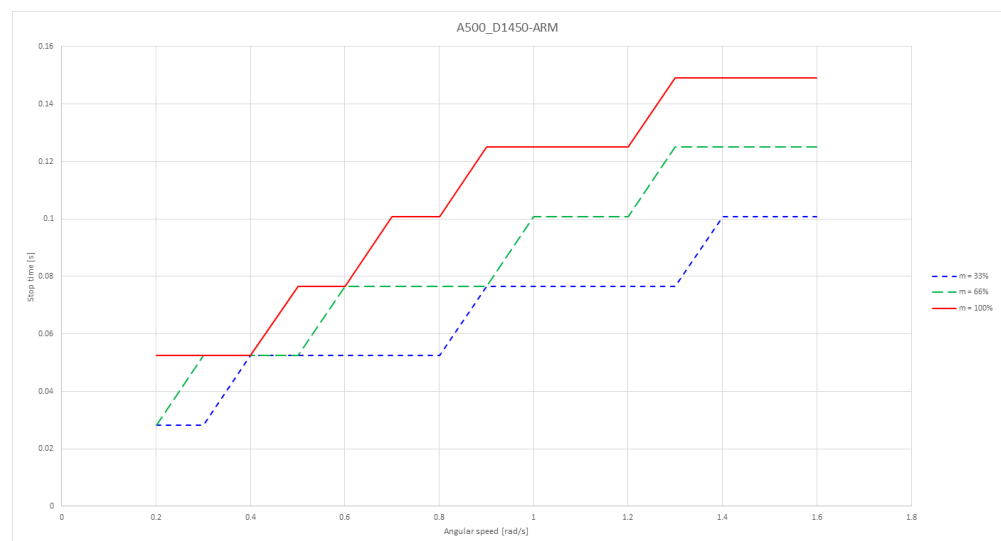
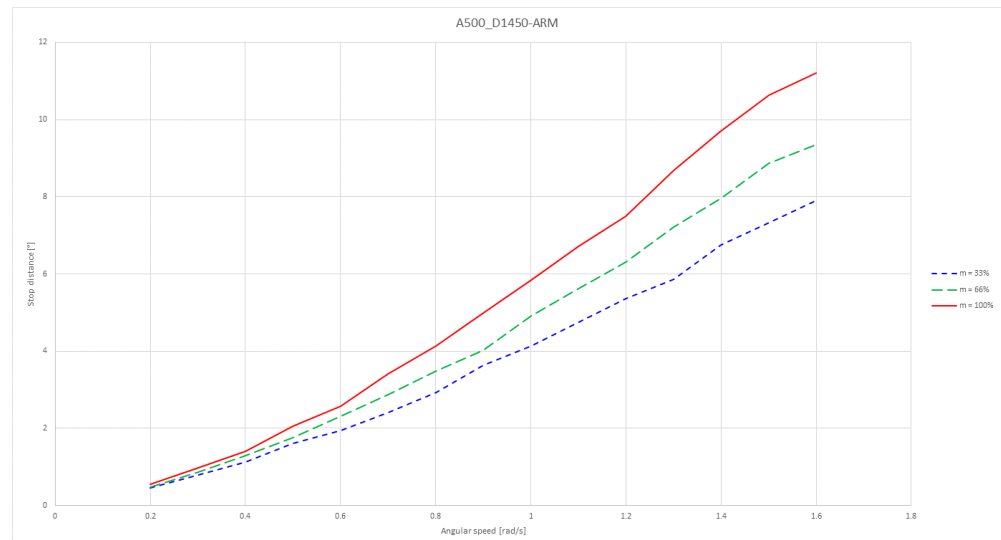
Stopping distance and stopping time



20.3 A500_D1450

Category 0, ARM

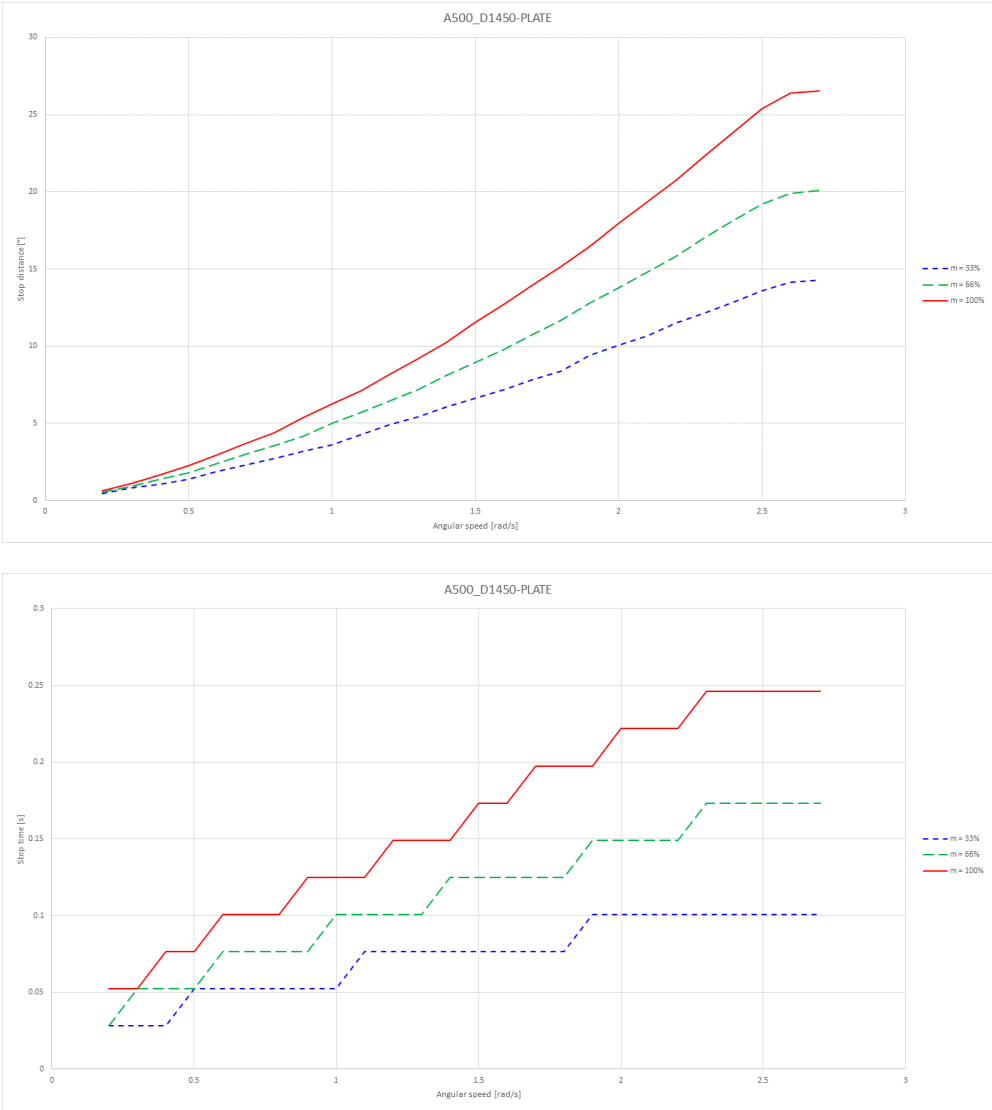
Stopping distance and stopping time



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Category 0, PLATE

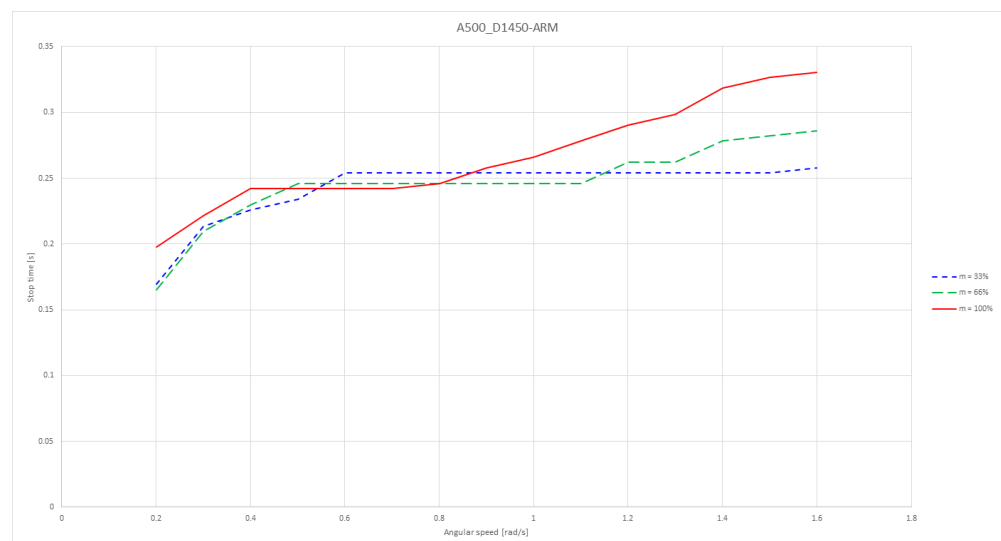
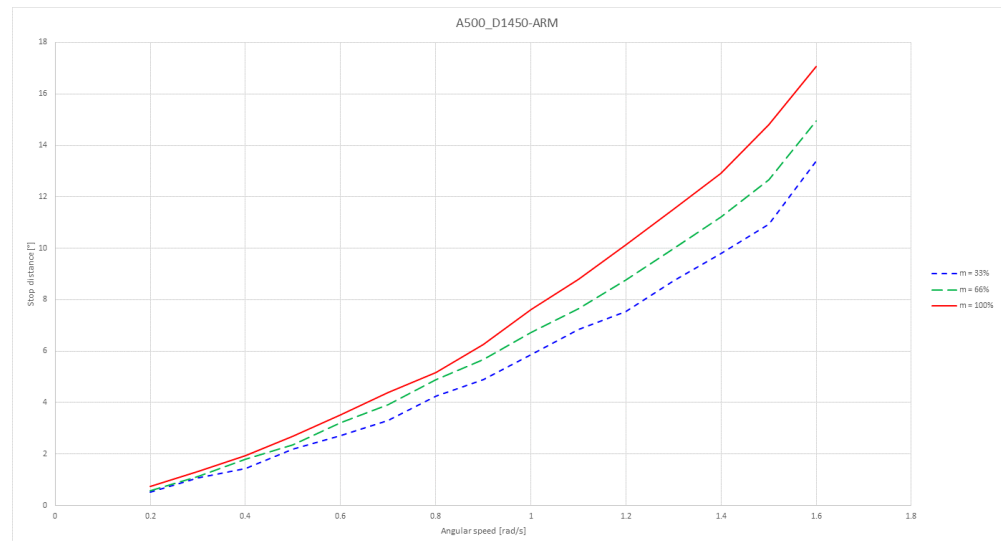
Stopping distance and stopping time



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Category 1, ARM

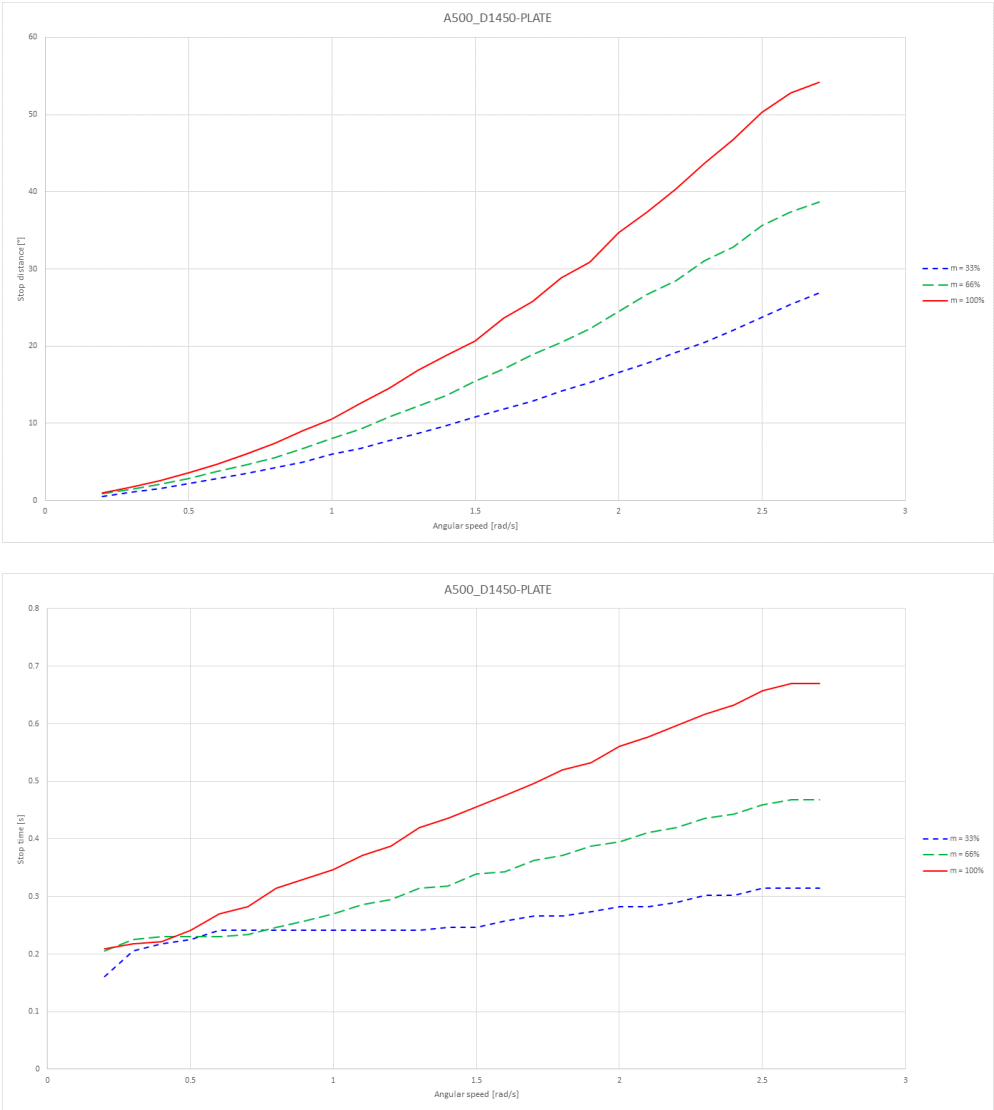
Stopping distance and stopping time



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Category 1, PLATE

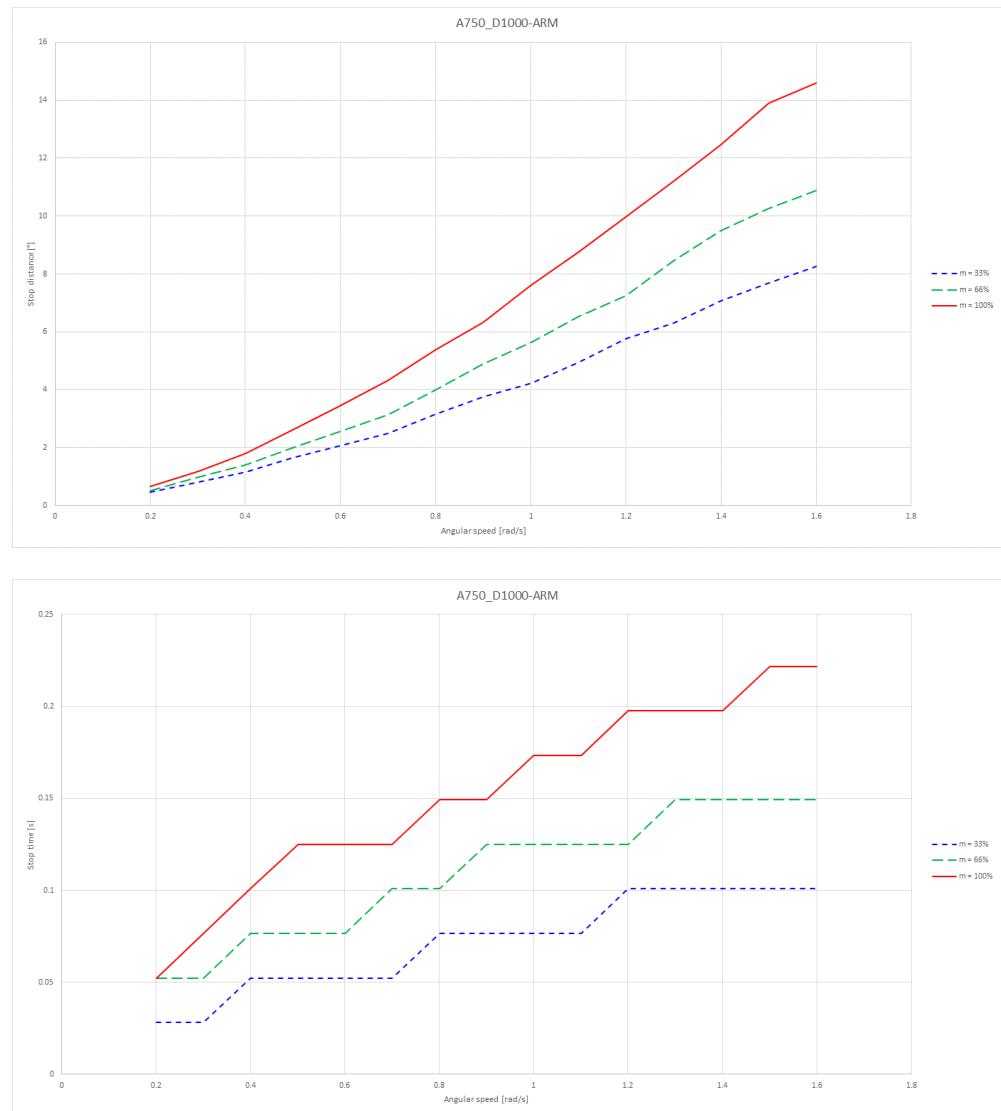
Stopping distance and stopping time



20.4 A750_D1000

Category 0, ARM

Stopping distance and stopping time



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Category 0, PLATE

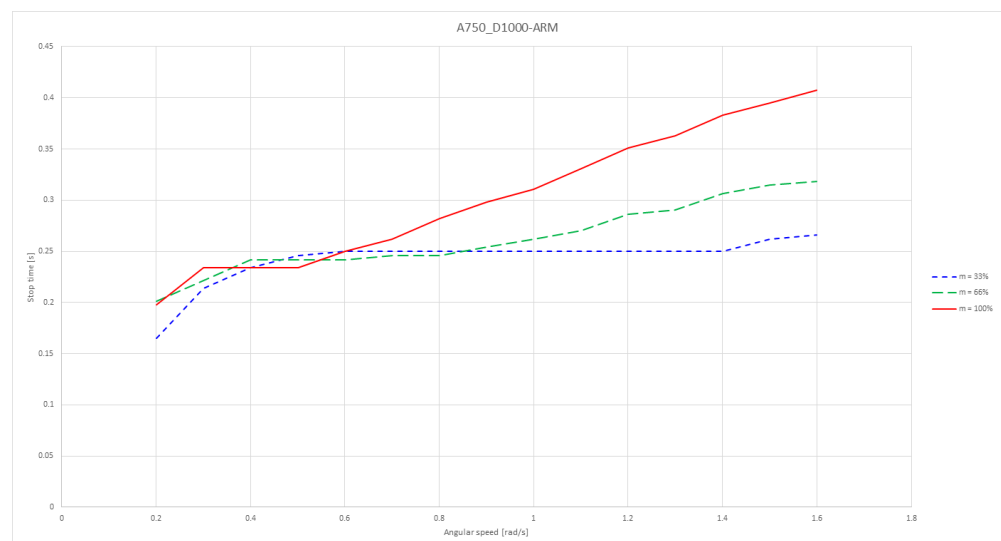
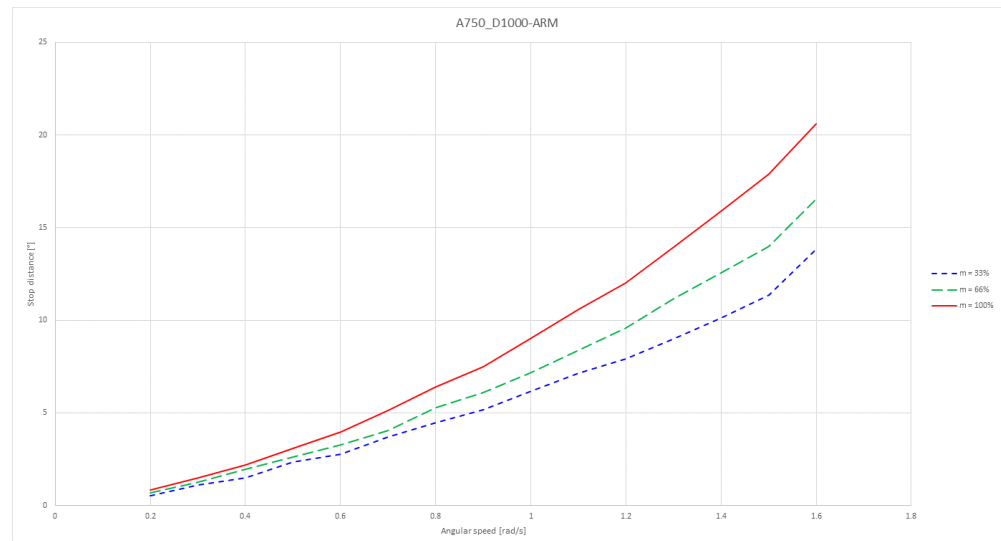
Stopping distance and stopping time



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Category 1, ARM

Stopping distance and stopping time



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Category 1, PLATE

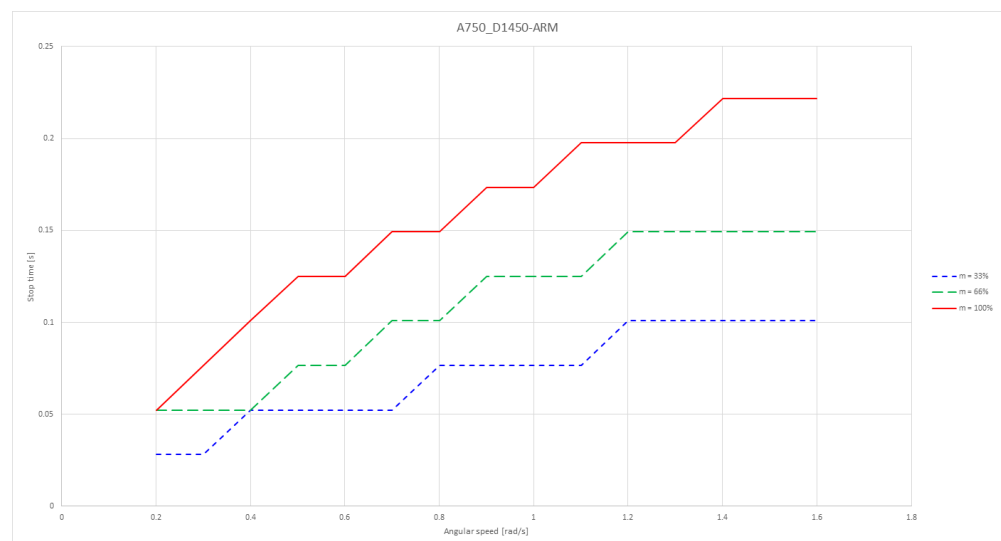
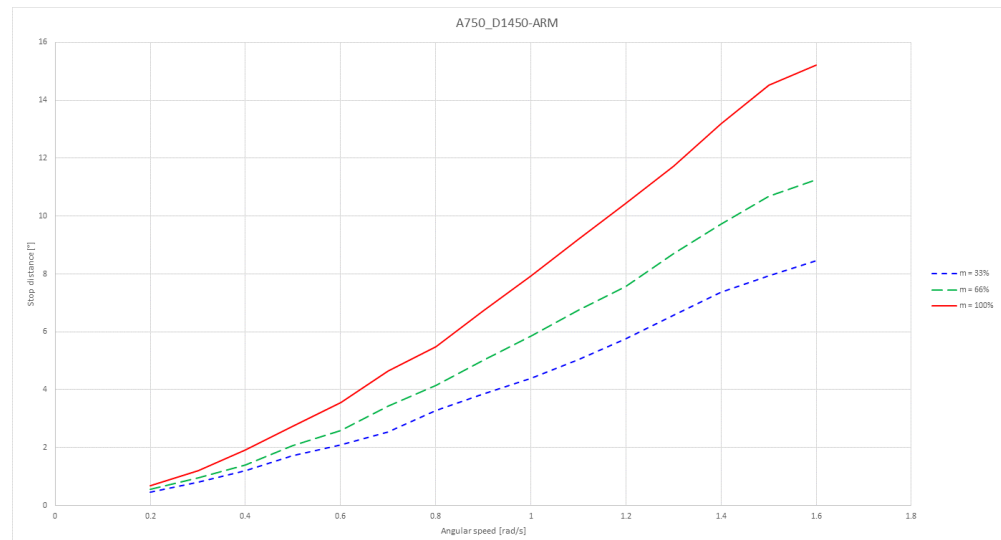
Stopping distance and stopping time



20.5 A750_D1450

Category 0, ARM

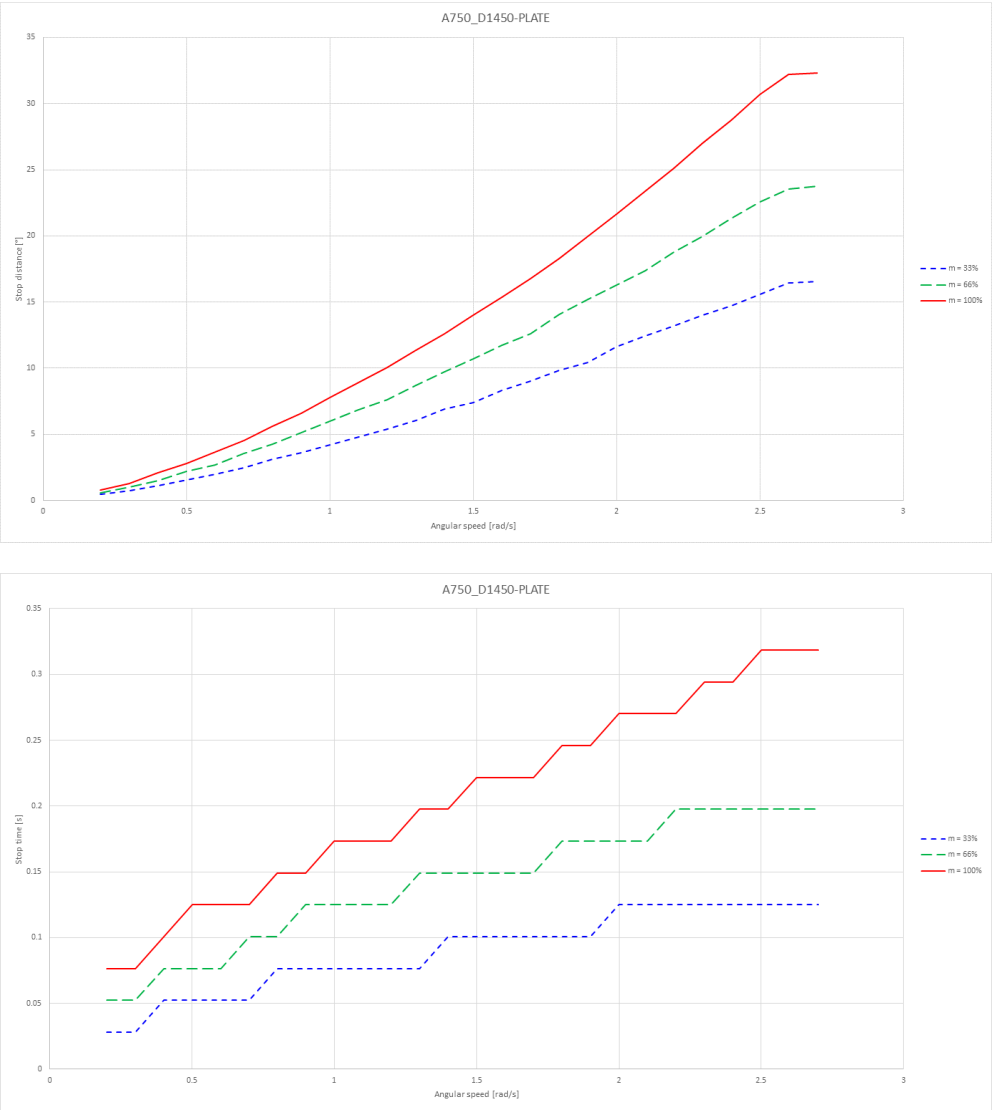
Stopping distance and stopping time



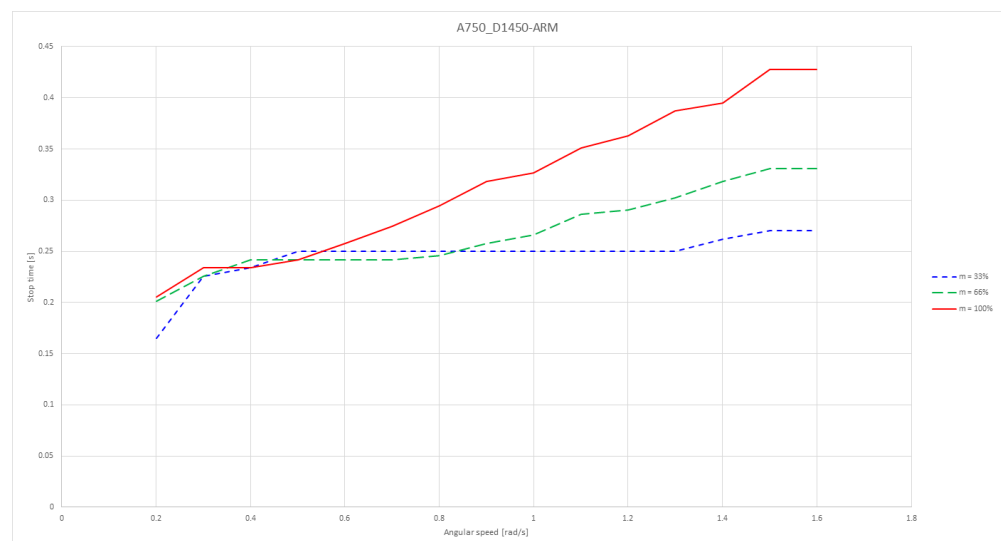
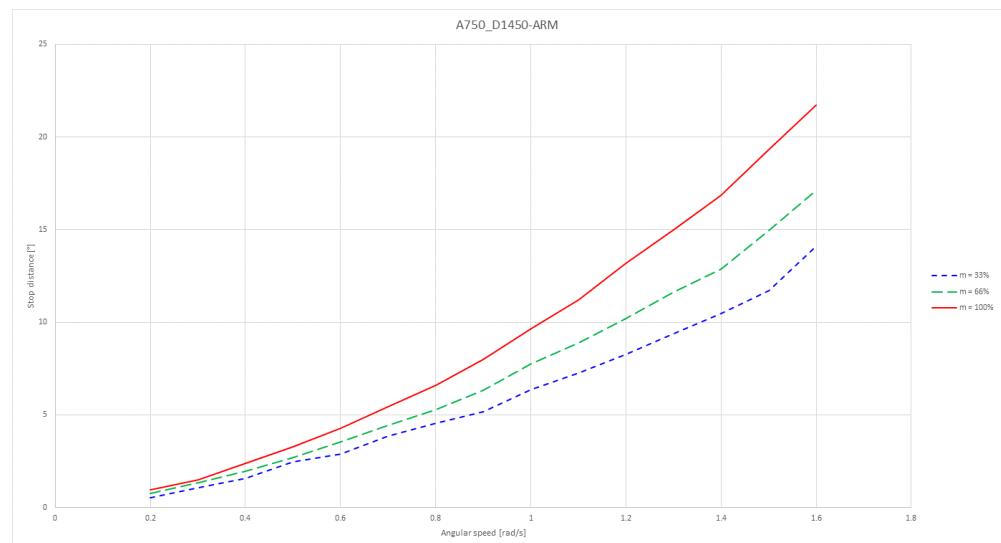
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Category 0, PLATE

Stopping distance and stopping time

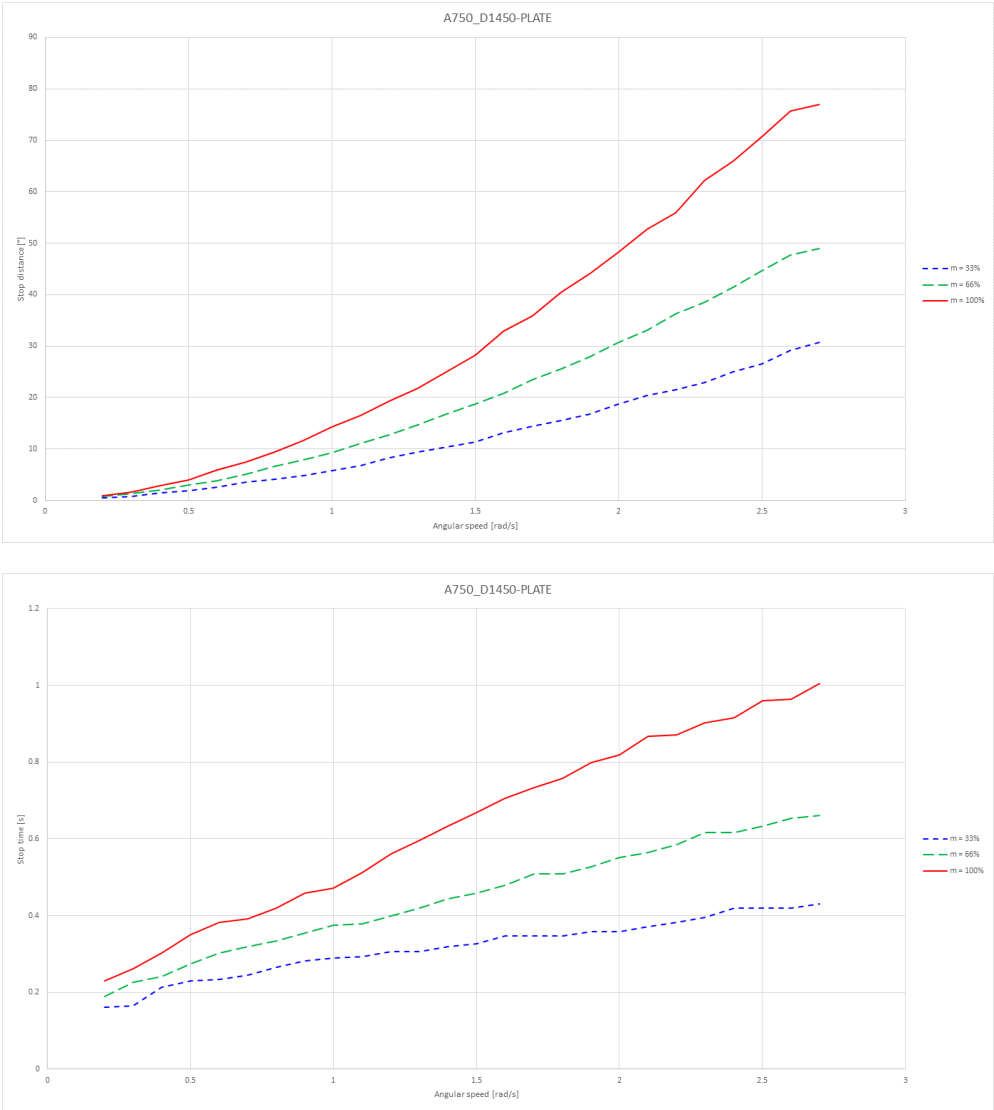


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Category 1, ARM**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

Stopping distance and stopping time

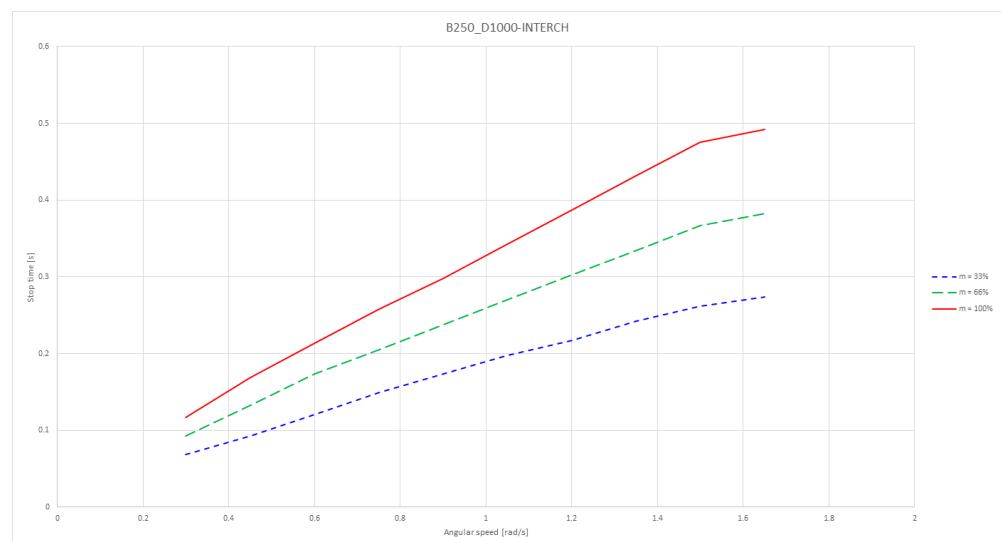
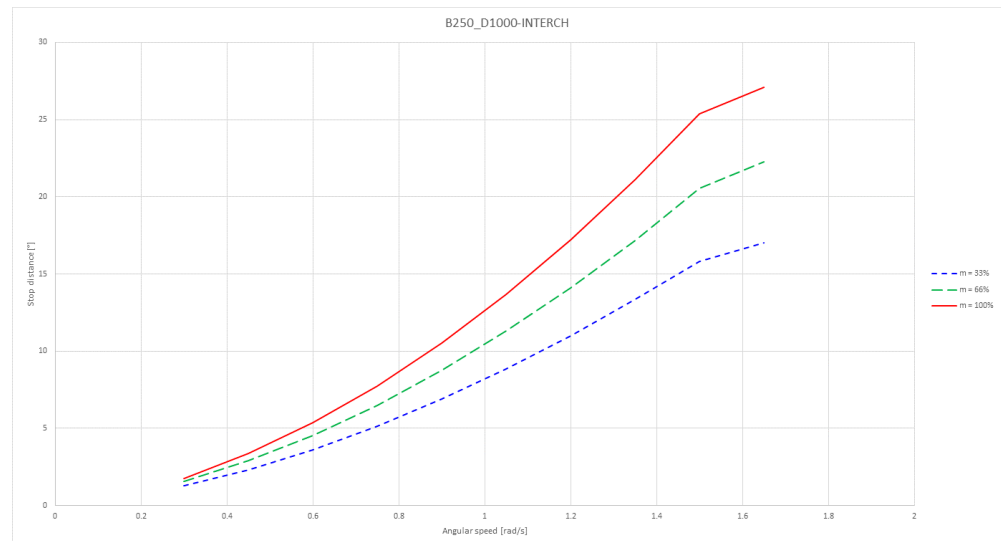


21 IRBP B

21.1 B250_D1000

Category 0, INTERCH

Stopping distance and stopping time



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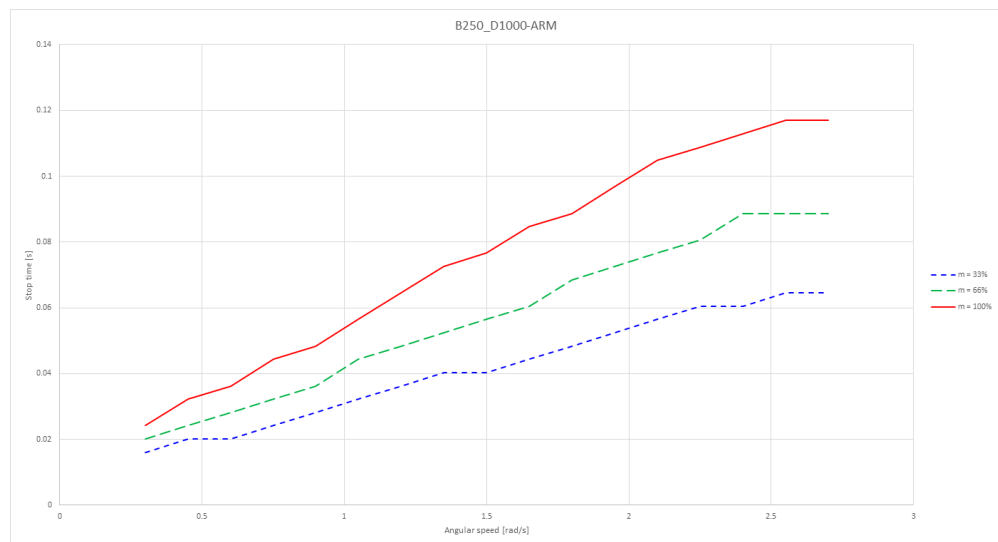
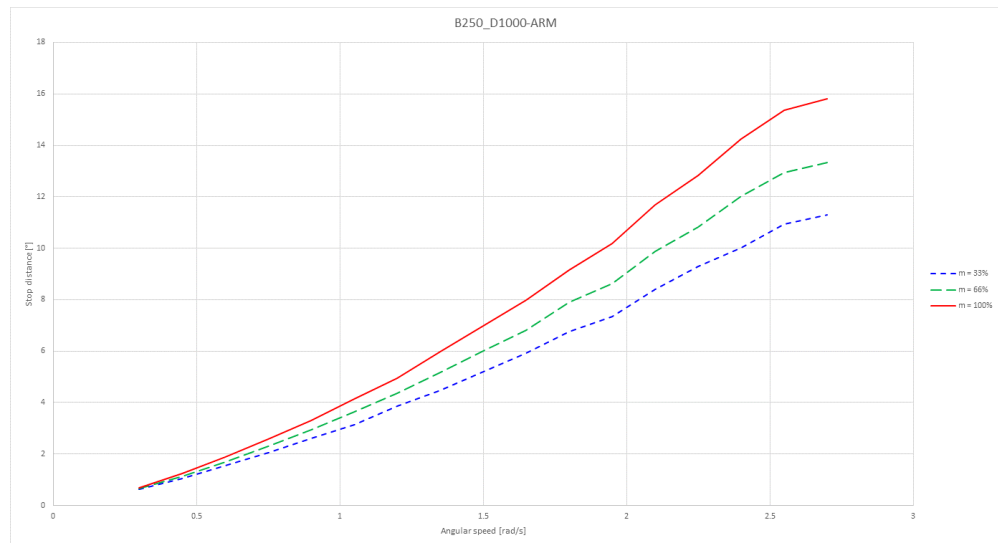
21 IRBP B

21.1 B250_D1000

Continued

Category 0, ARM

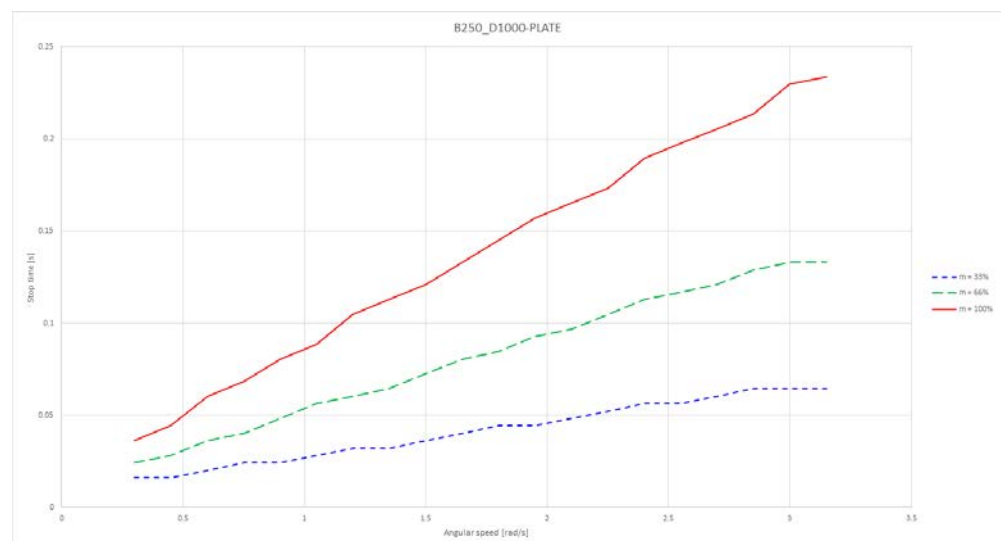
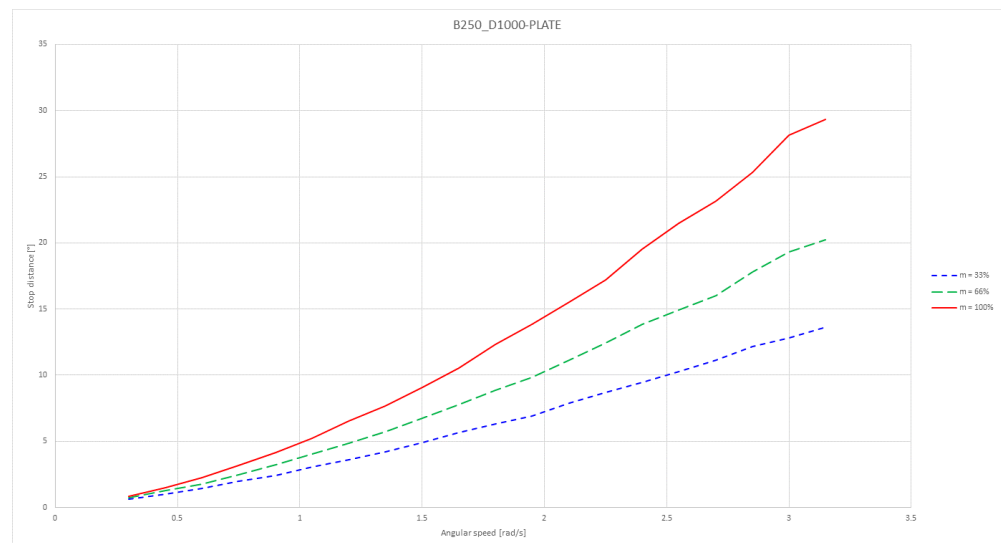
Stopping distance and stopping time



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Category 0, PLATE

Stopping distance and stopping time



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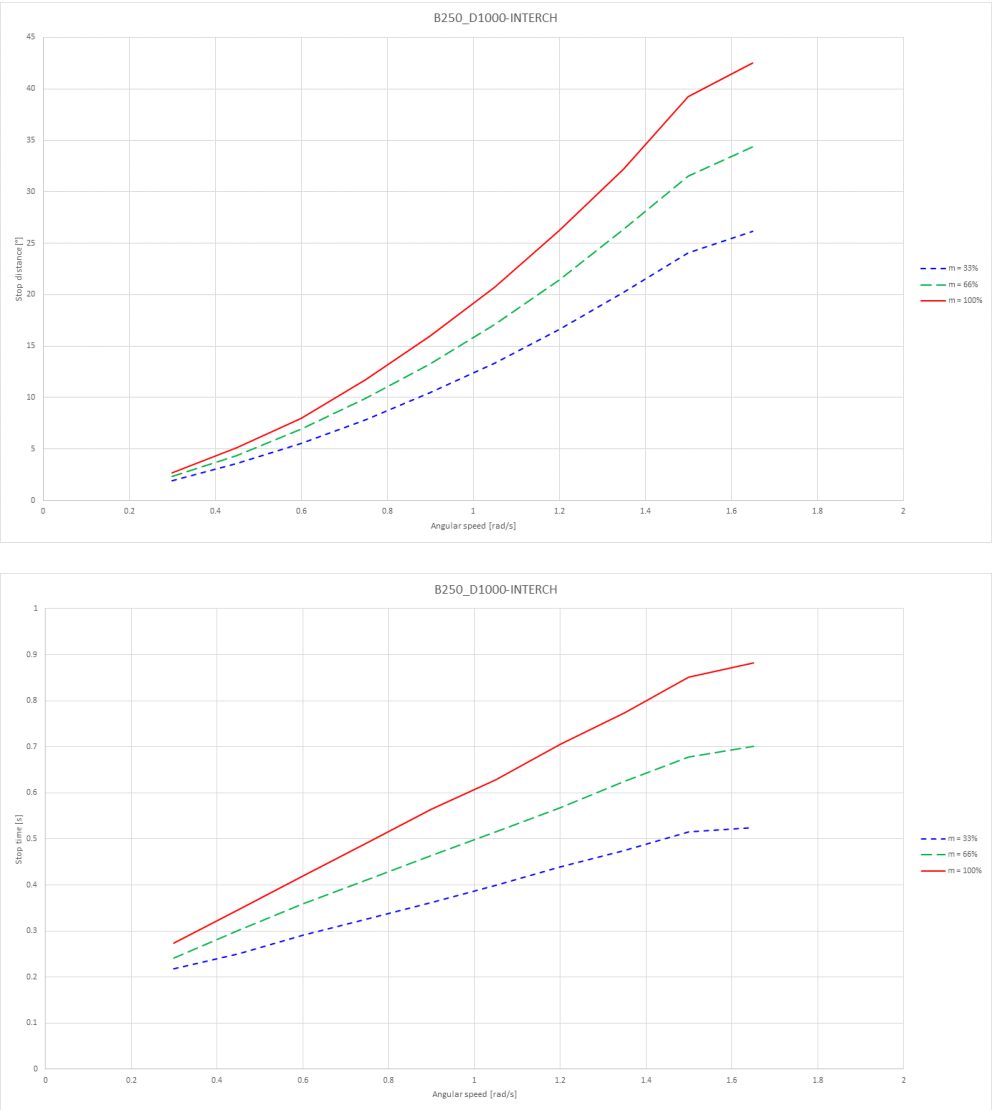
21 IRBP B

21.1 B250_D1000

Continued

Category 1, INTERCH

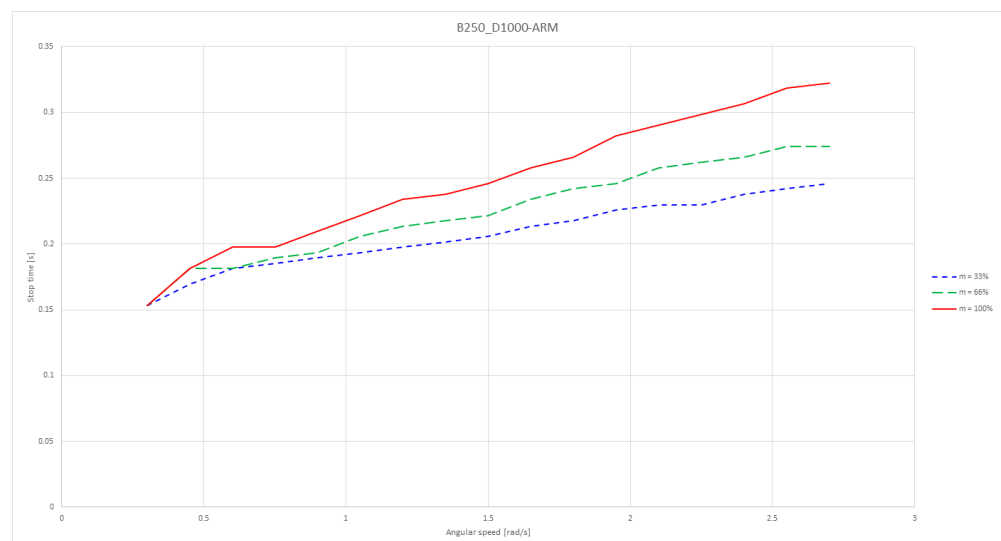
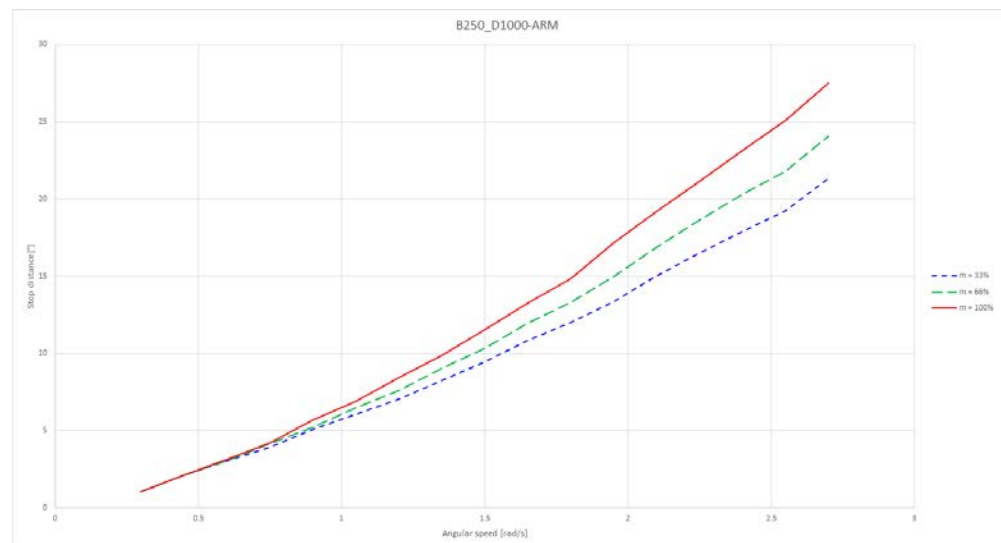
Stopping distance and stopping time



Continues on next page

Category 1, ARM

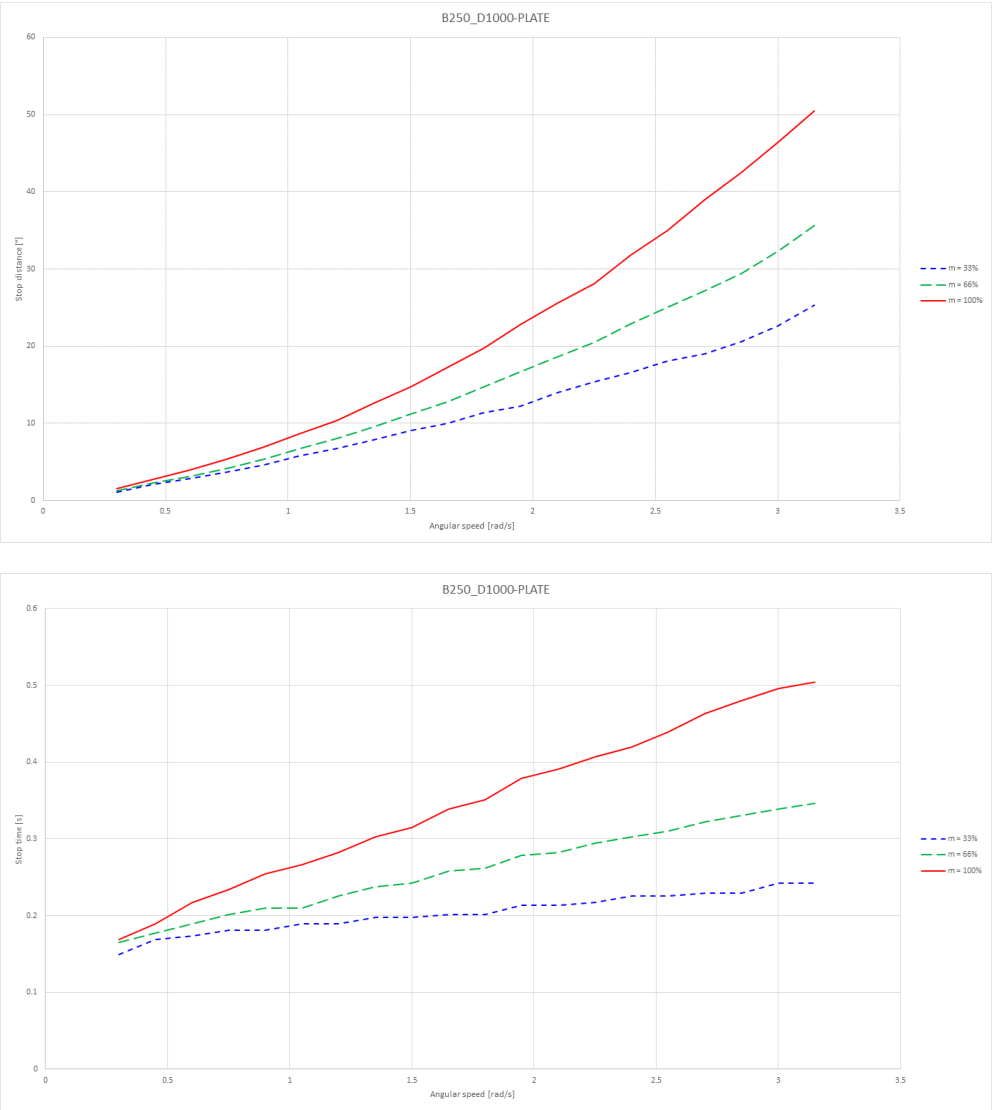
Stopping distance and stopping time



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Category 1, PLATE

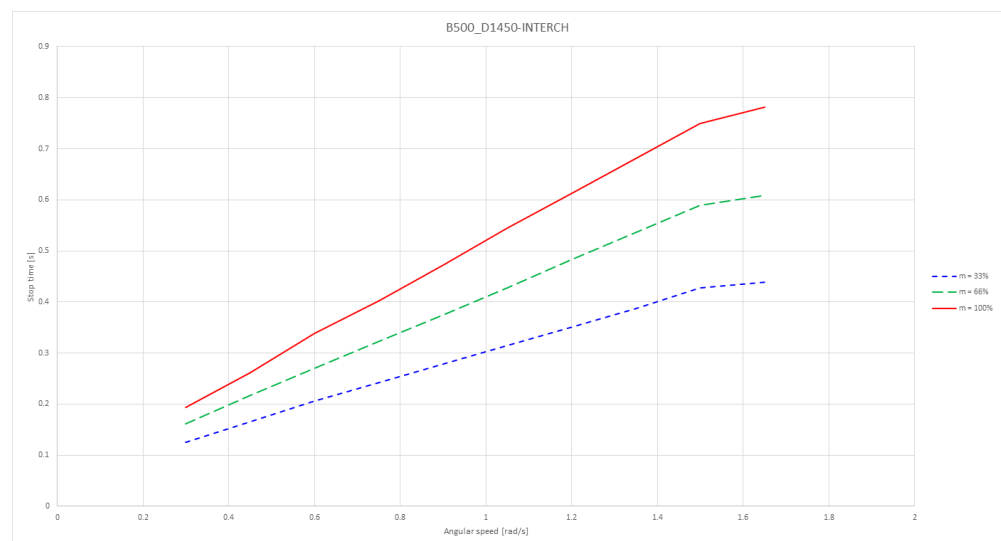
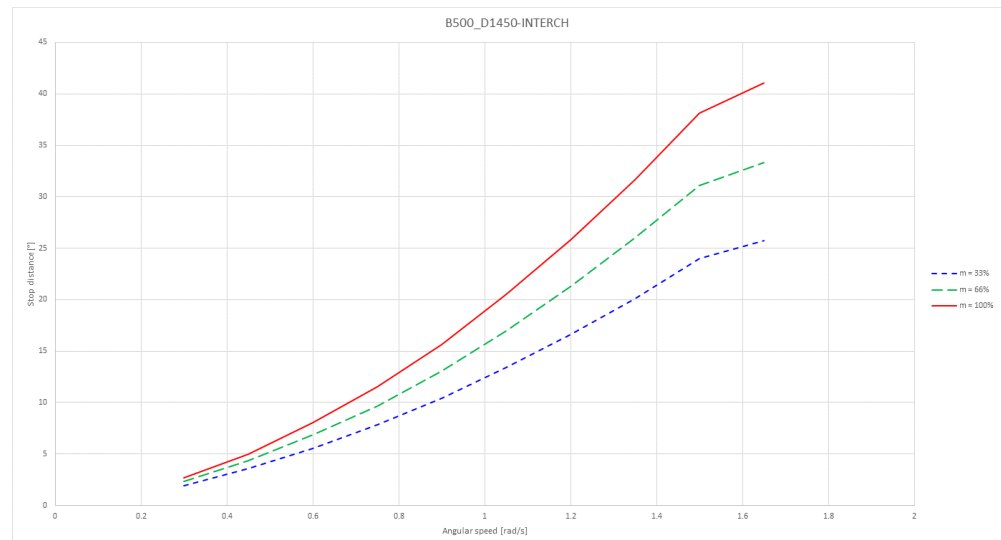
Stopping distance and stopping time



21.2 B500_D1450

Category 0, INTERCH

Stopping distance and stopping time



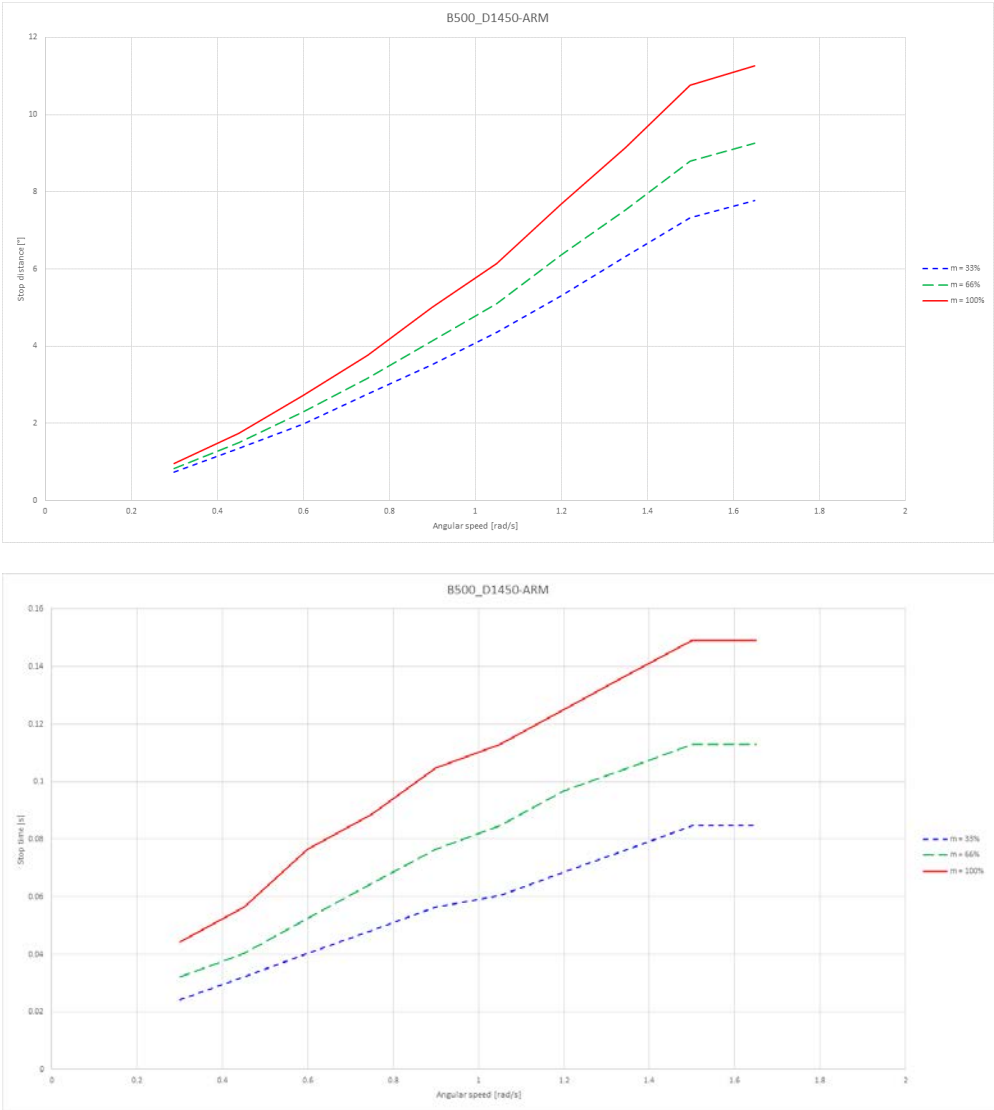
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21 IRBP B

21.2 B500_D1450
Continued

Category 0, ARM

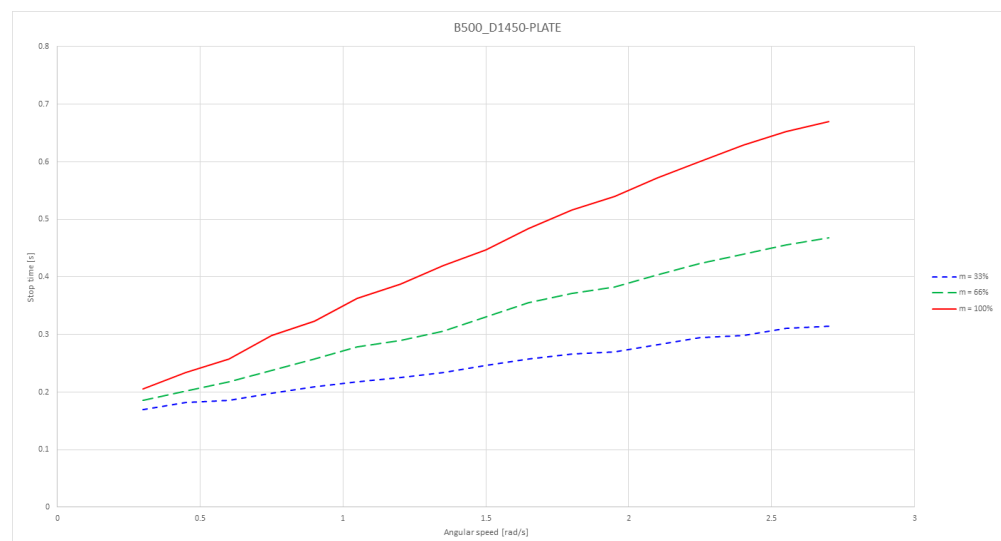
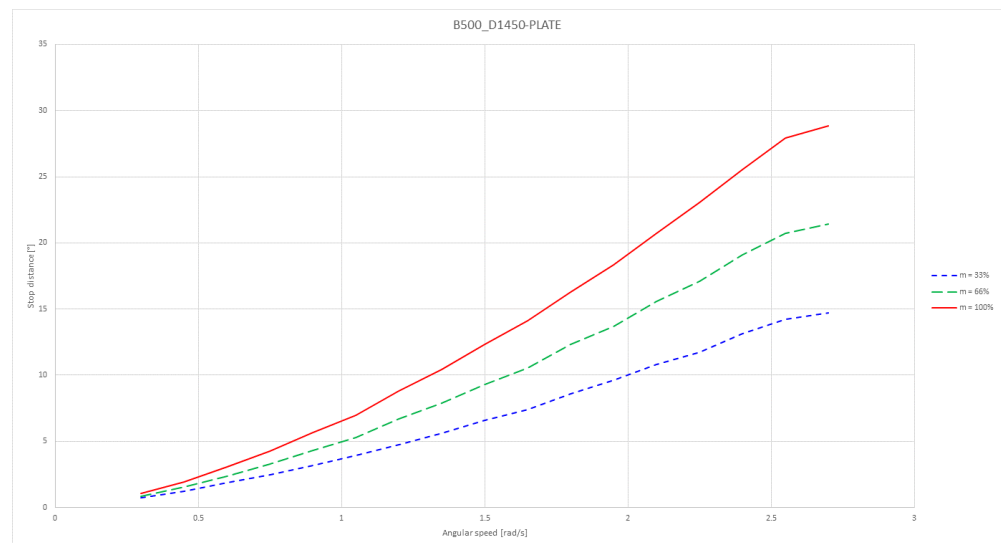
Stopping distance and stopping time



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Category 0, PLATE

Stopping distance and stopping time



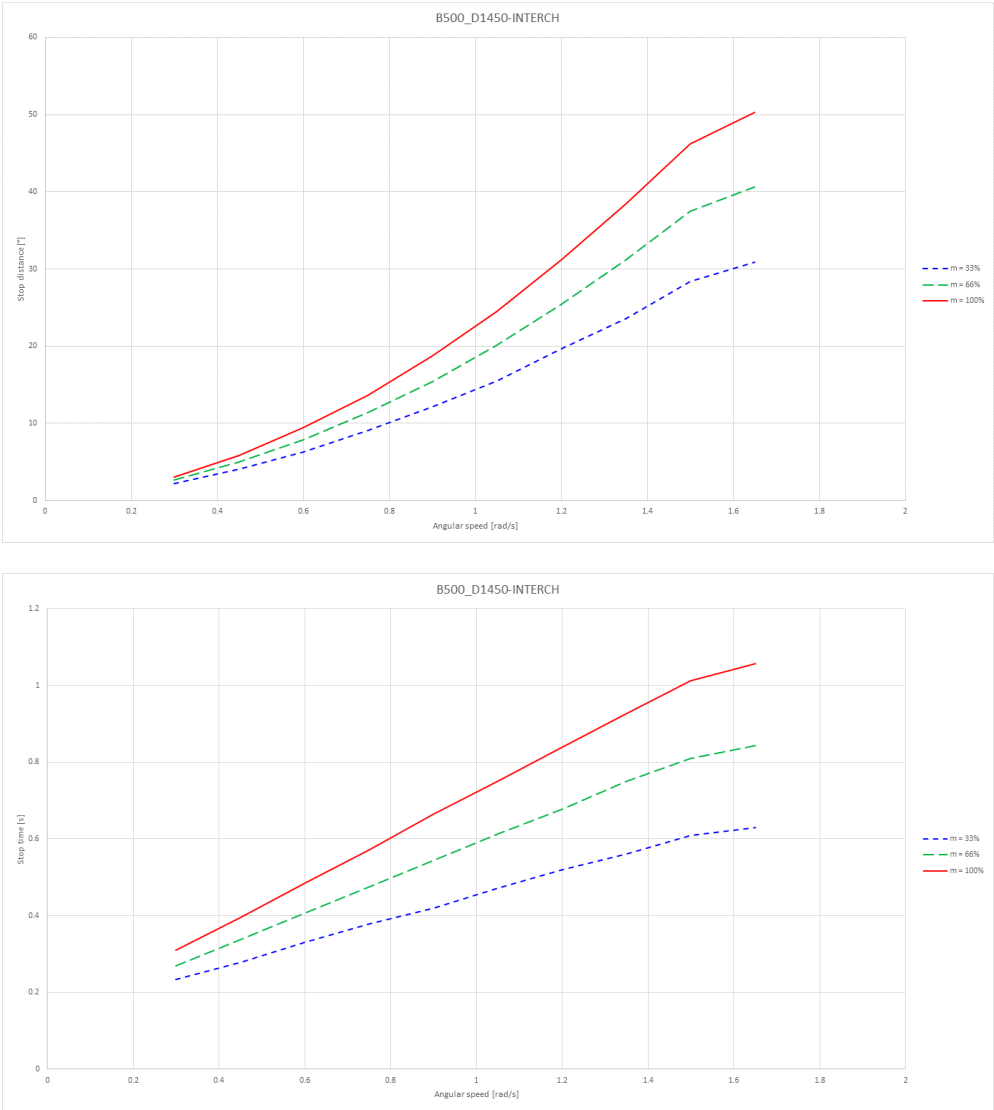
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21 IRBP B

21.2 B500_D1450
Continued

Category 1, INTERCH

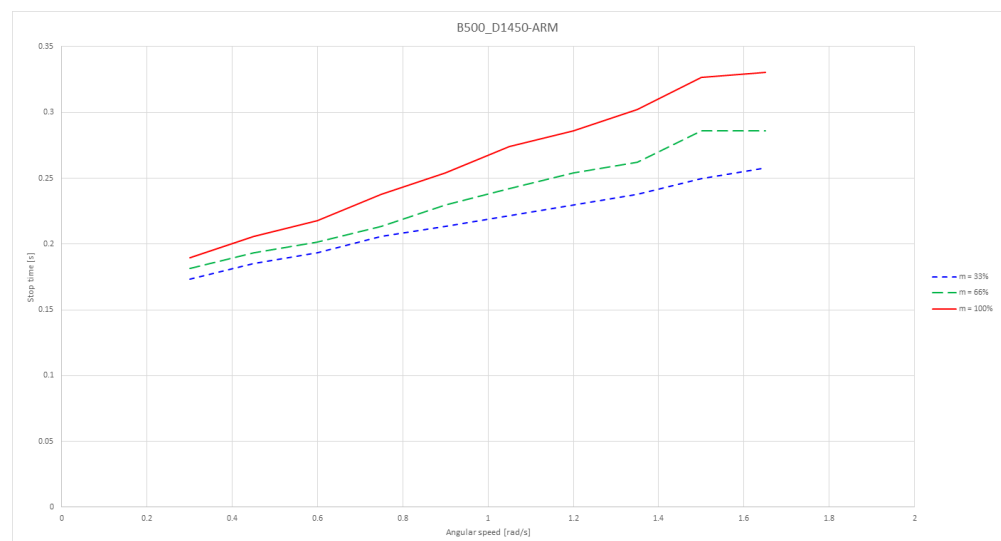
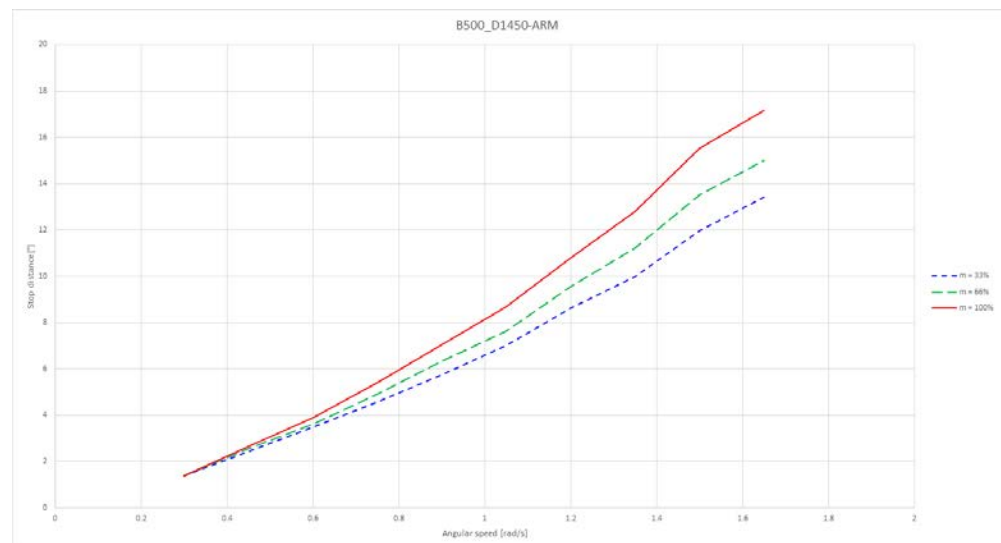
Stopping distance and stopping time



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Category 1, ARM

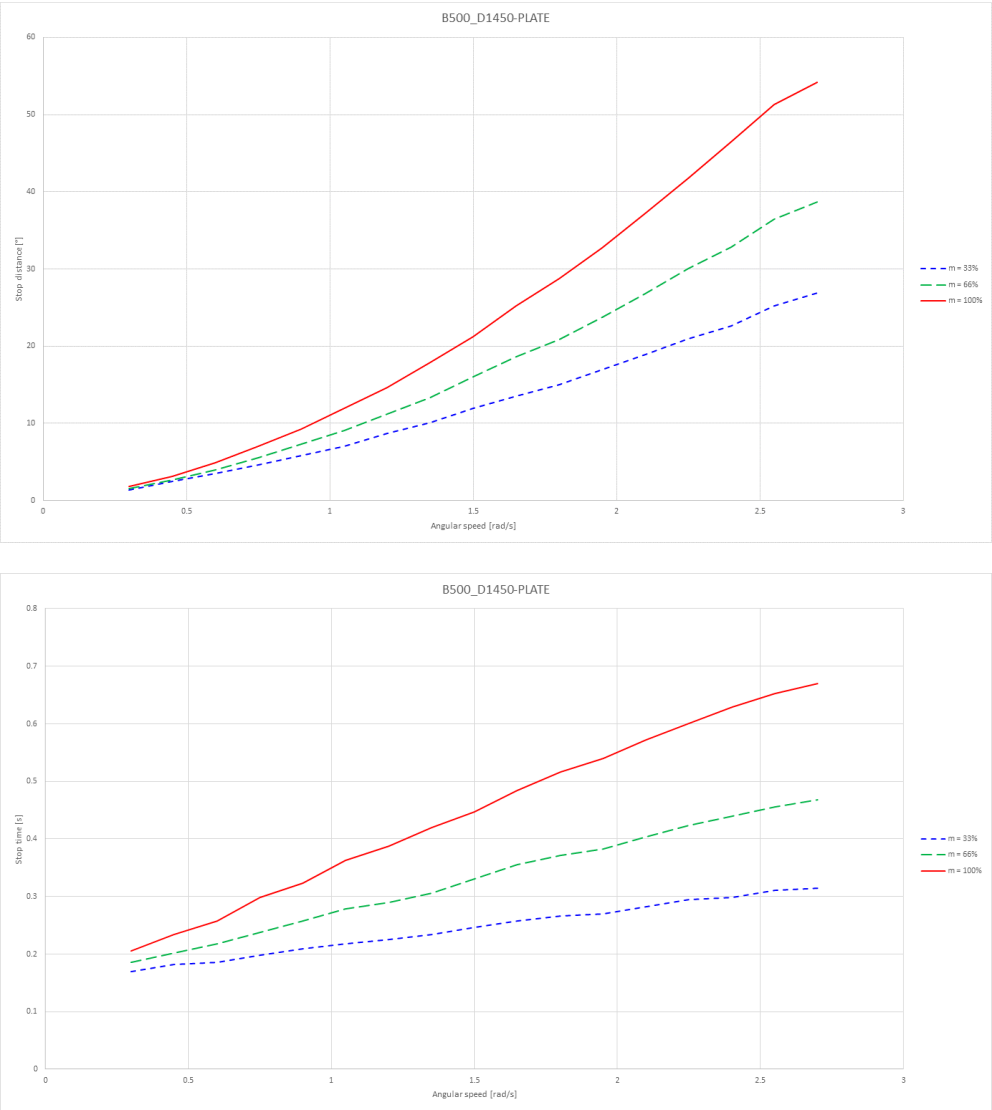
Stopping distance and stopping time



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Category 1, PLATE

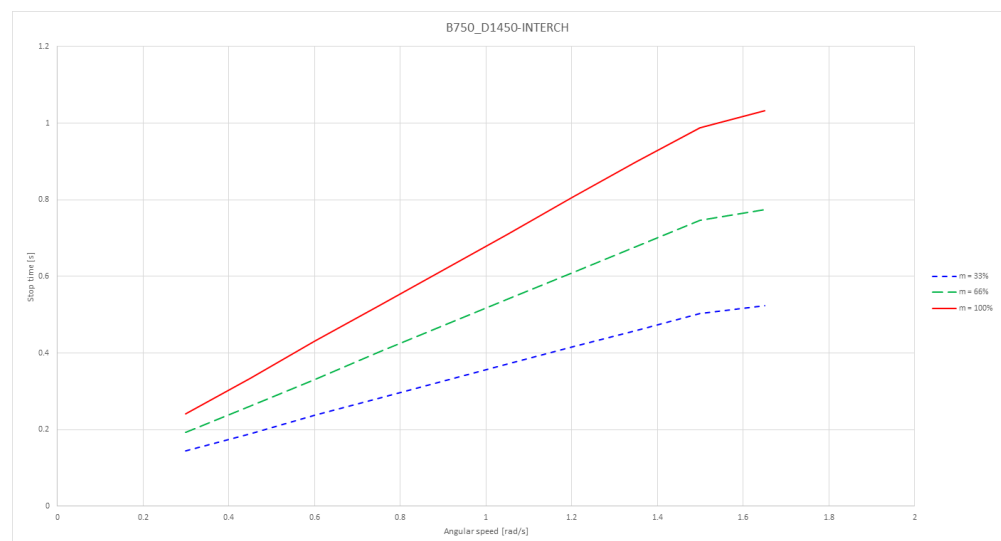
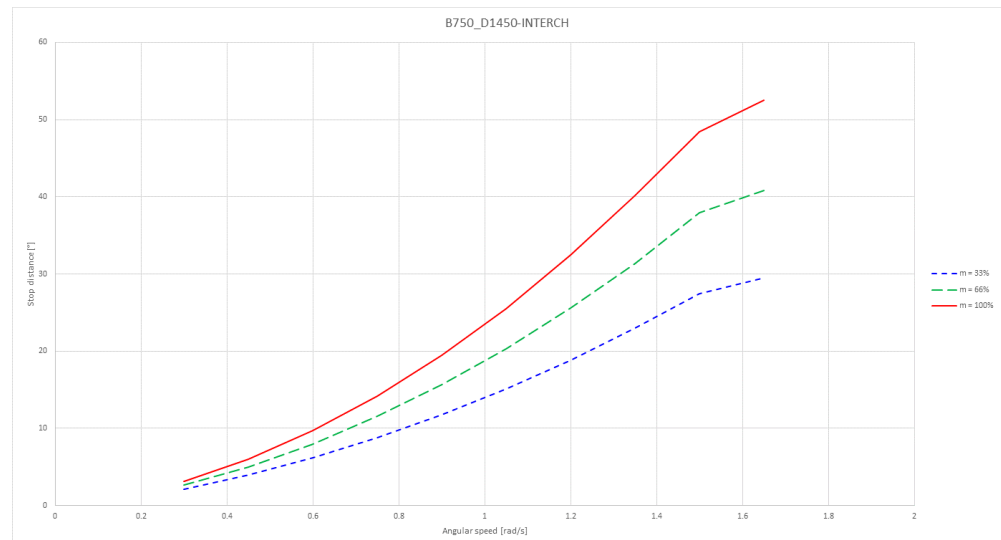
Stopping distance and stopping time



21.3 B750_D1450

Category 0, INTERCH

Stopping distance and stopping time



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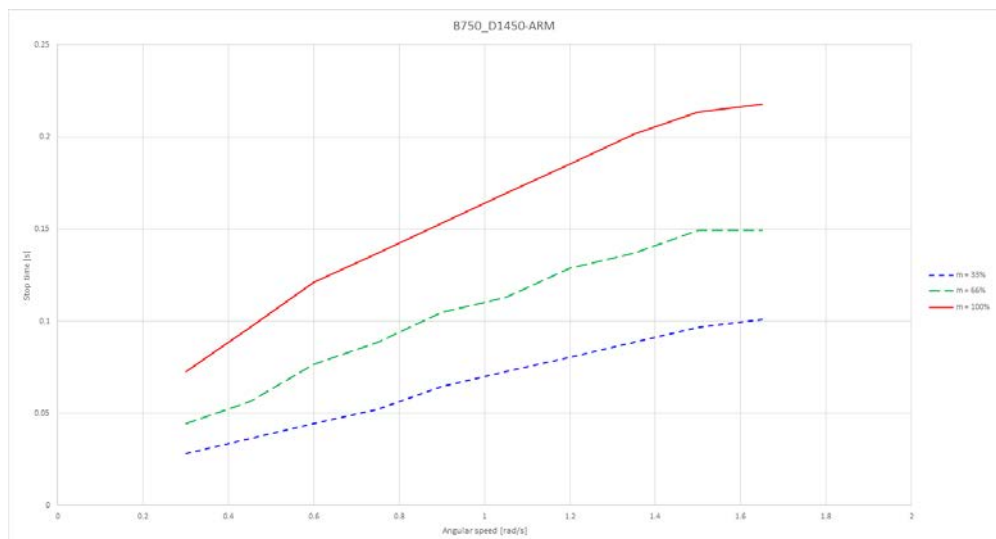
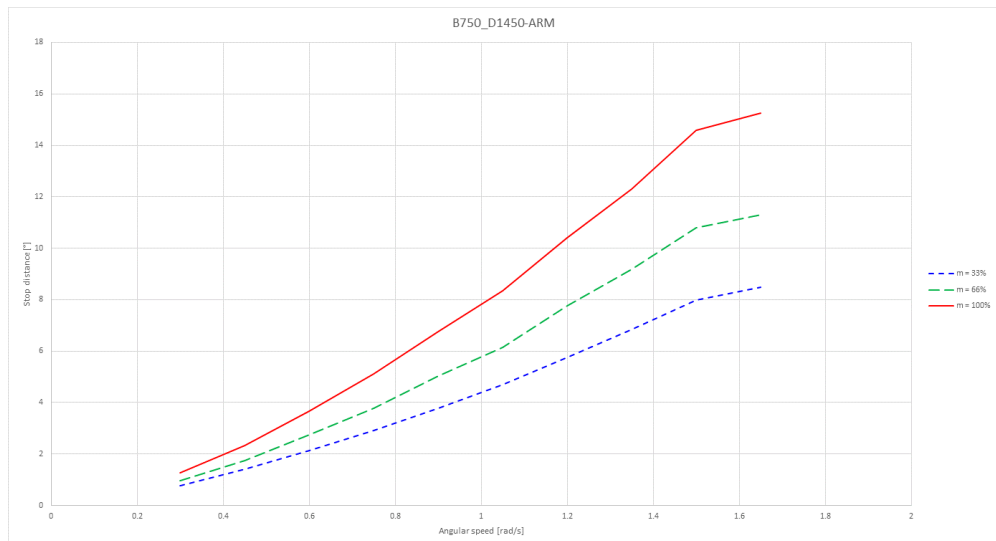
21 IRBP B

21.3 B750_D1450

Continued

Category 0, ARM

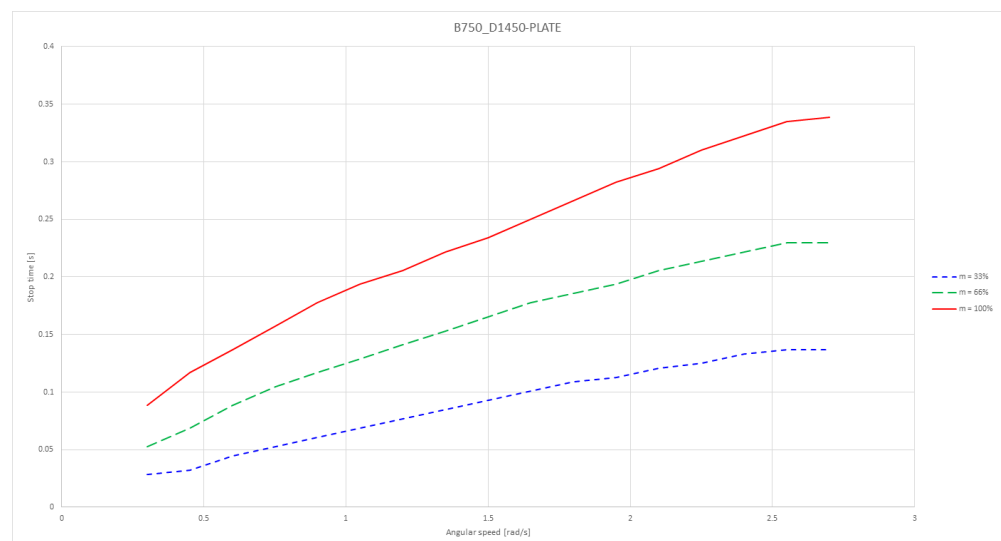
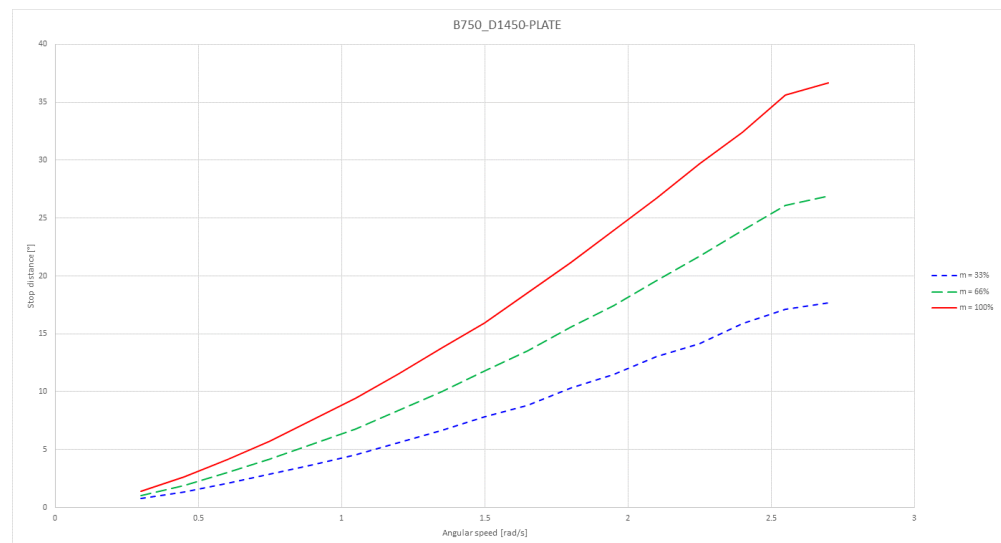
Stopping distance and stopping time



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Category 0, PLATE

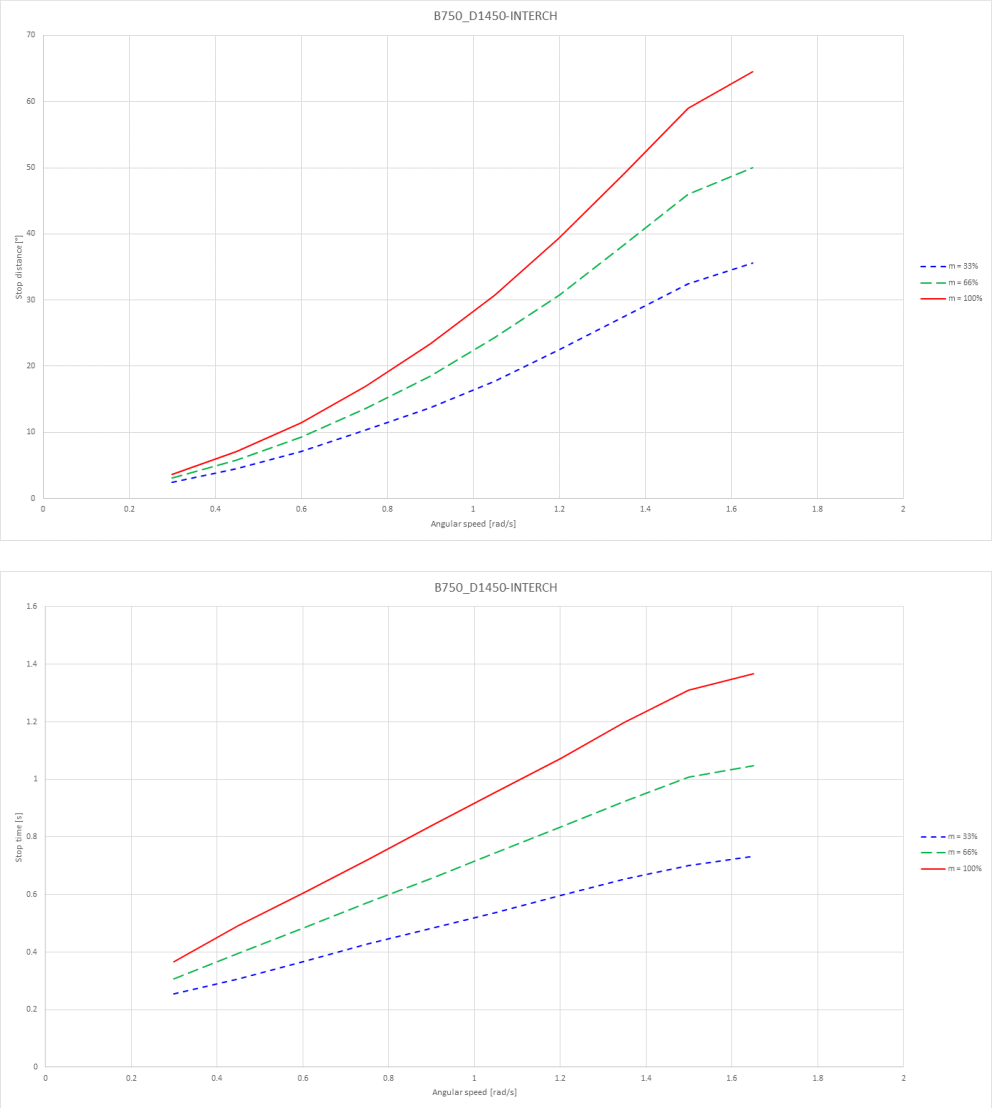
Stopping distance and stopping time



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Category 1, INTERCH

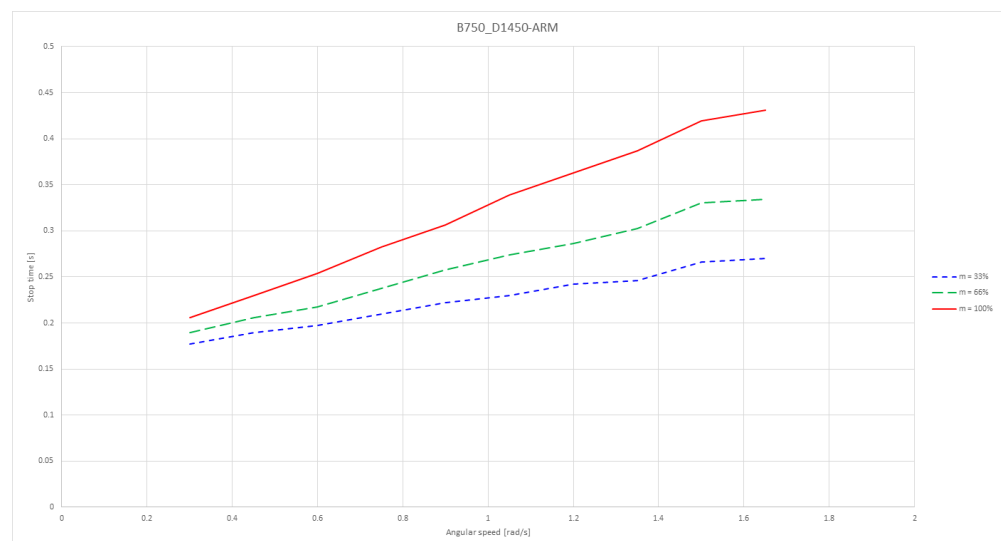
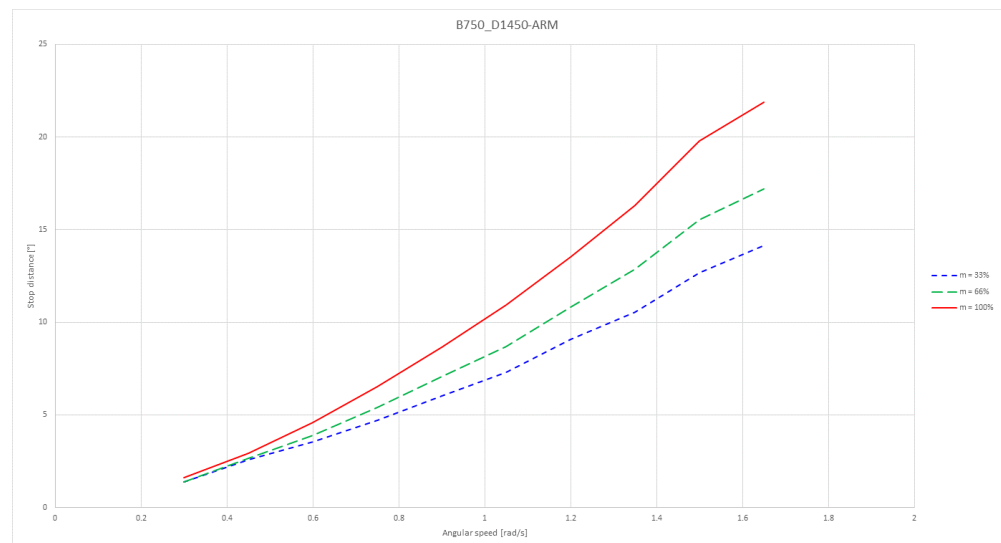
Stopping distance and stopping time



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Category 1, ARM

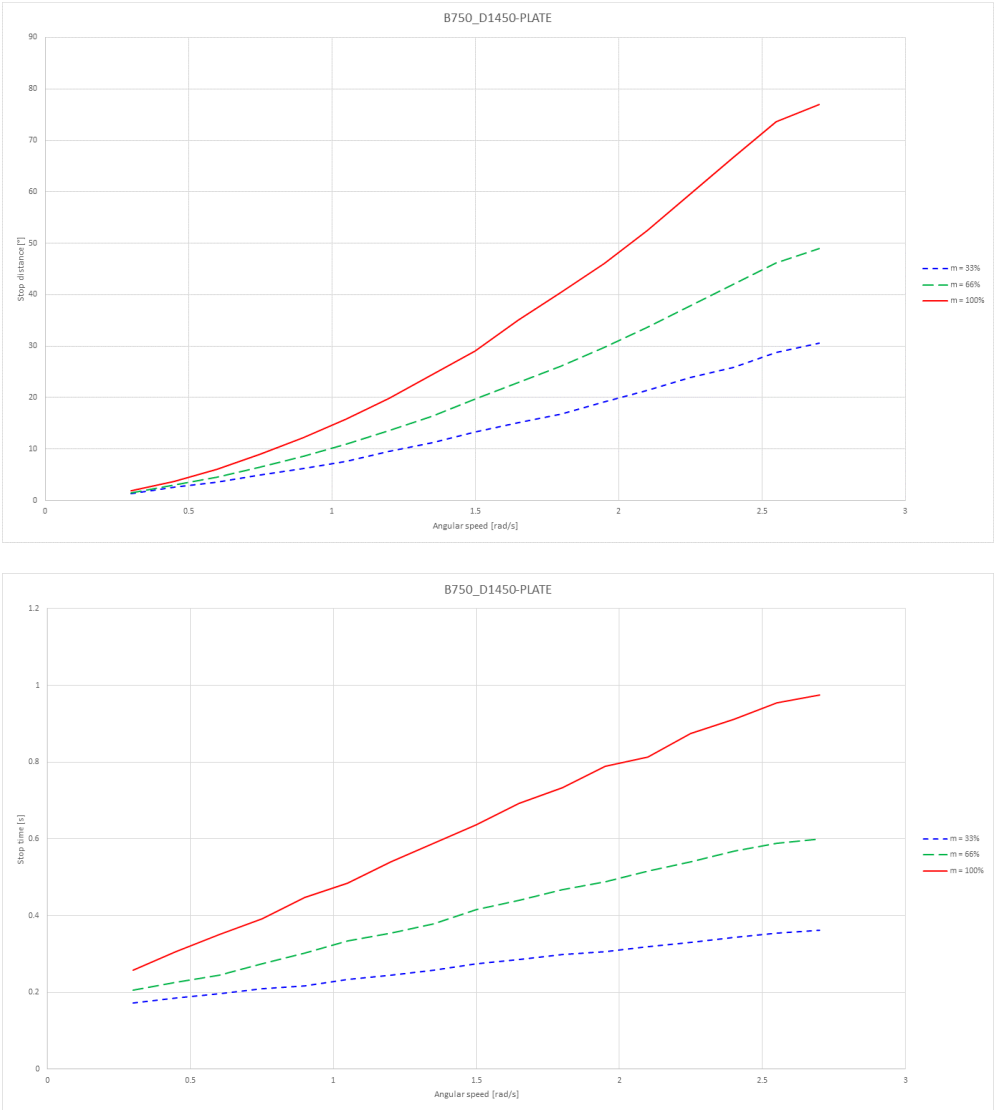
Stopping distance and stopping time



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Category 1, PLATE

Stopping distance and stopping time

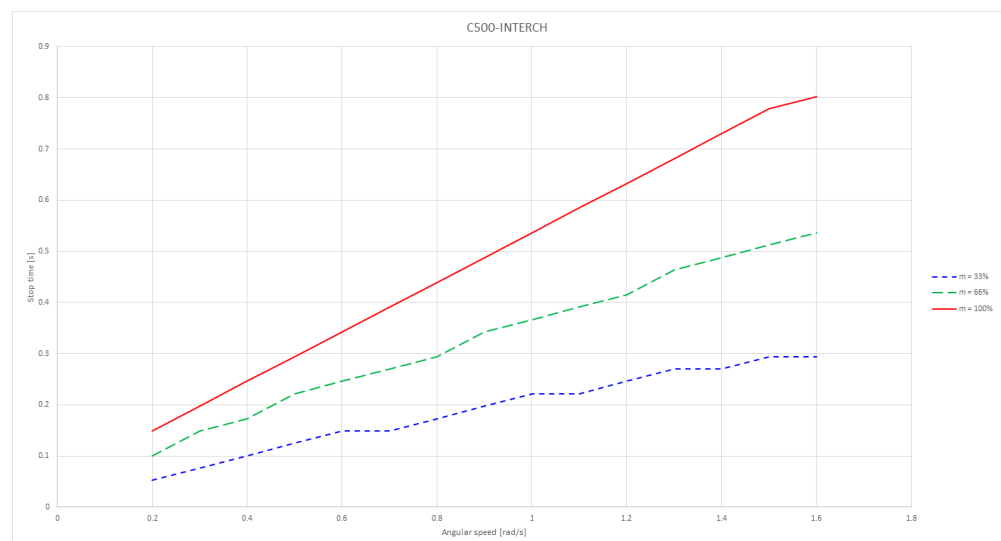
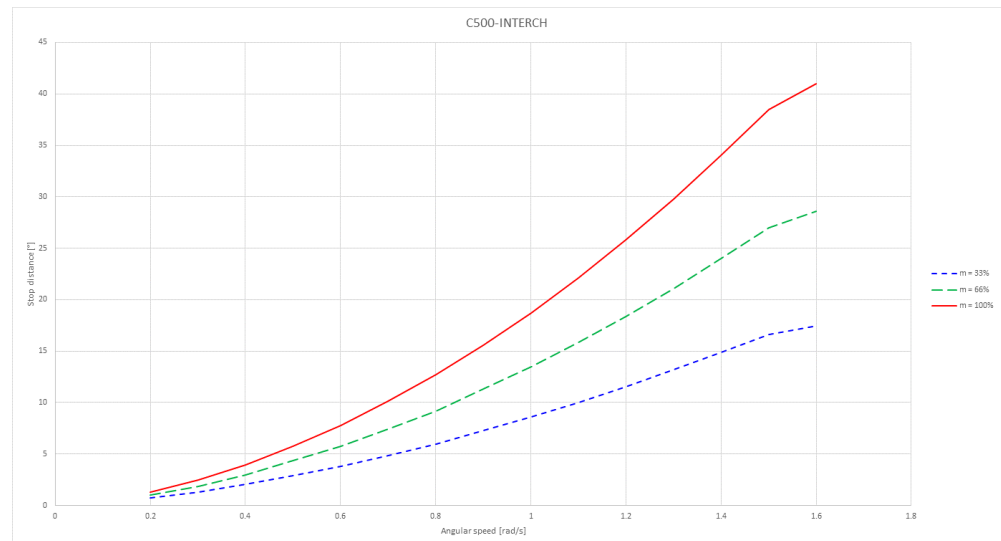


22 IRBP C

22.1 C500

Category 0, INTERCH

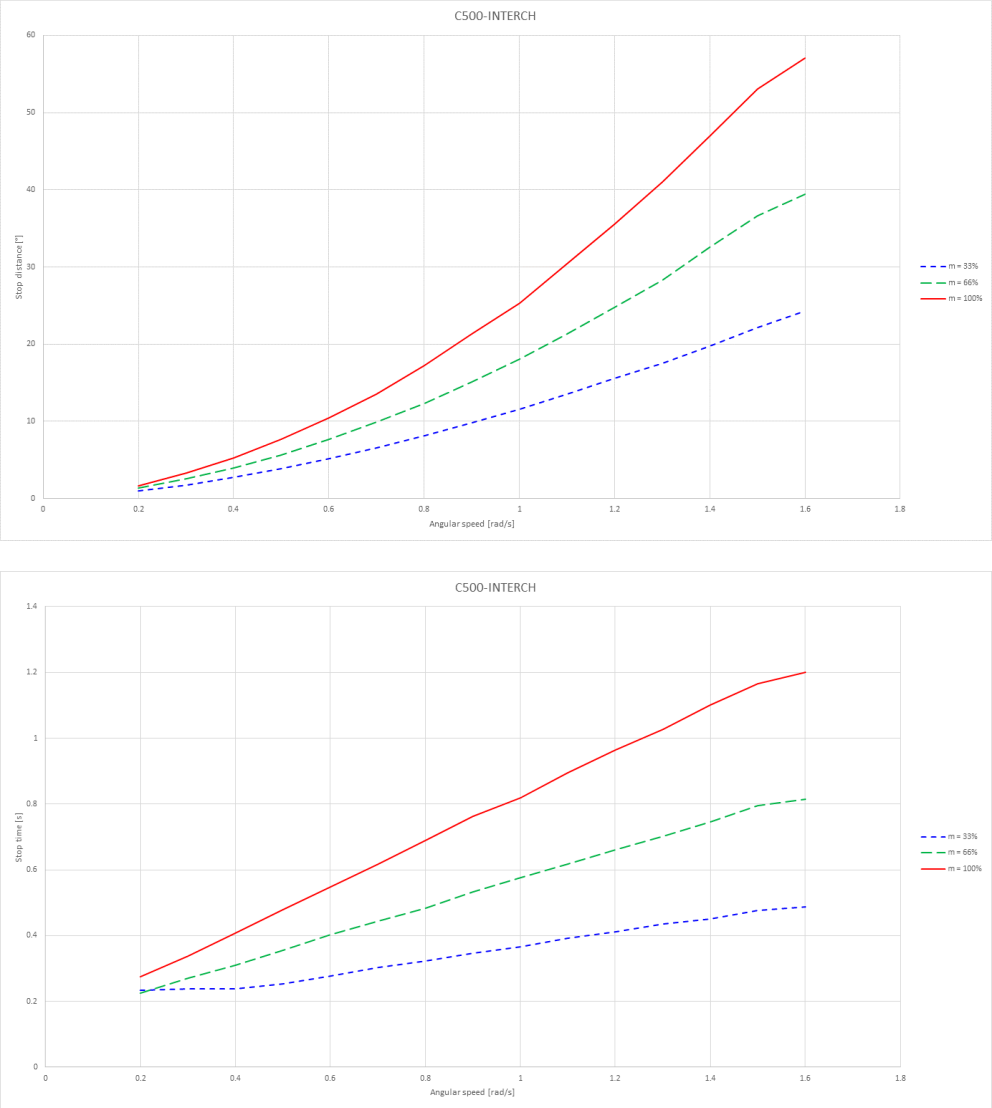
Stopping distance and stopping time



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Category 1, INTERCH

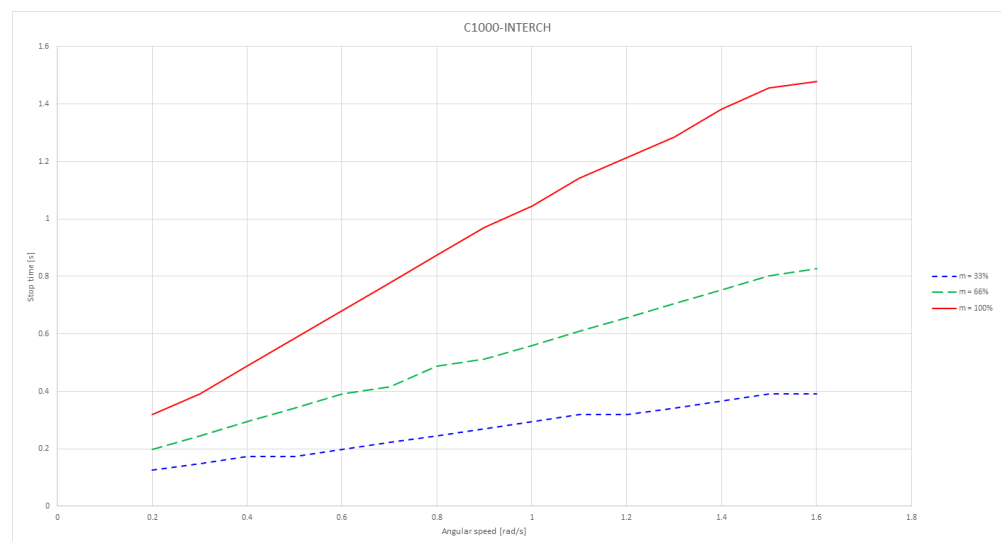
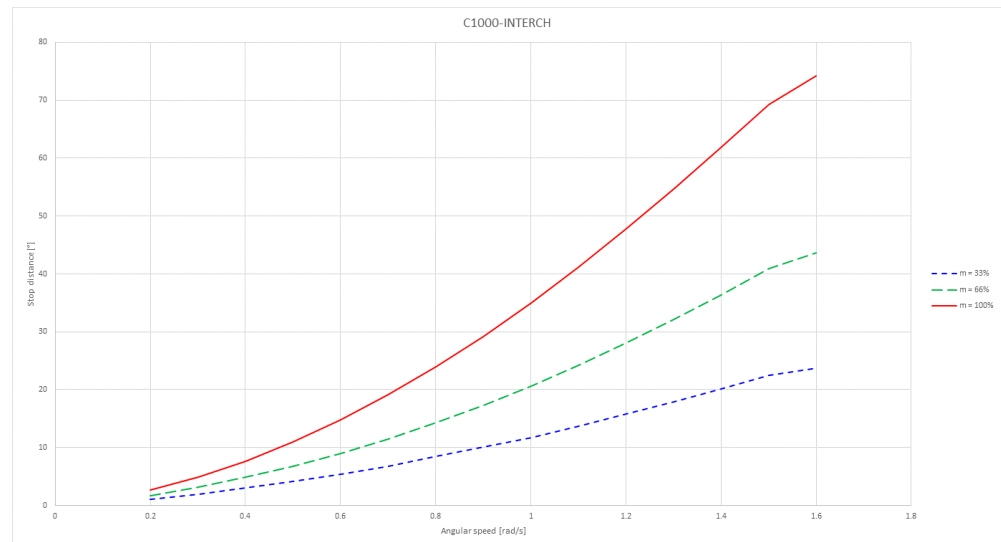
Stopping distance and stopping time



22.2 C1000

Category 0, INTERCH

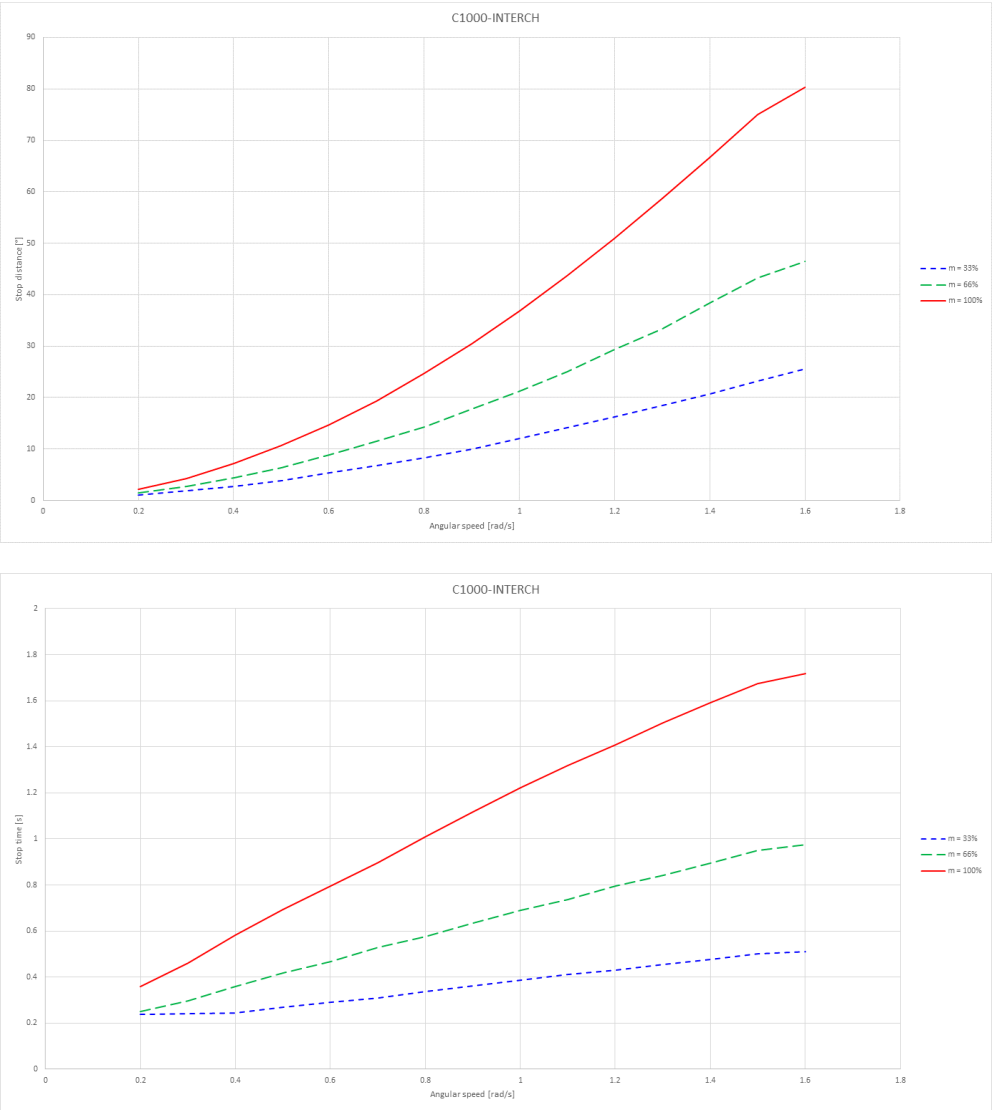
Stopping distance and stopping time



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Category 1, INTERCH

Stopping distance and stopping time

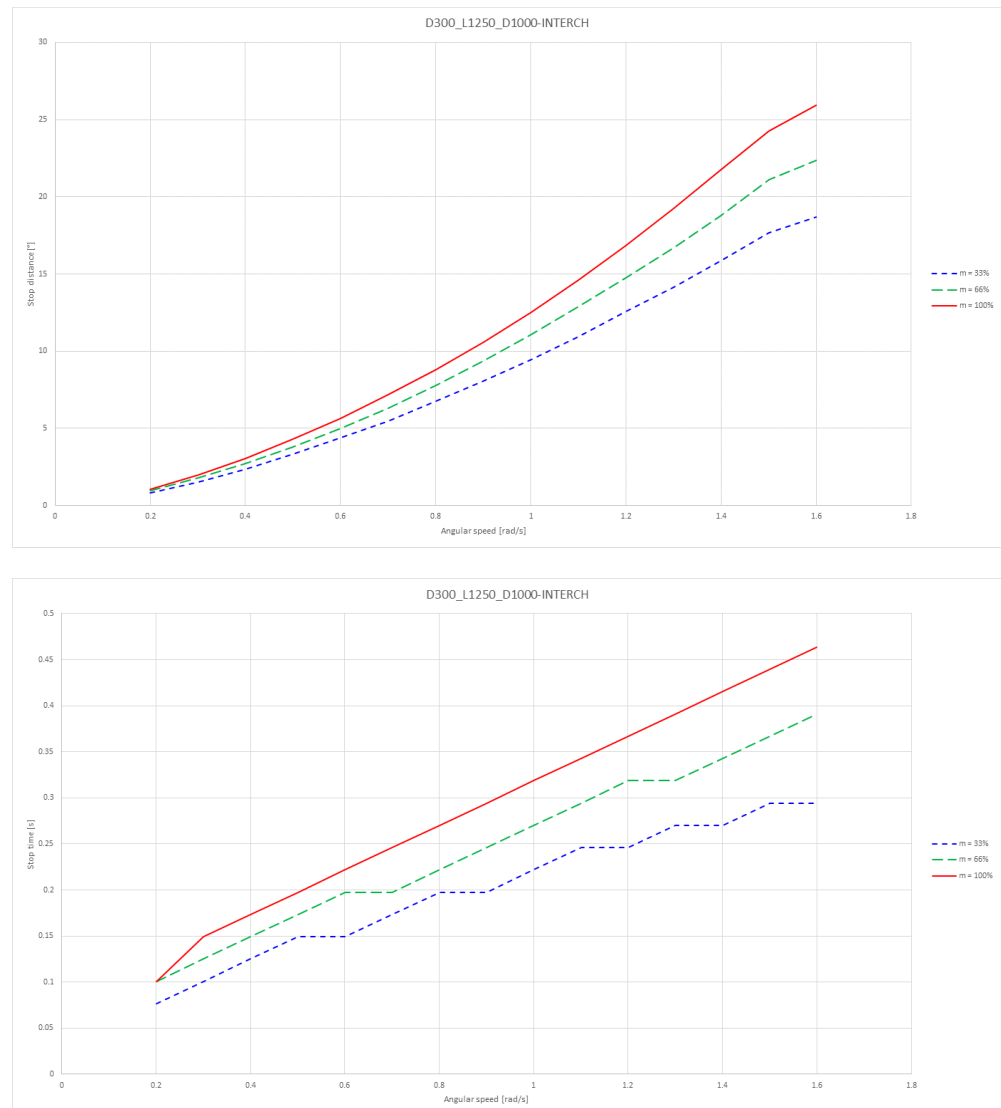


23 IRBP D

23.1 D300_L1250_D1000

Category 0, INTERCH

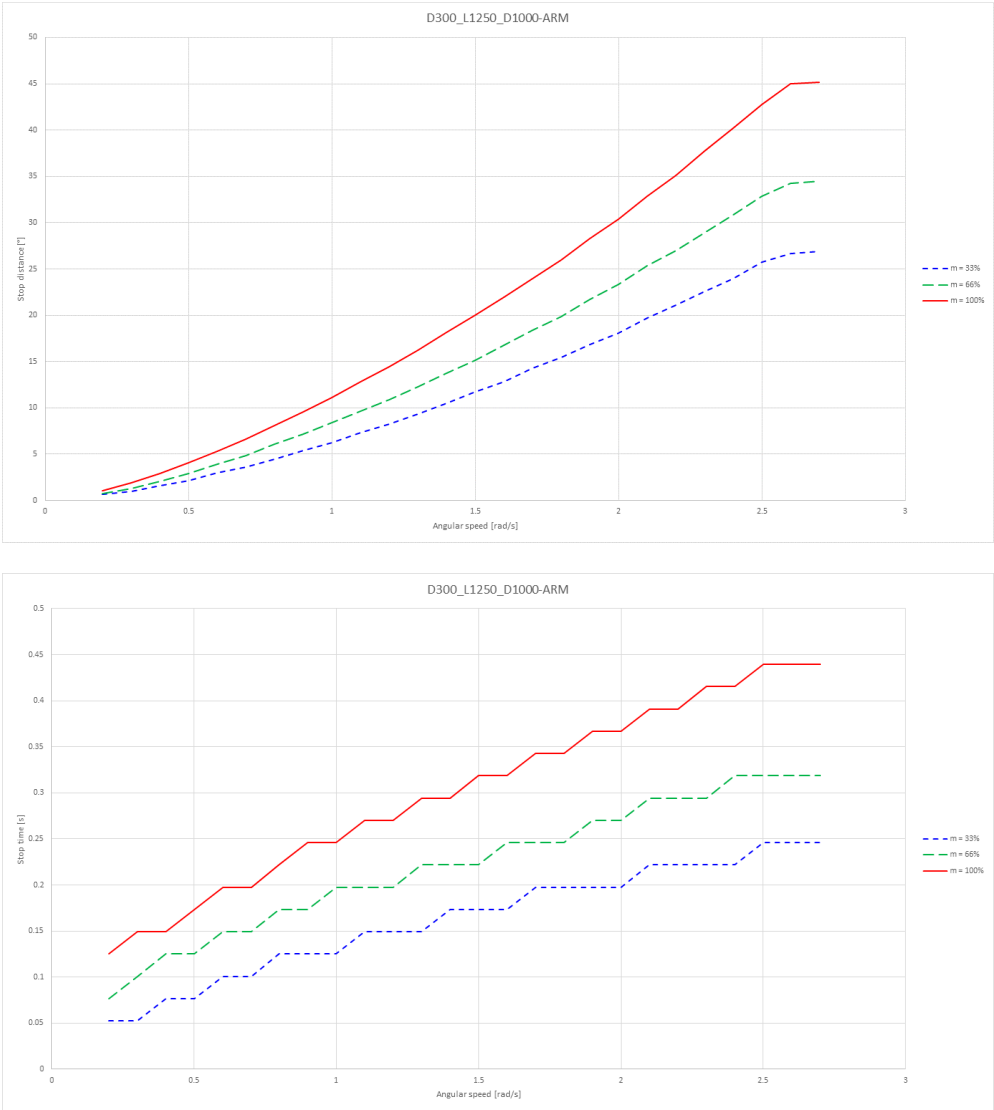
Stopping distance and stopping time



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Category 0, ARM

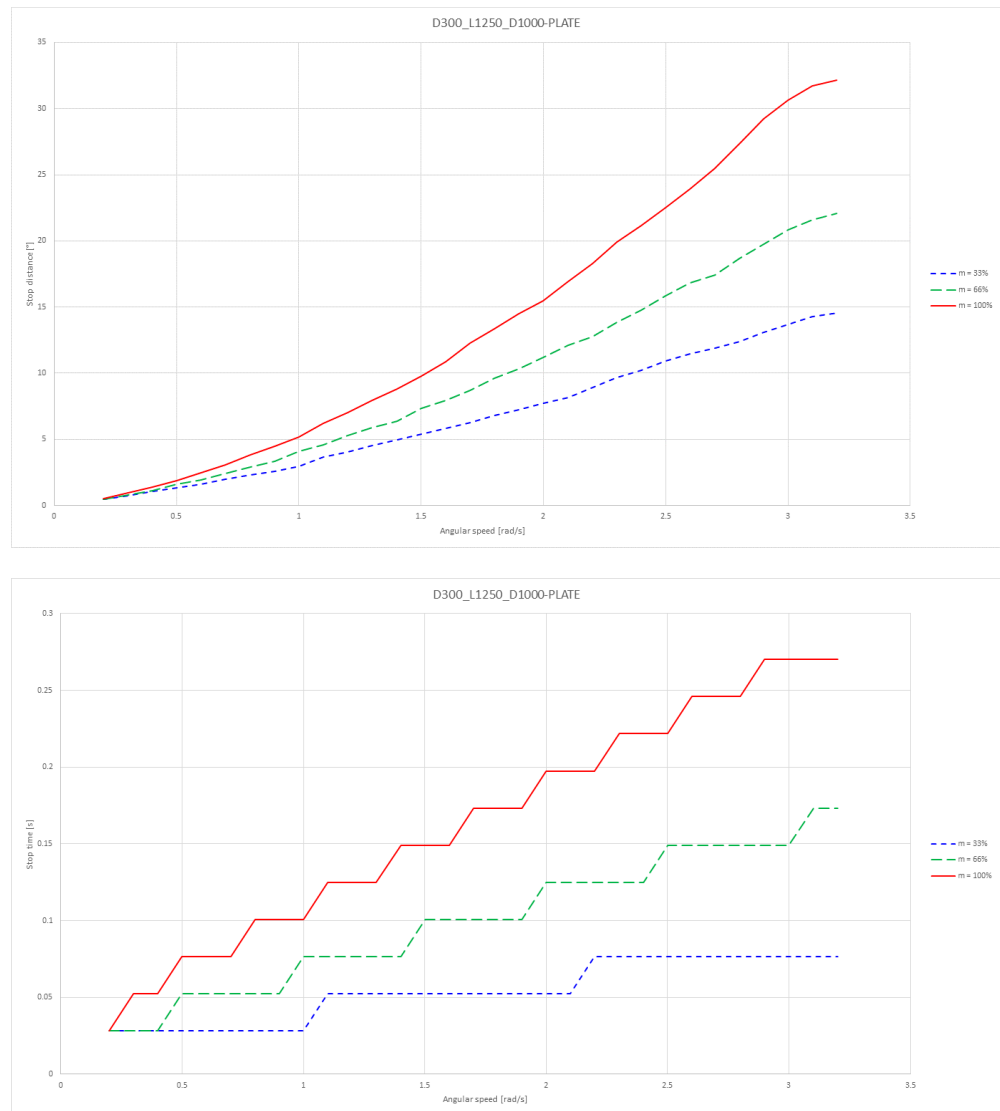
Stopping distance and stopping time



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Category 0, PLATE

Stopping distance and stopping time



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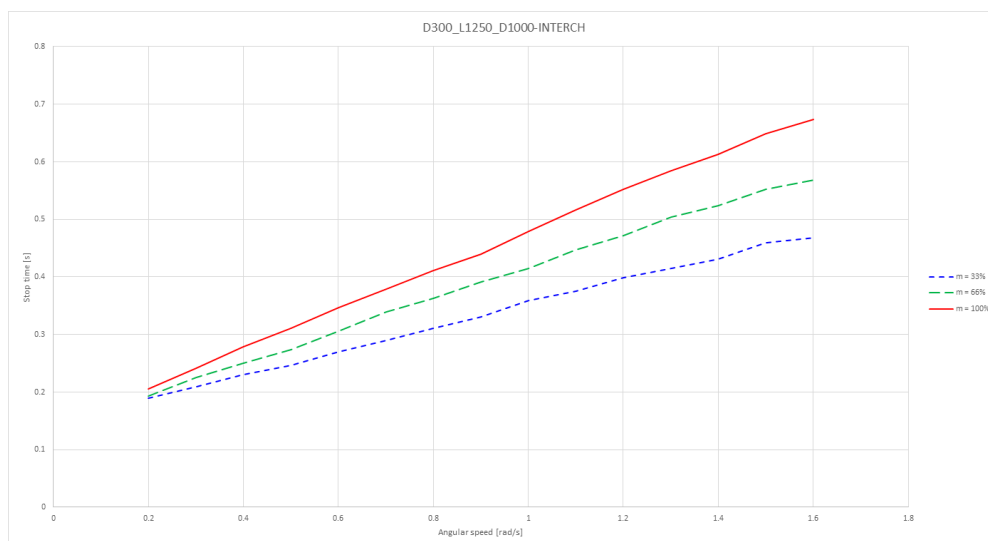
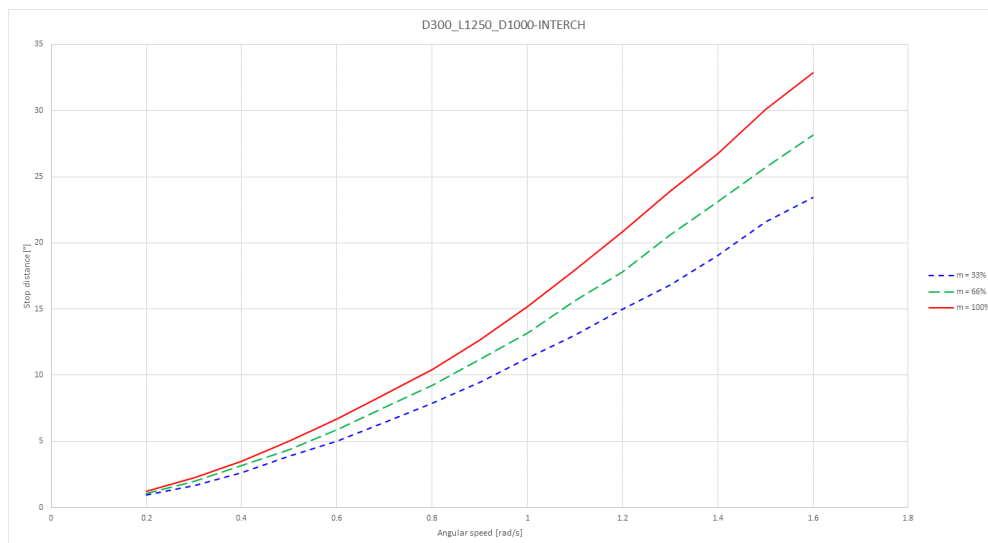
23 IRBP D

23.1 D300_L1250_D1000

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Category 1, INTERCH

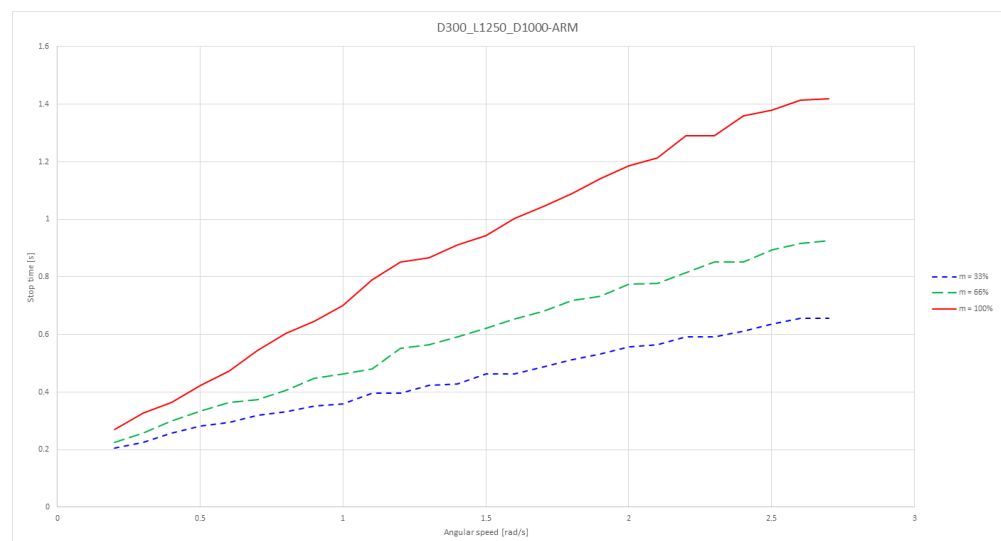
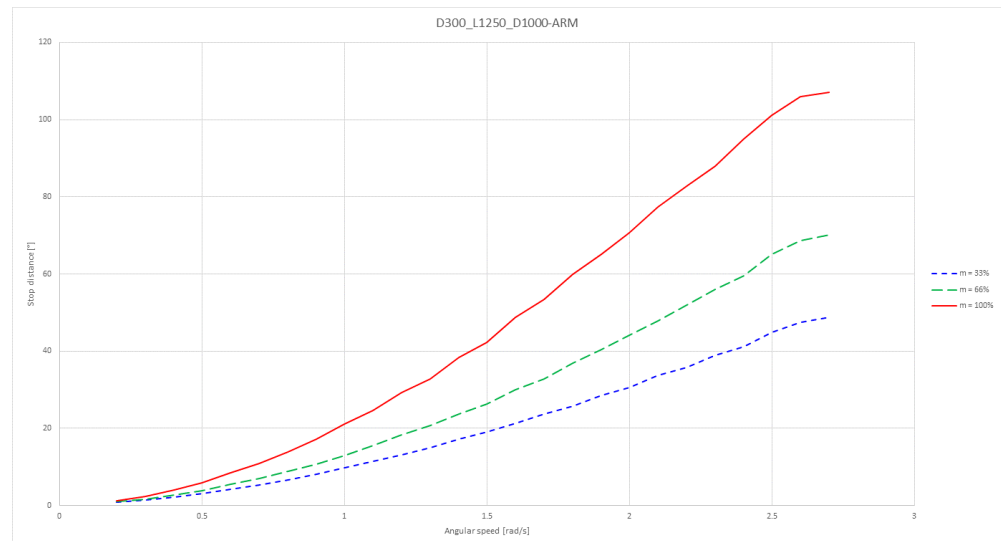
Stopping distance and stopping time



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Category 1, ARM

Stopping distance and stopping time



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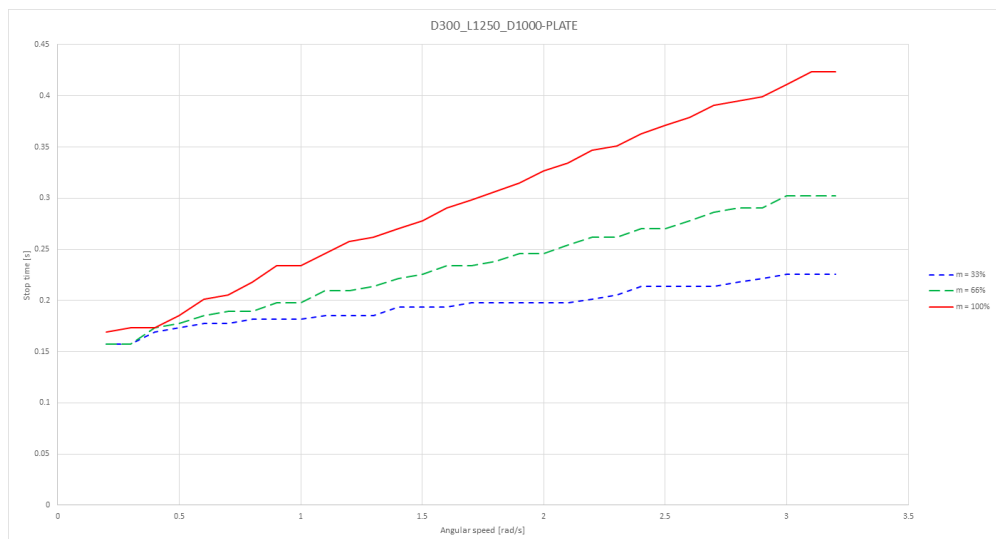
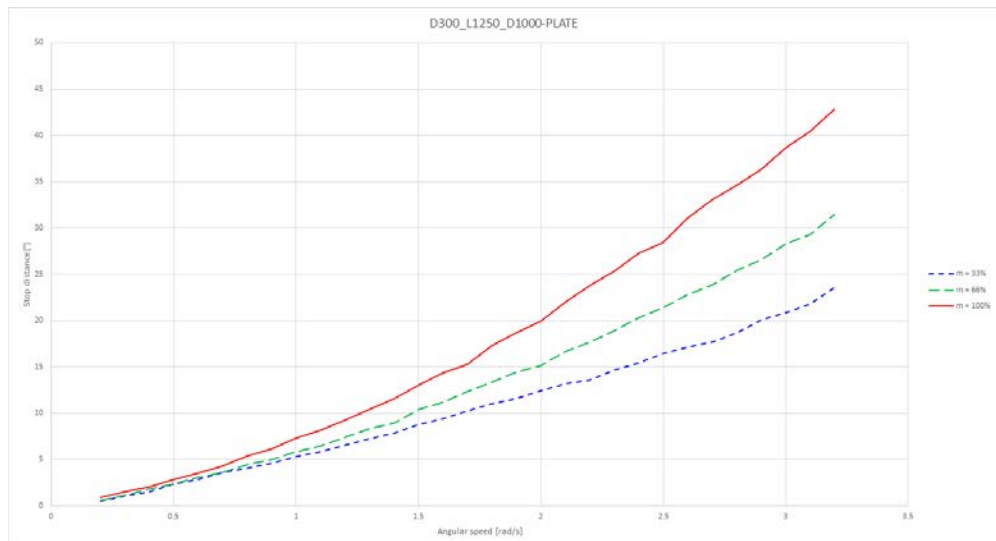
23 IRBP D

23.1 D300_L1250_D1000

Continued

Category 1, PLATE

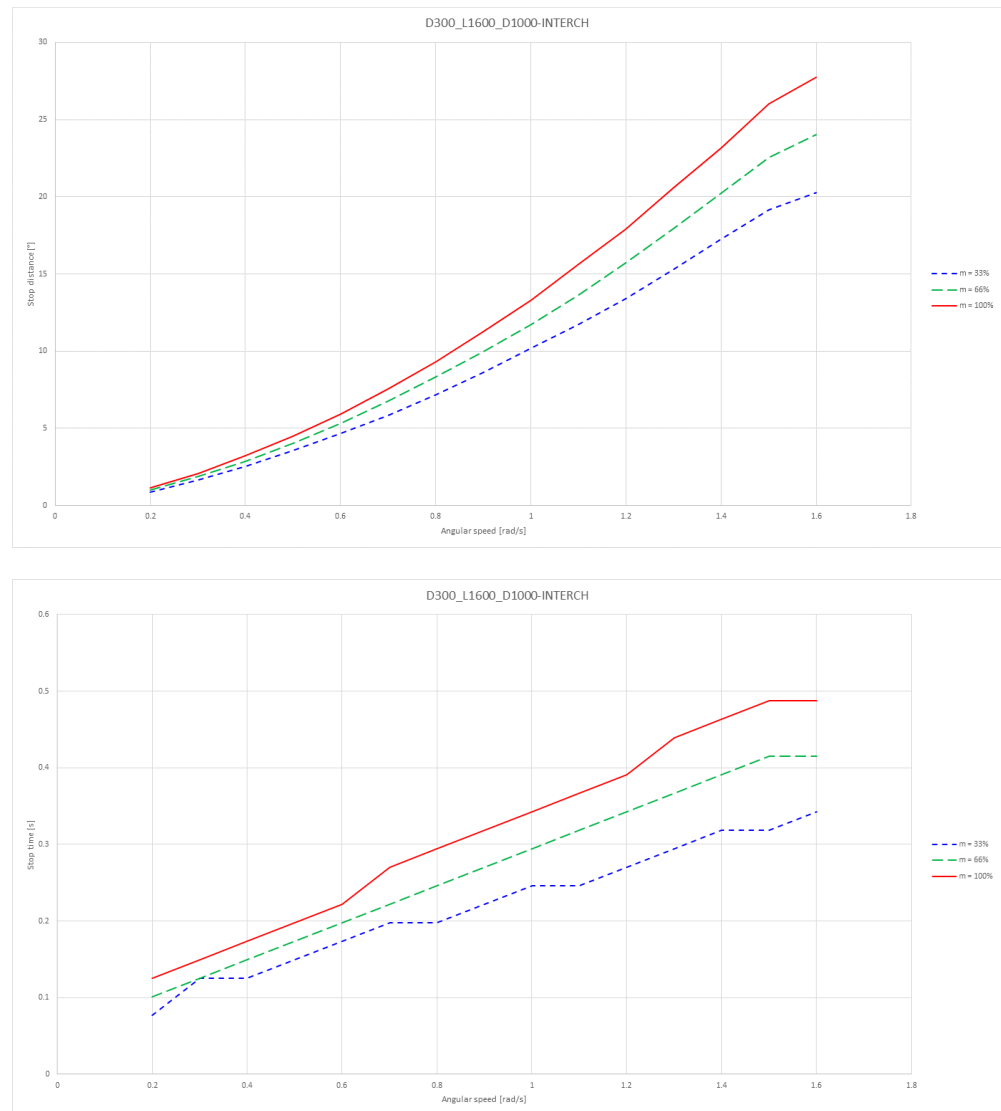
Stopping distance and stopping time



23.2 D300_L1600_D1000

Category 0, INTERCH

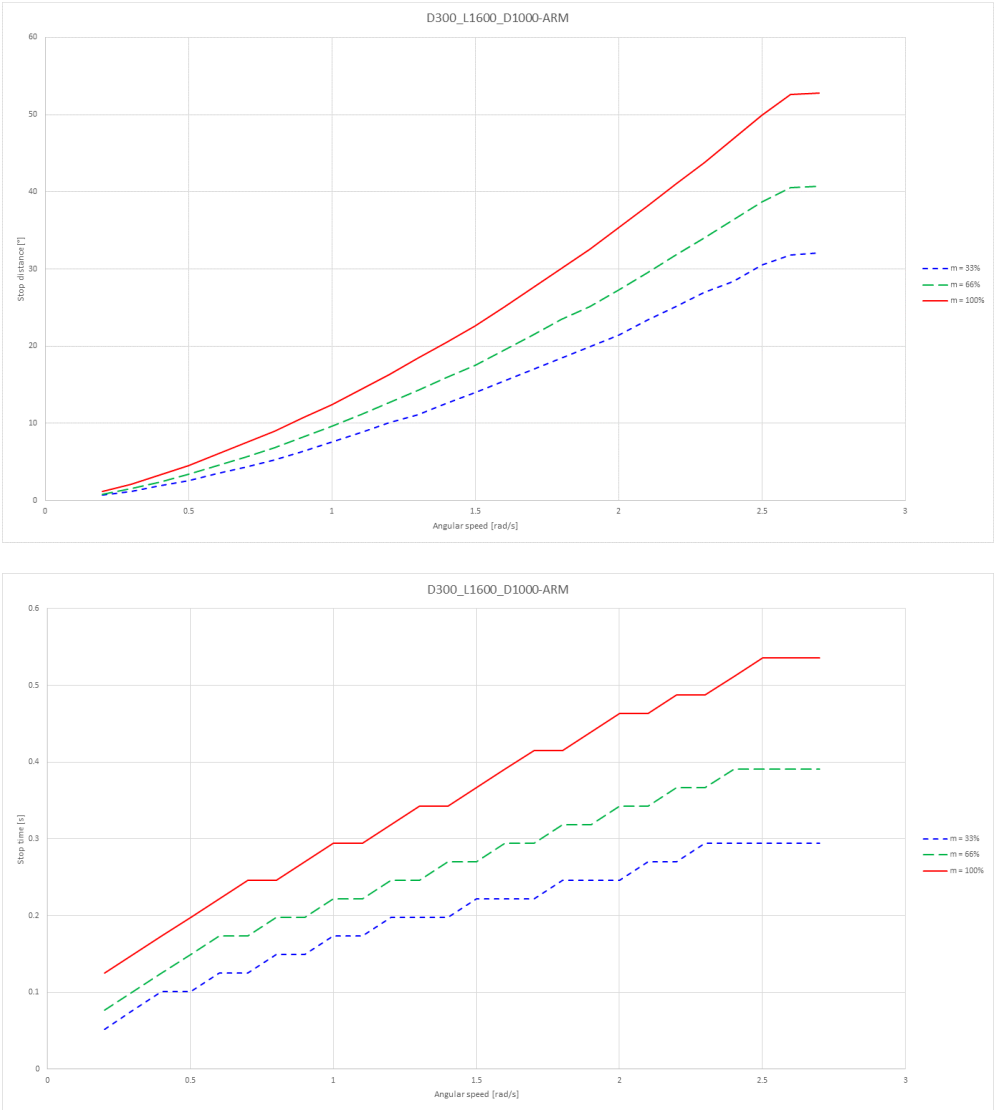
Stopping distance and stopping time



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Category 0, ARM

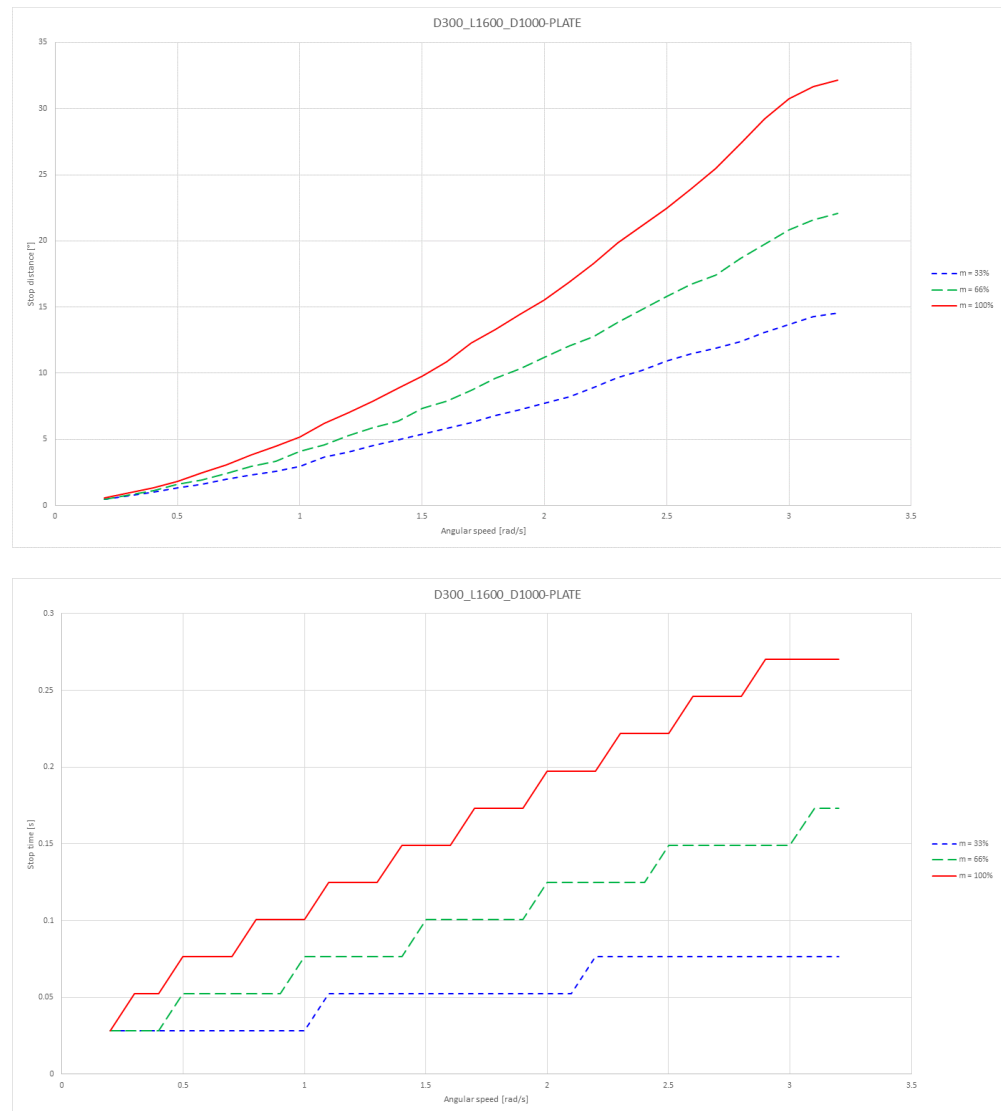
Stopping distance and stopping time



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Category 0, PLATE

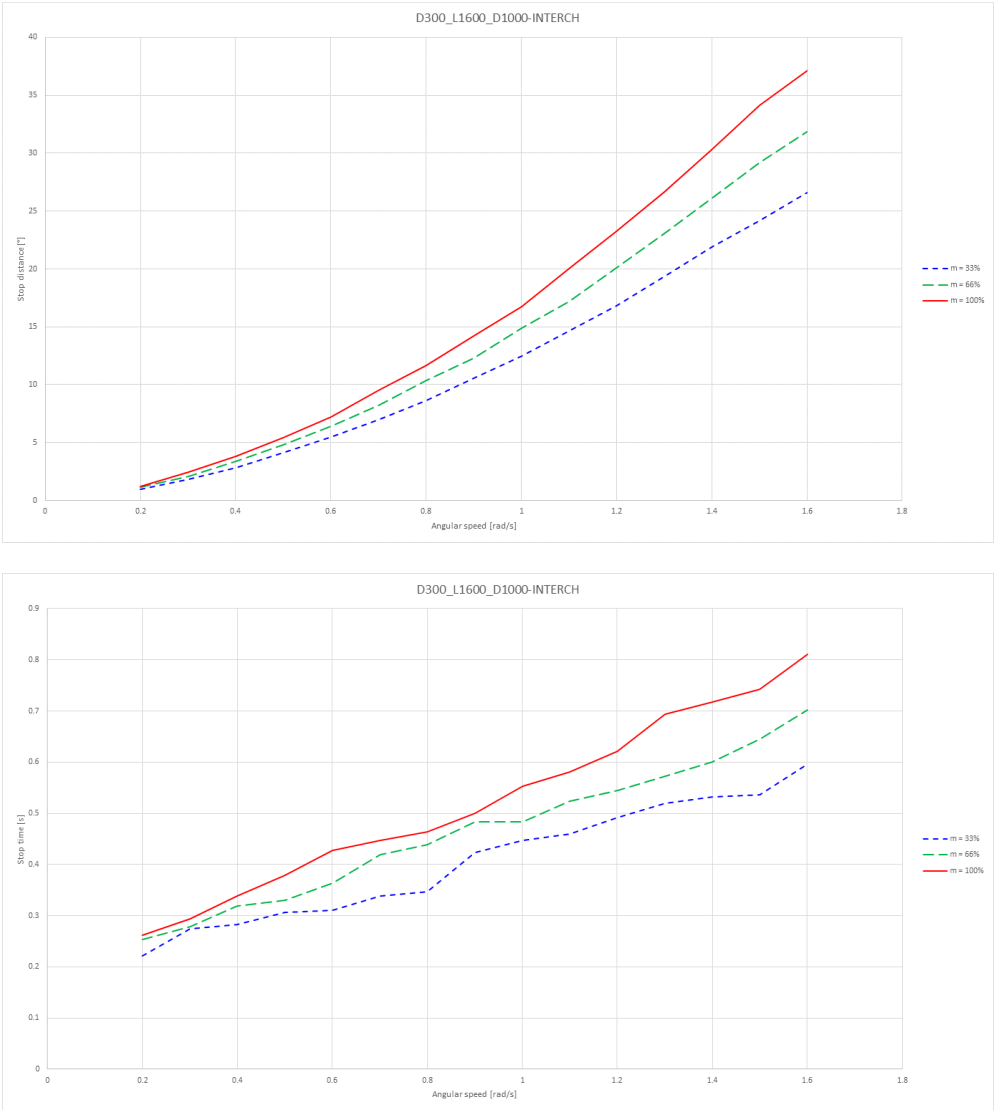
Stopping distance and stopping time



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Category 1, INTERCH

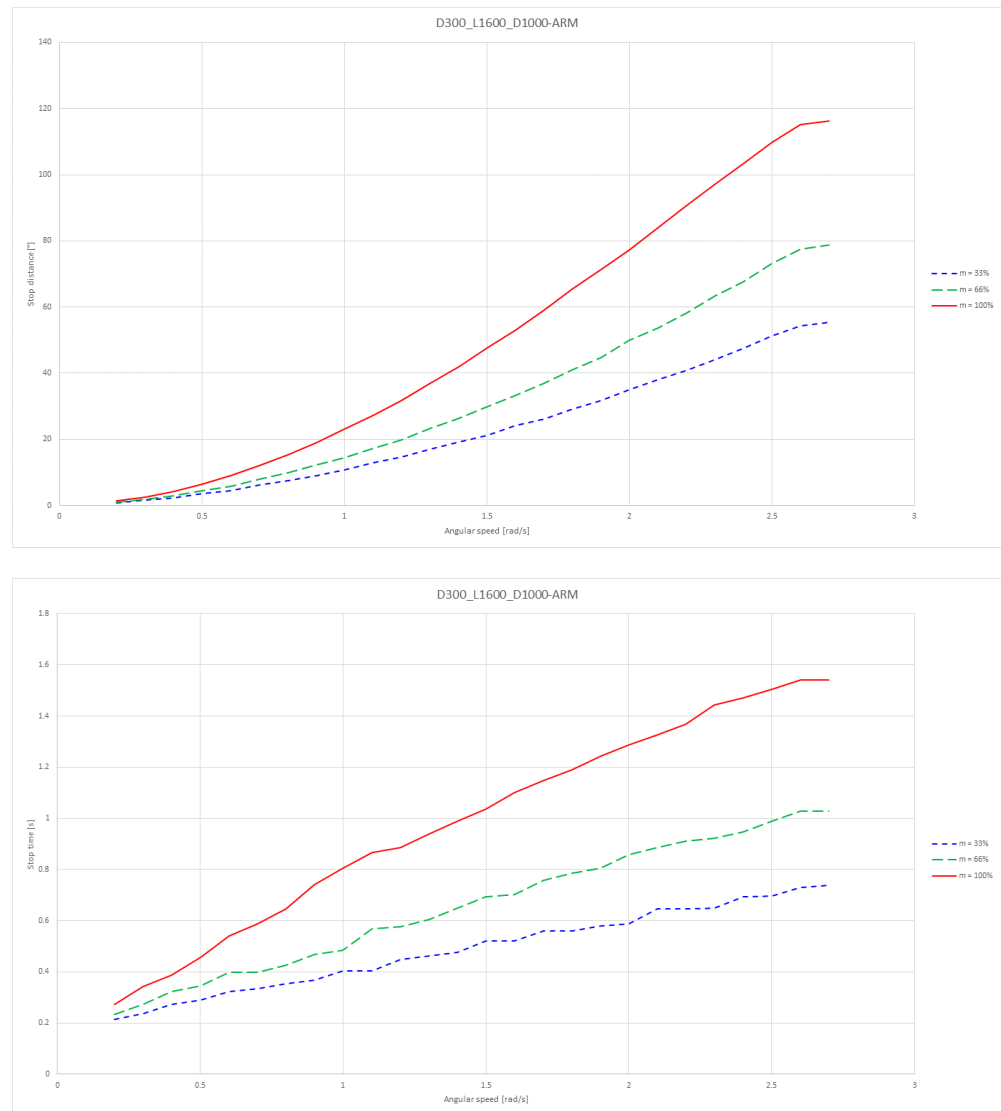
Stopping distance and stopping time



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Category 1, ARM

Stopping distance and stopping time



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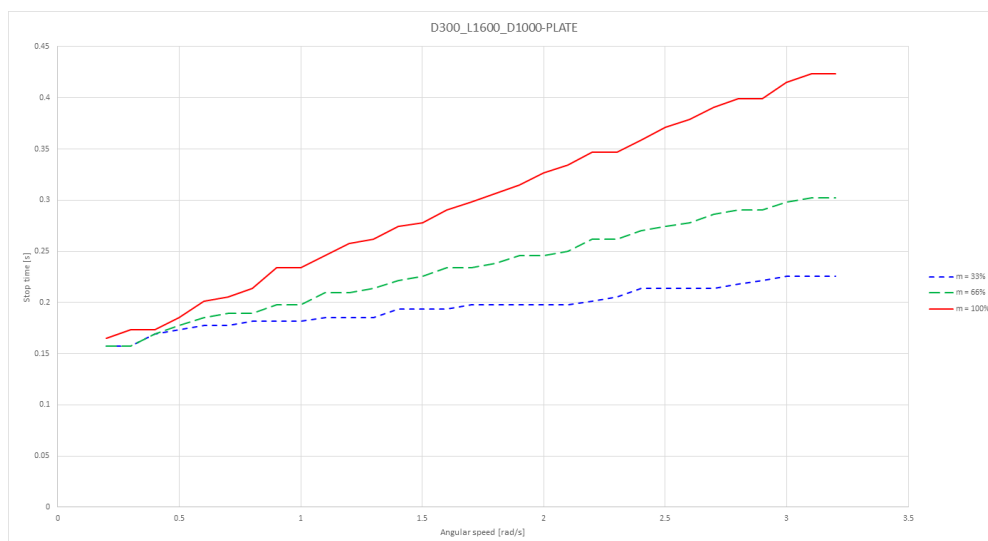
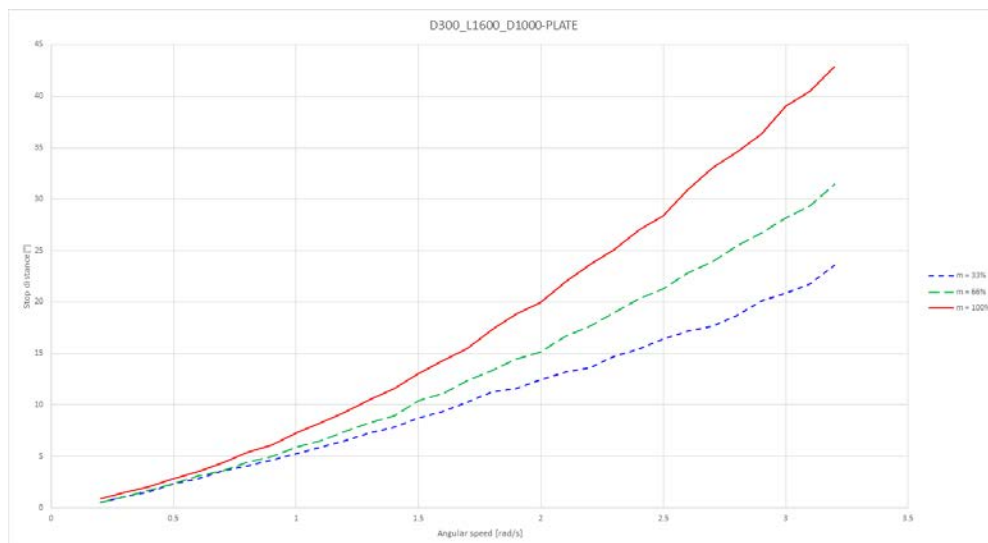
23 IRBP D

23.2 D300_L1600_D1000

Continued

Category 1, PLATE

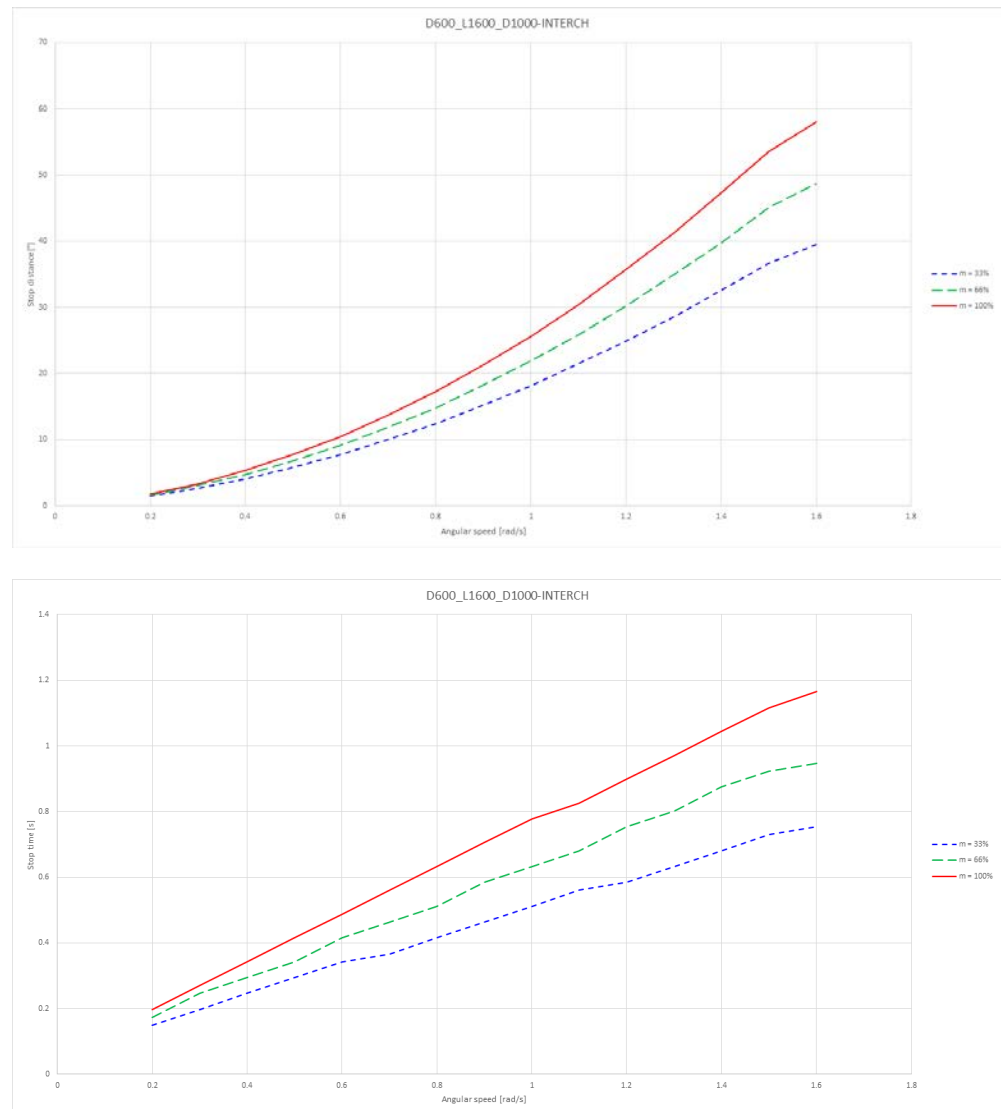
Stopping distance and stopping time



23.3 D600_L1600_D1000

Category 0, INTERCH

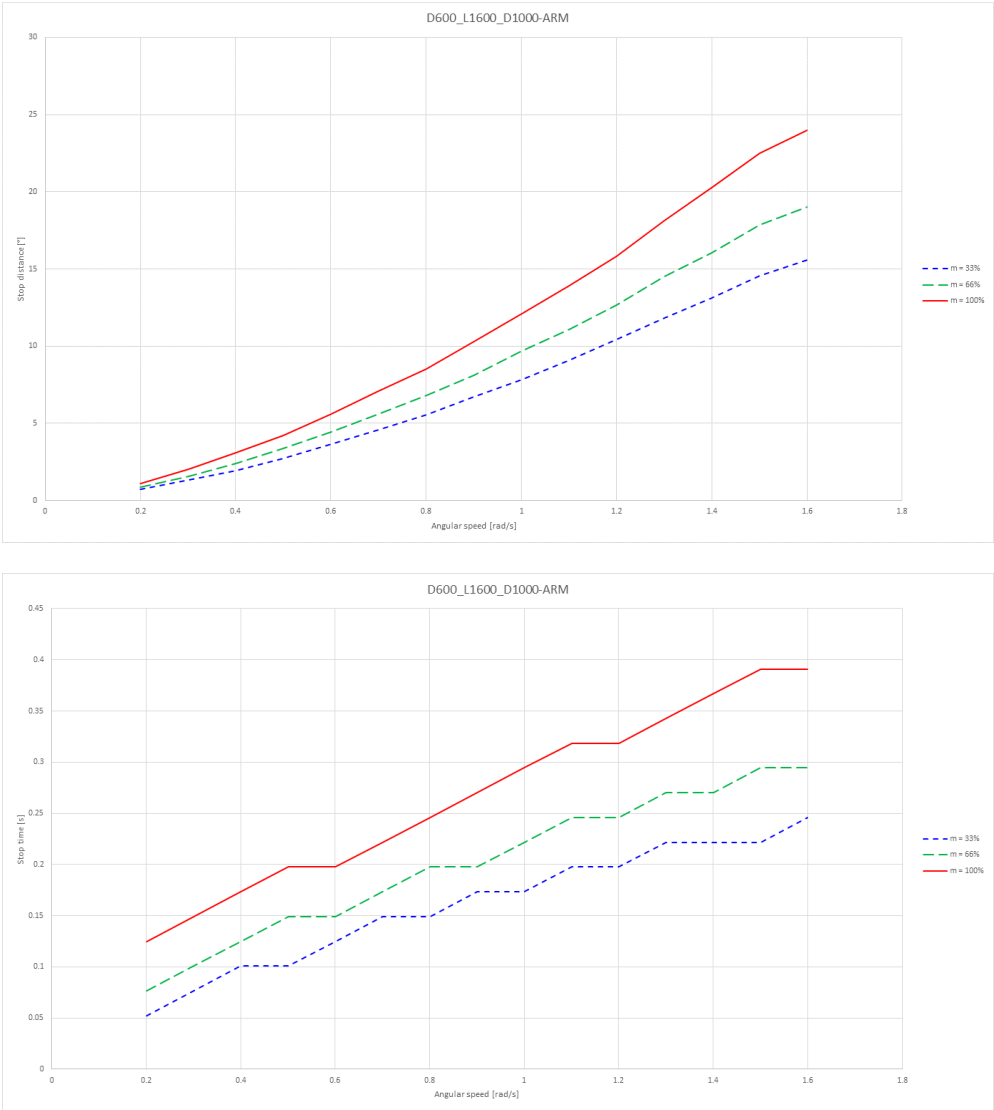
Stopping distance and stopping time



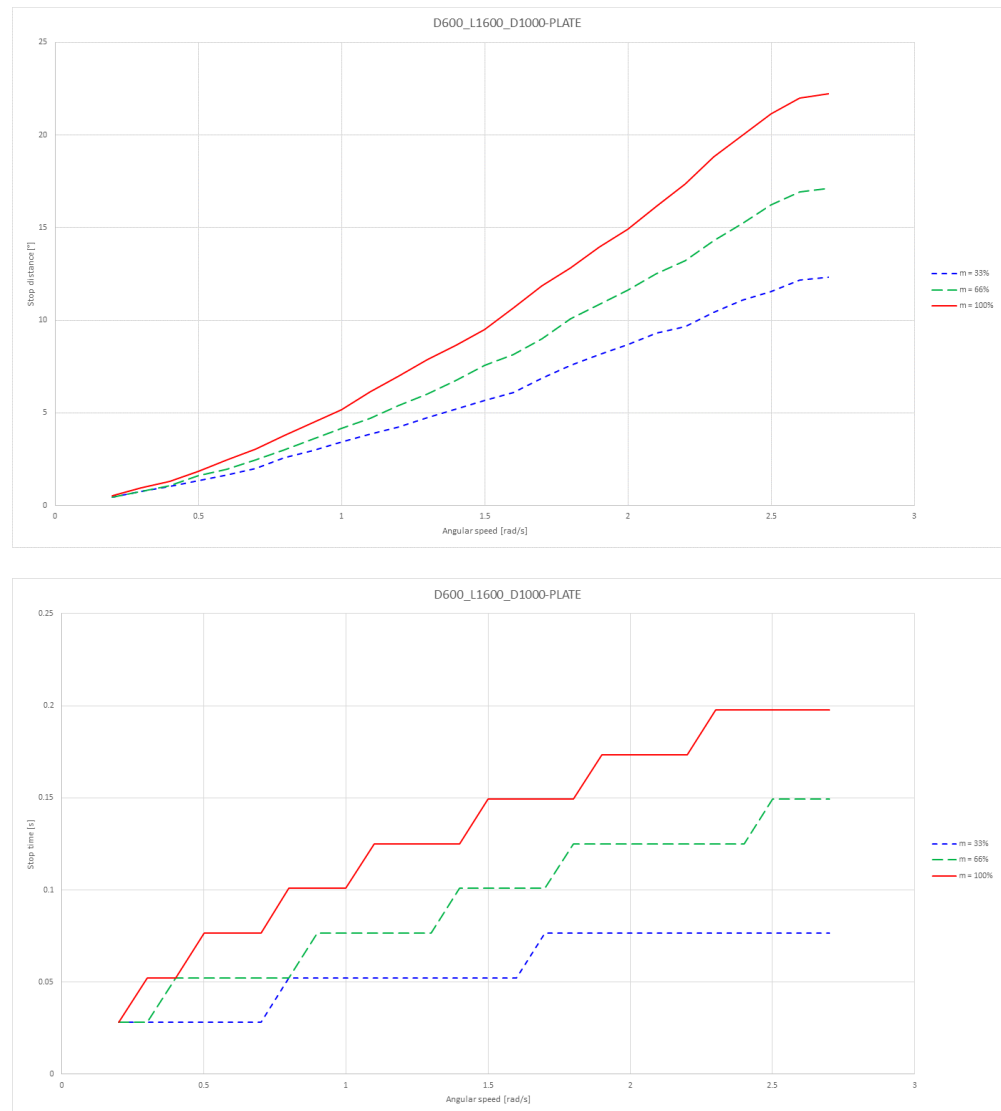
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Category 0, ARM

Stopping distance and stopping time



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Category 0, PLATE**Stopping distance and stopping time***Continues on next page*

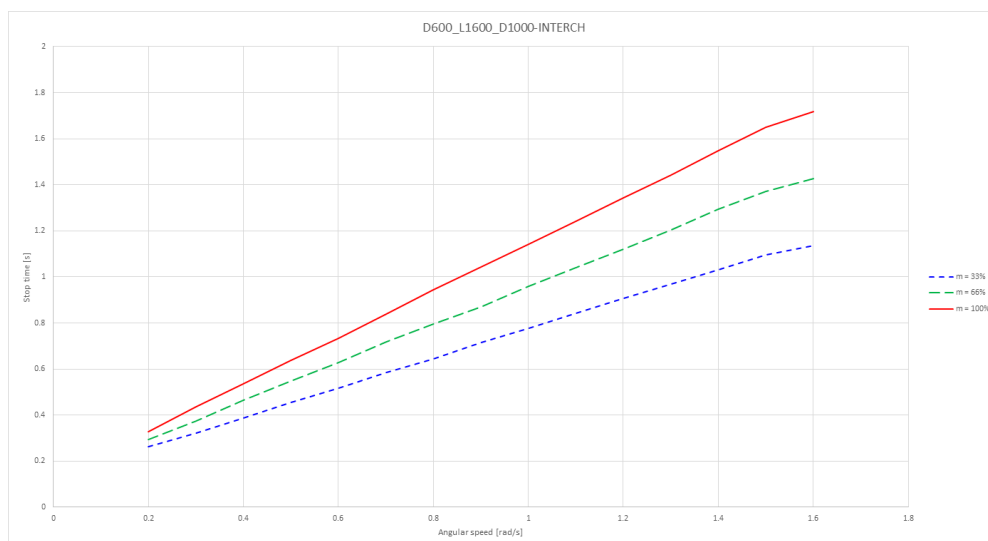
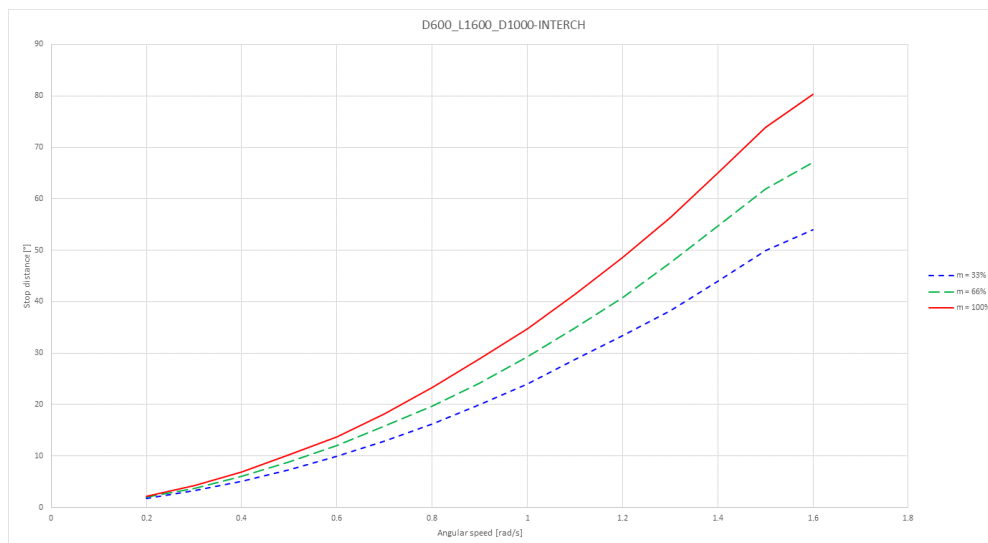
23 IRBP D

23.3 D600_L1600_D1000

Continued

Category 1, INTERCH

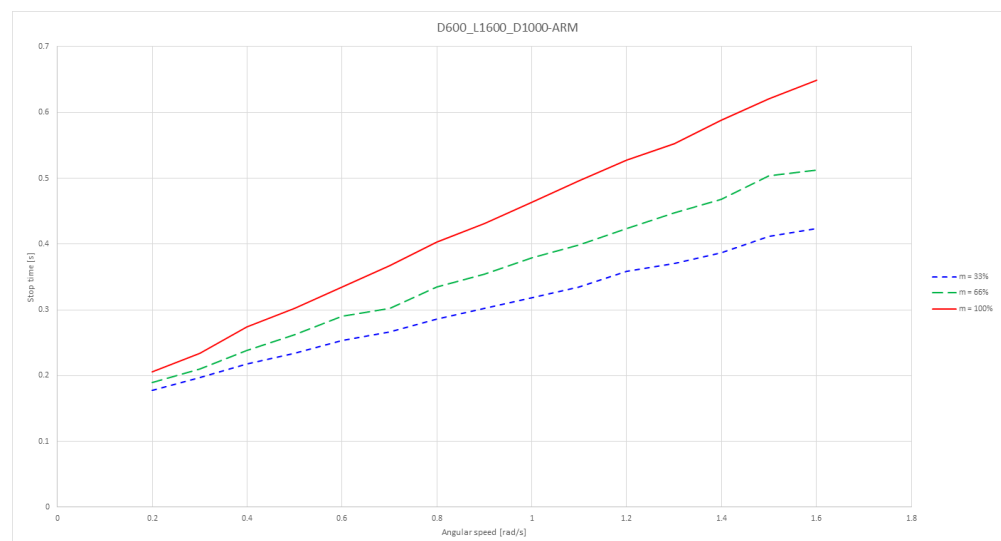
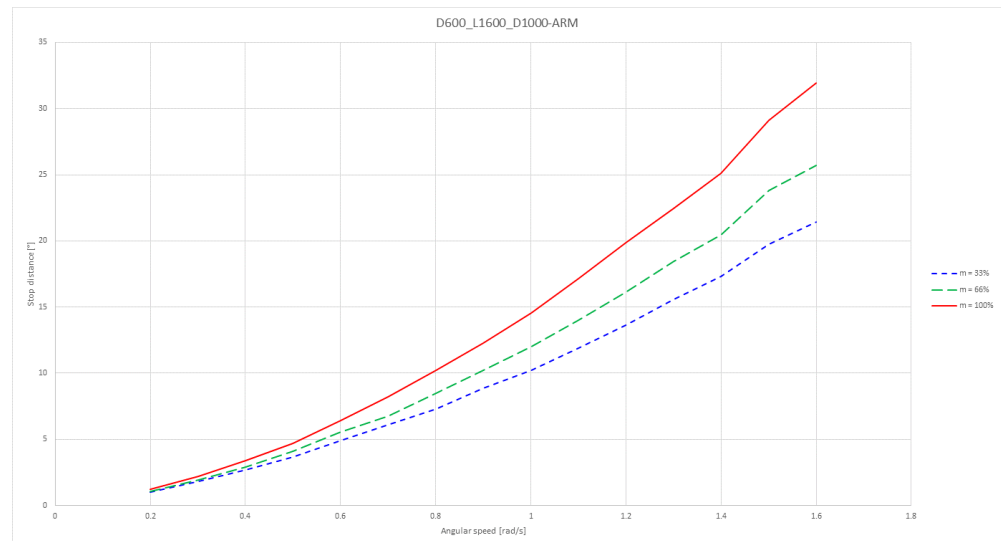
Stopping distance and stopping time



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Category 1, ARM

Stopping distance and stopping time



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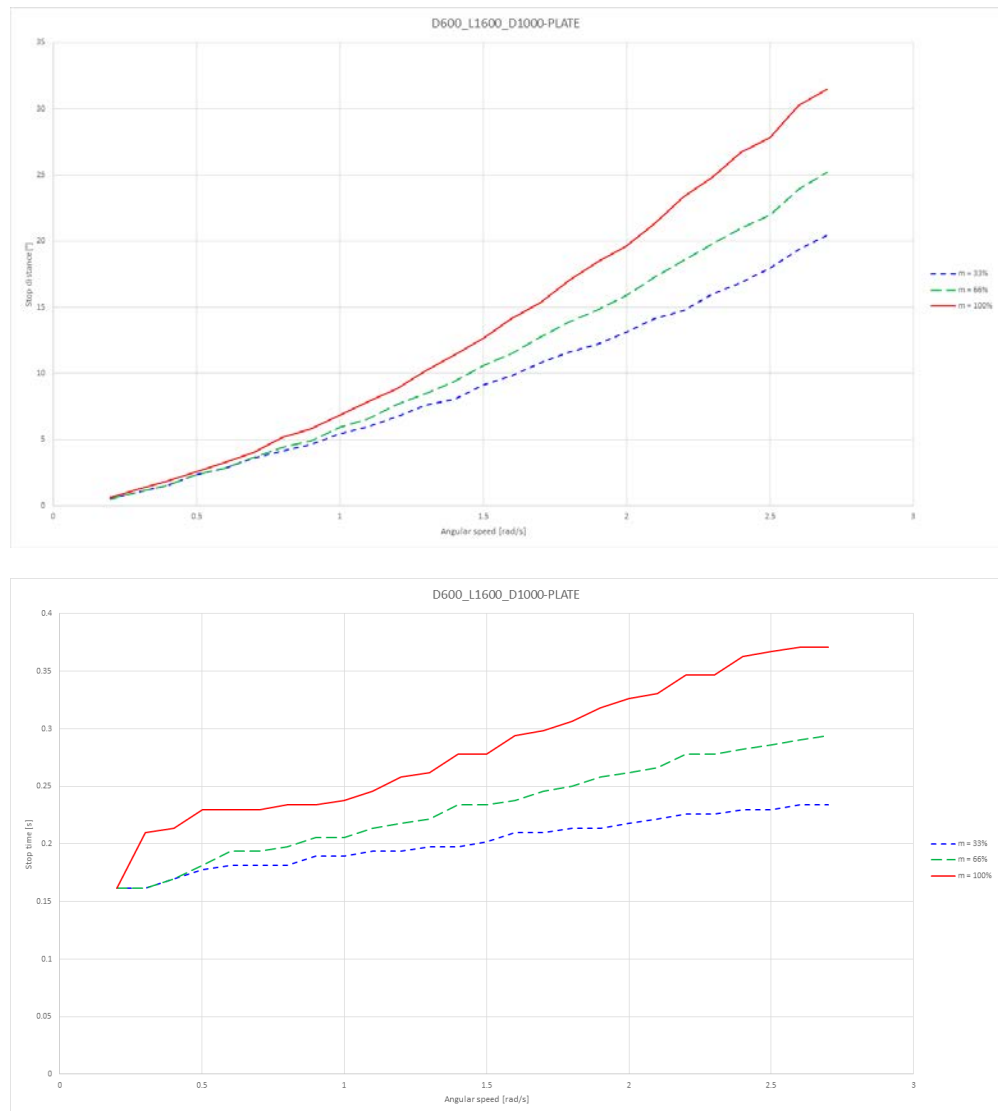
23 IRBP D

23.3 D600_L1600_D1000

Continued

Category 1, PLATE

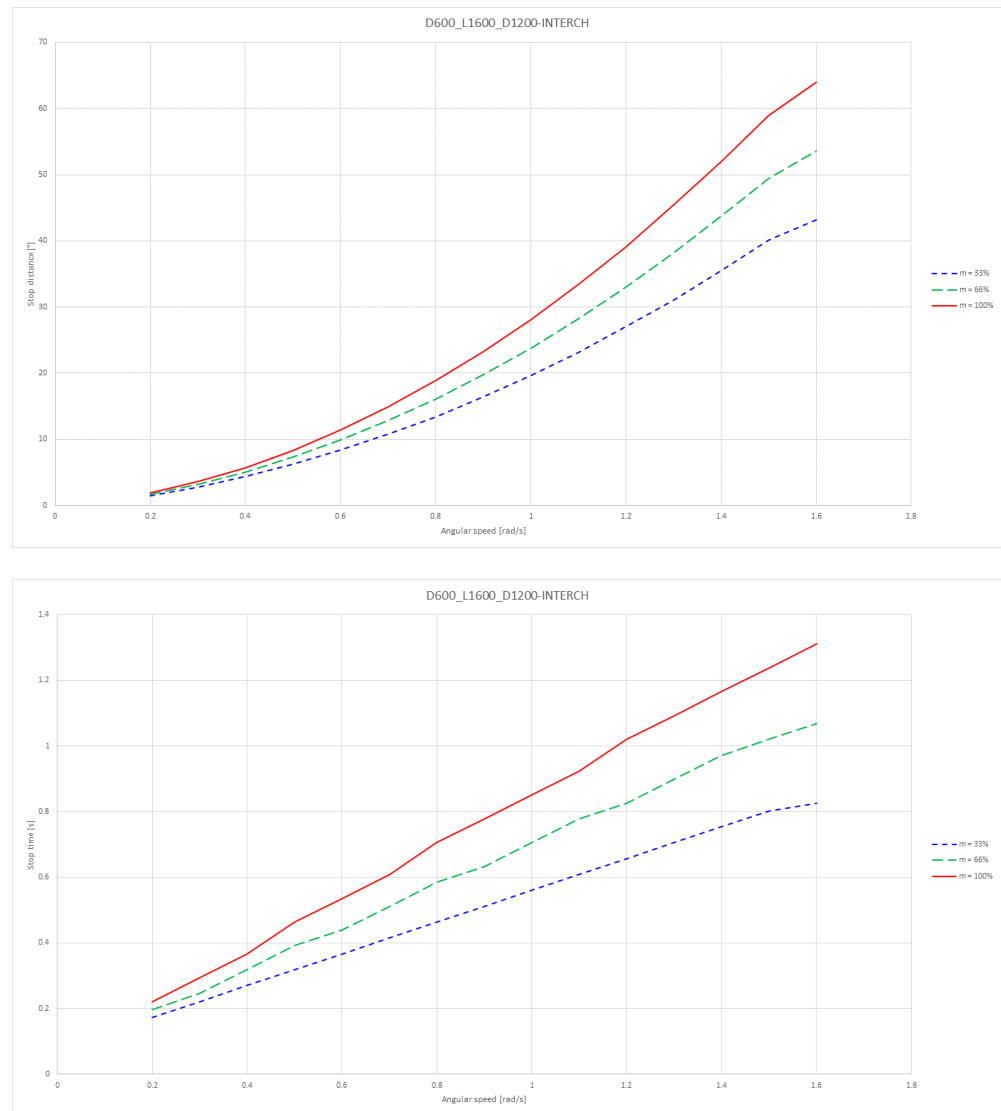
Stopping distance and stopping time



23.4 D600_L1600_D1200

Category 0, INTERCH

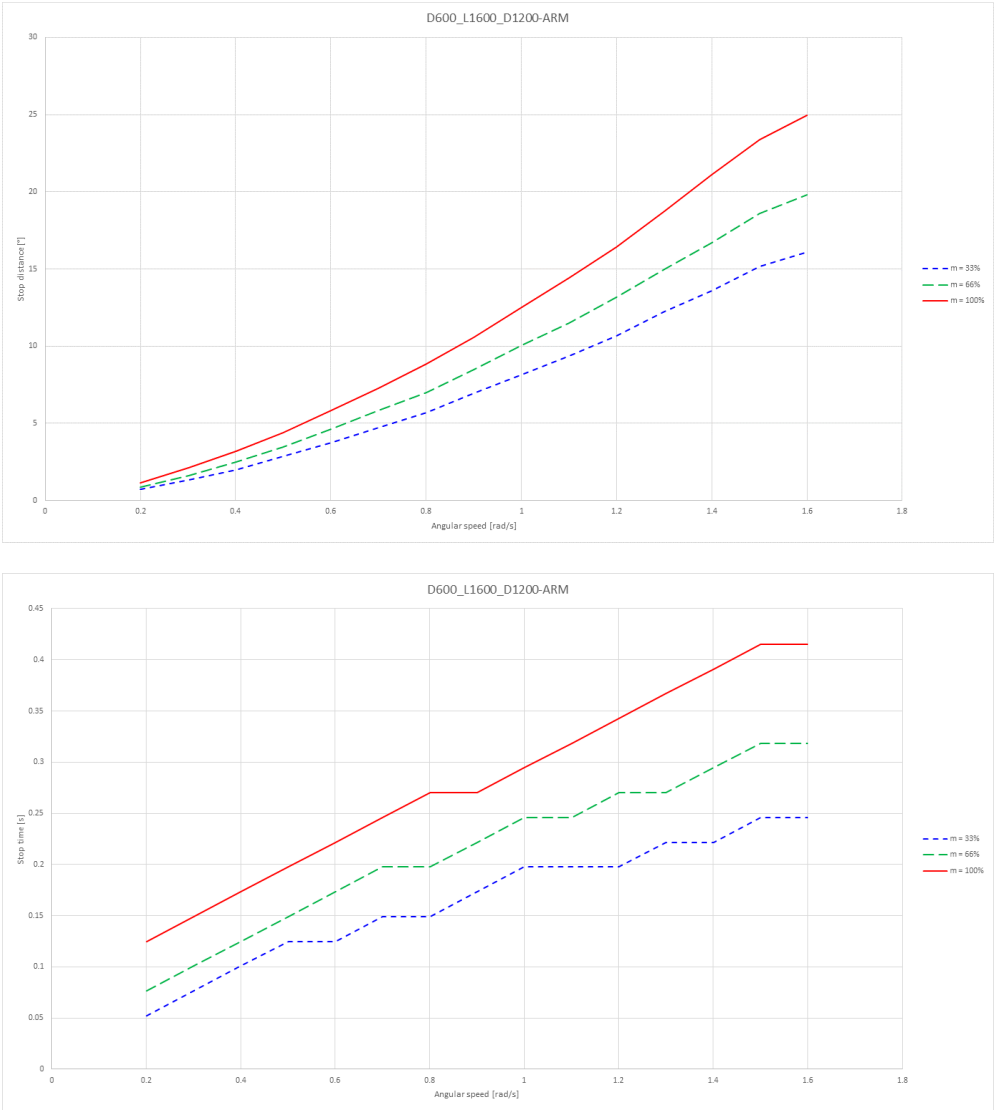
Stopping distance and stopping time



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Category 0, ARM

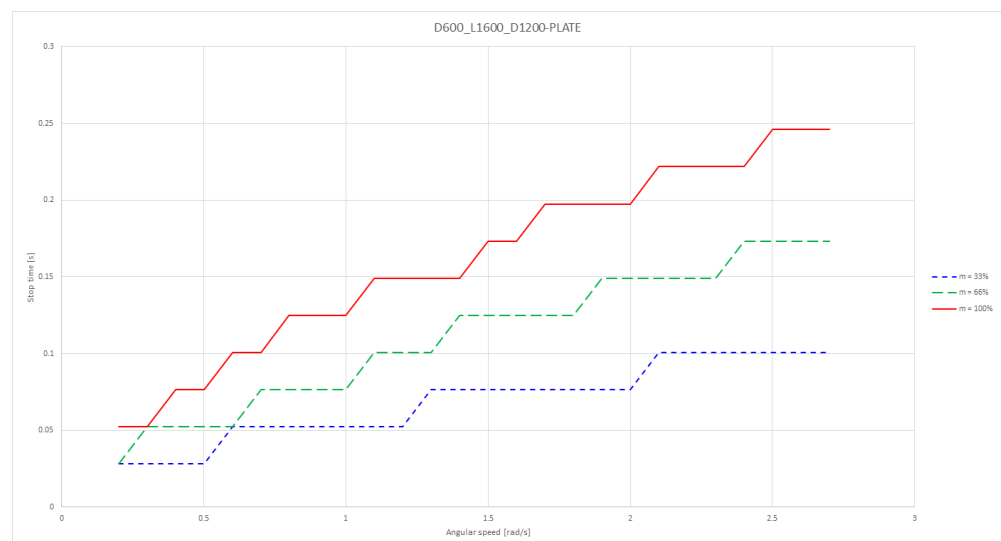
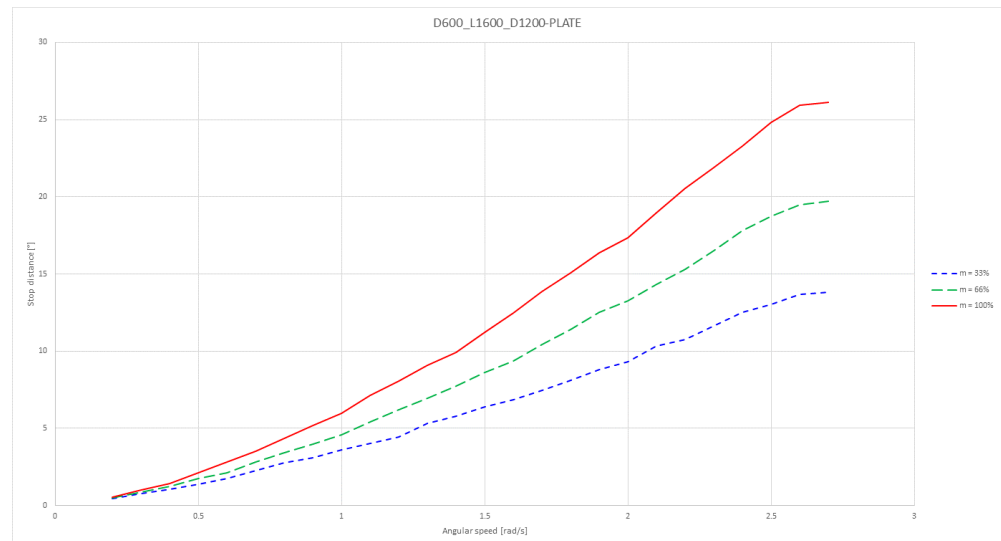
Stopping distance and stopping time



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Category 0, PLATE

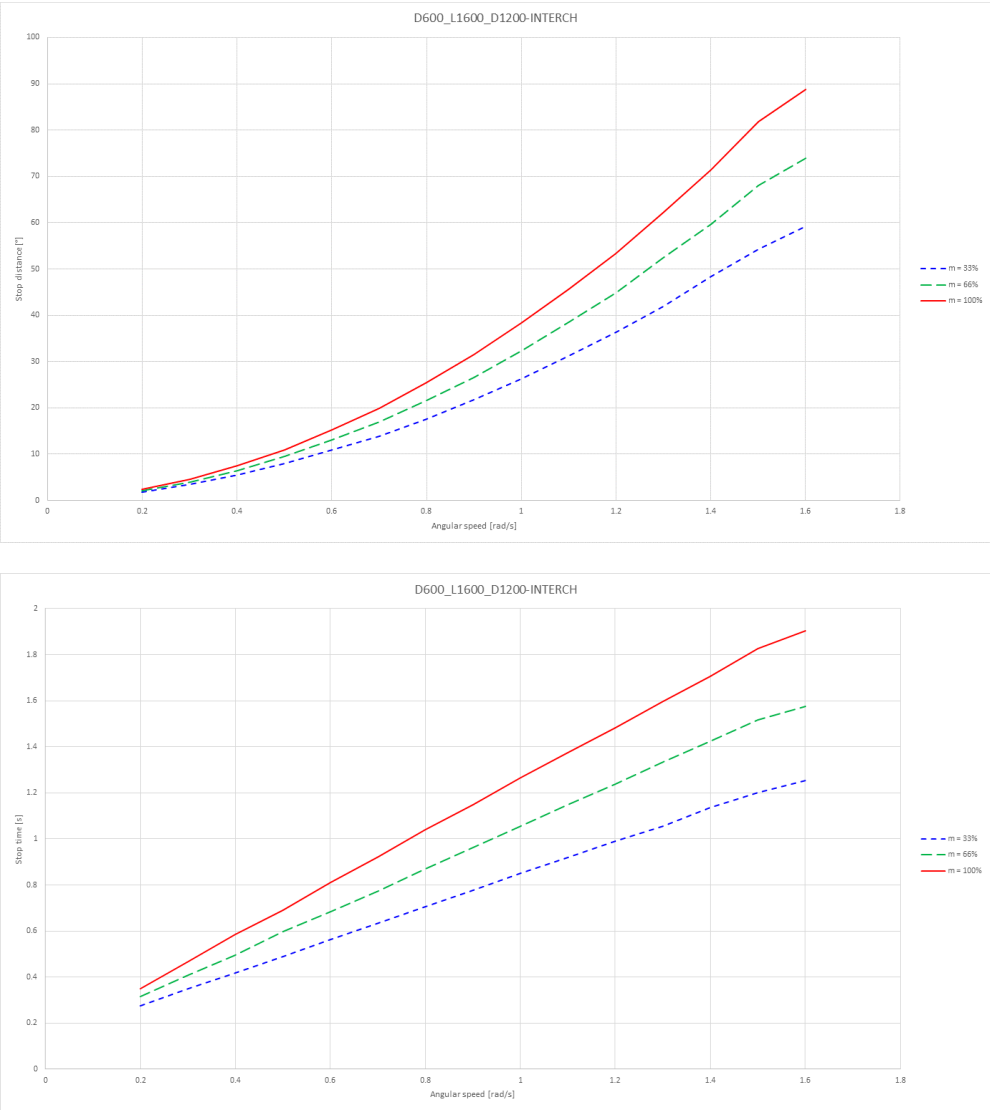
Stopping distance and stopping time



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Category 1, INTERCH

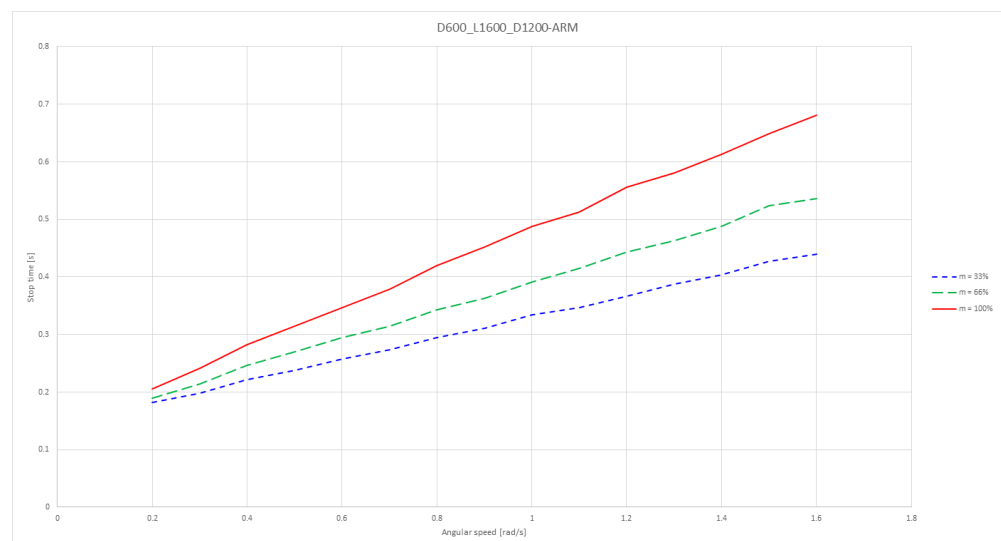
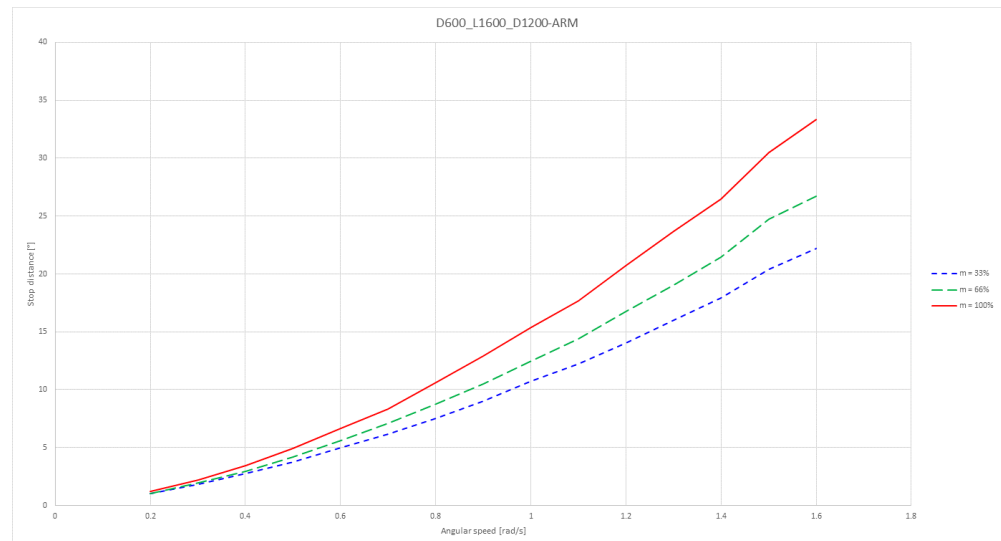
Stopping distance and stopping time



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Category 1, ARM

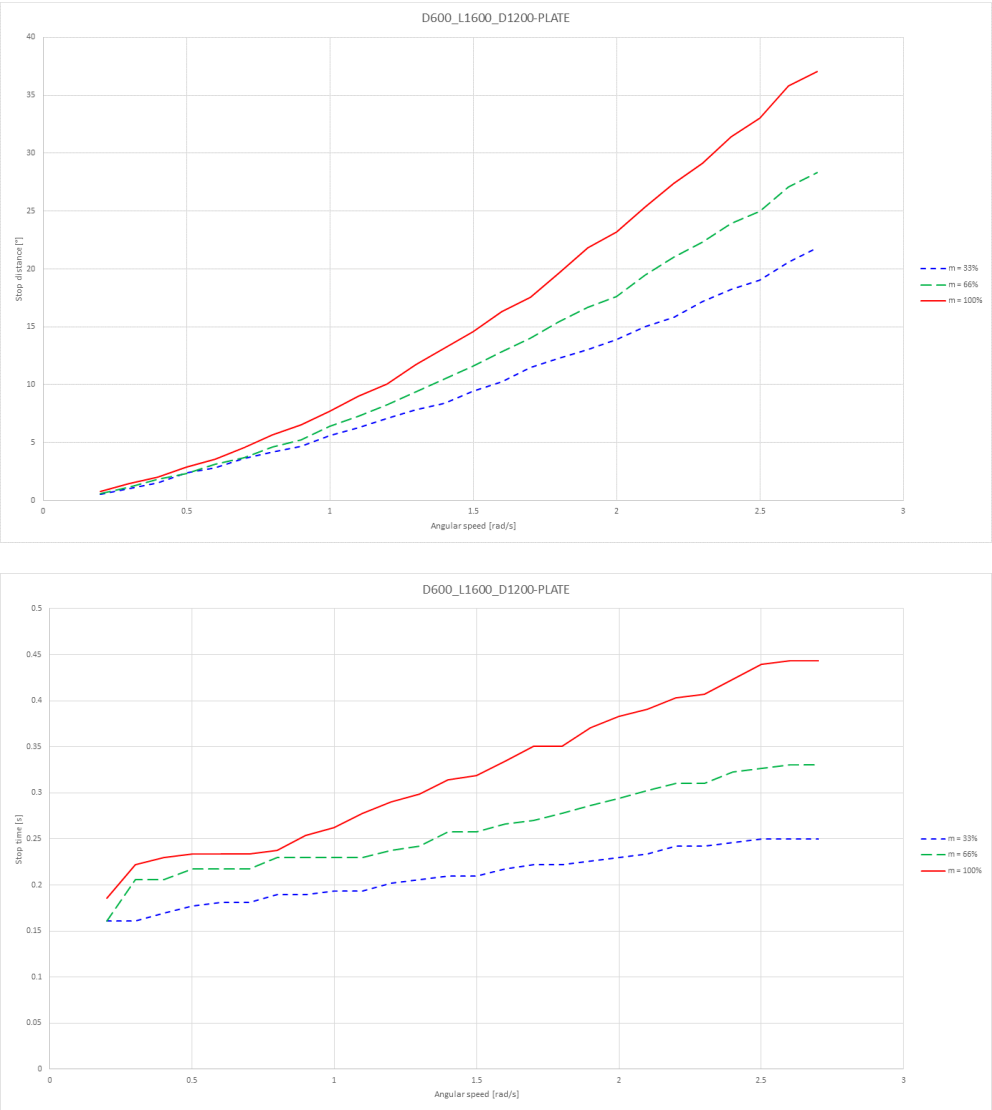
Stopping distance and stopping time



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Category 1, PLATE

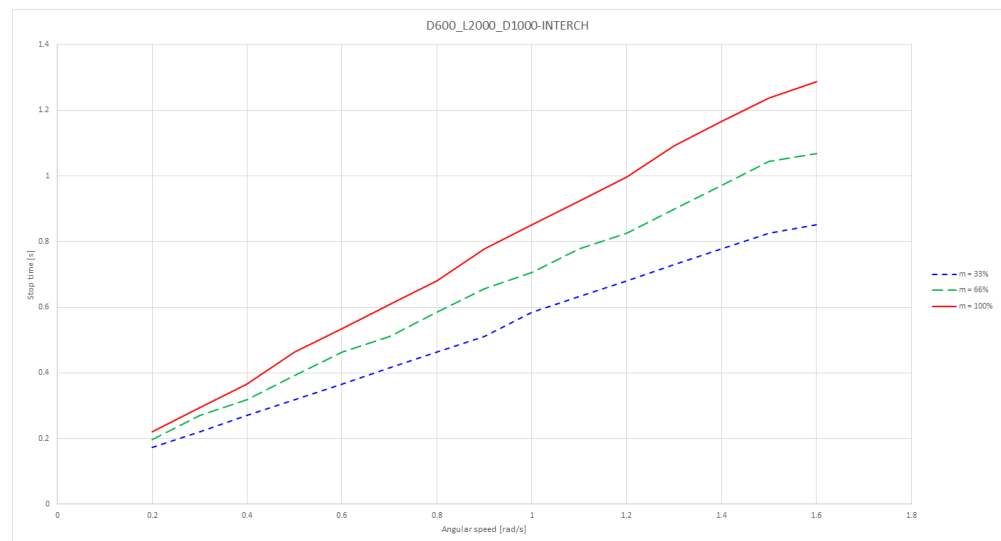
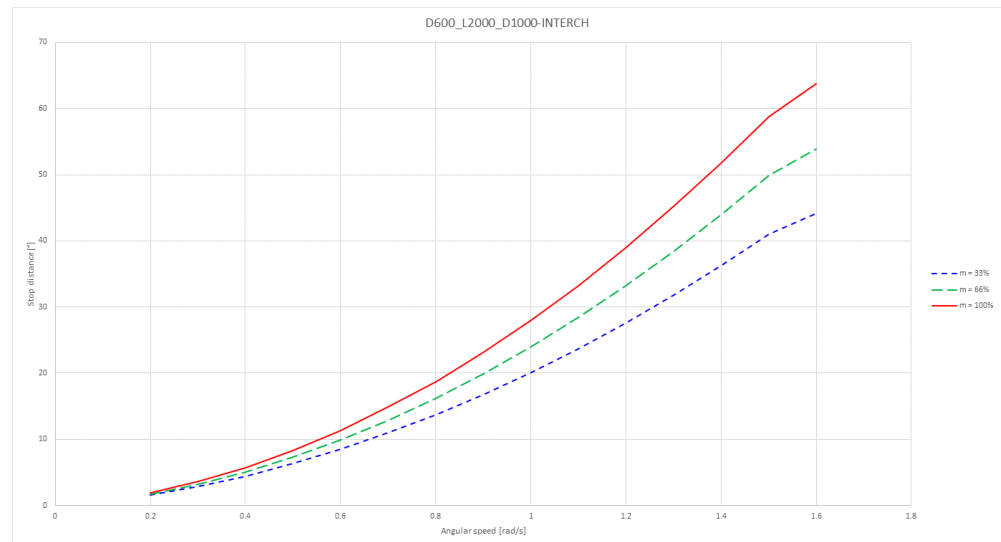
Stopping distance and stopping time



23.5 D600_L2000_D1000

Category 0, INTERCH

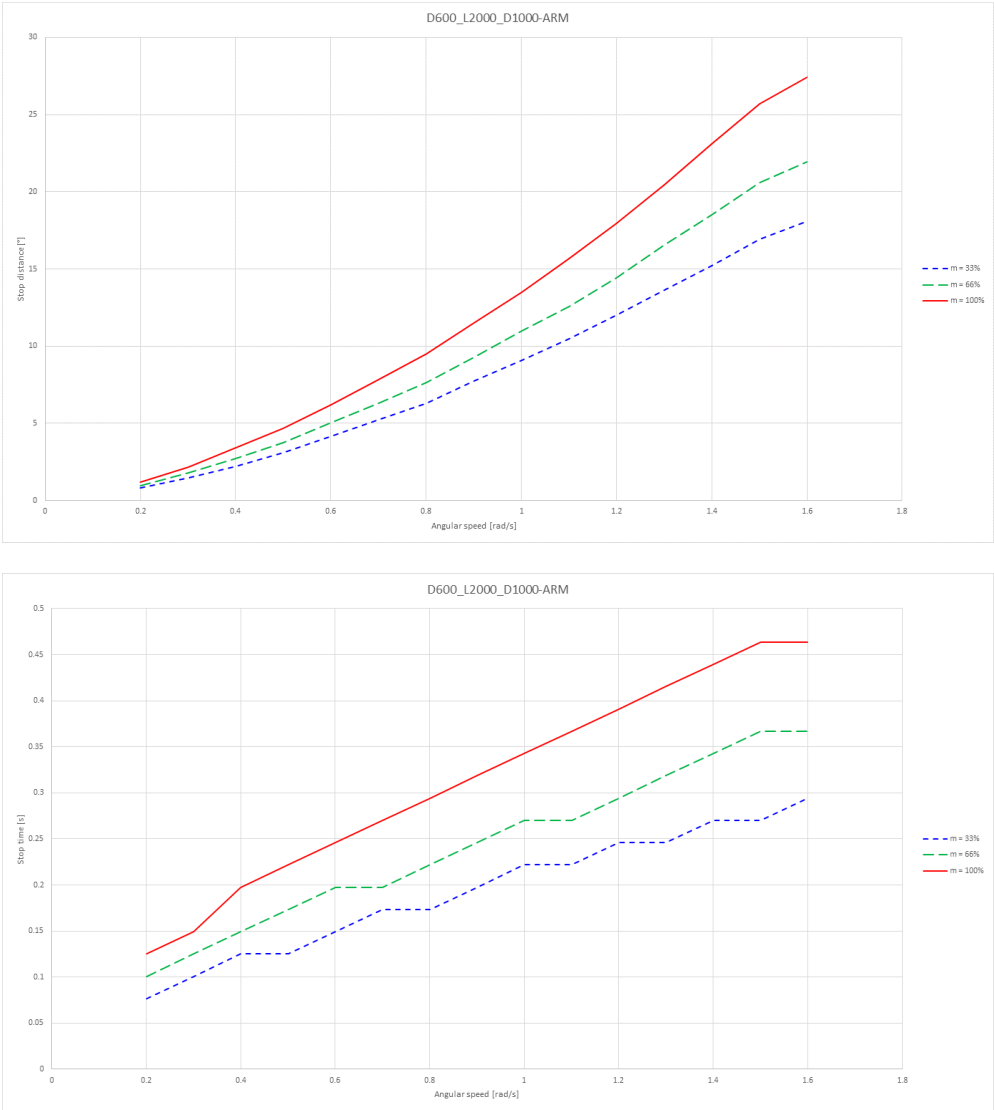
Stopping distance and stopping time



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Category 0, ARM

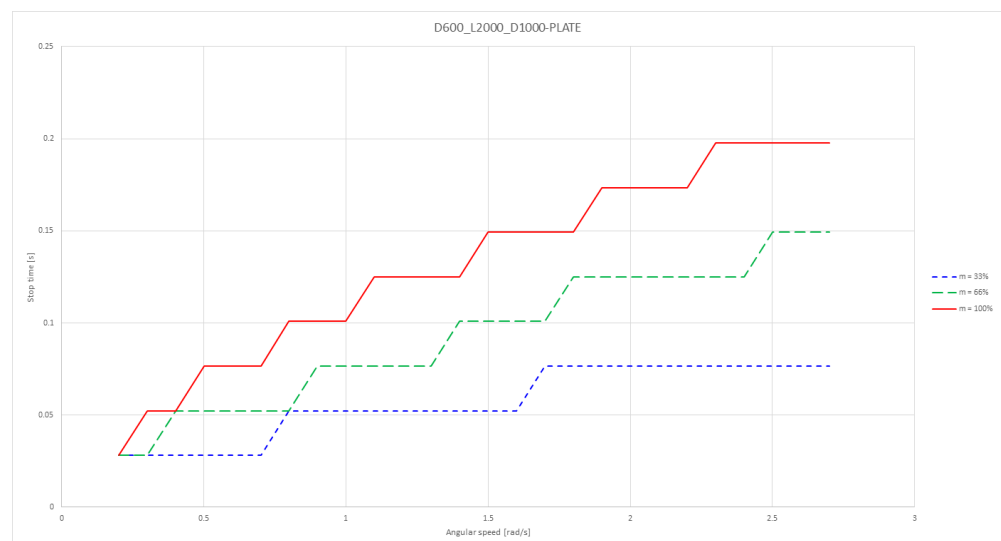
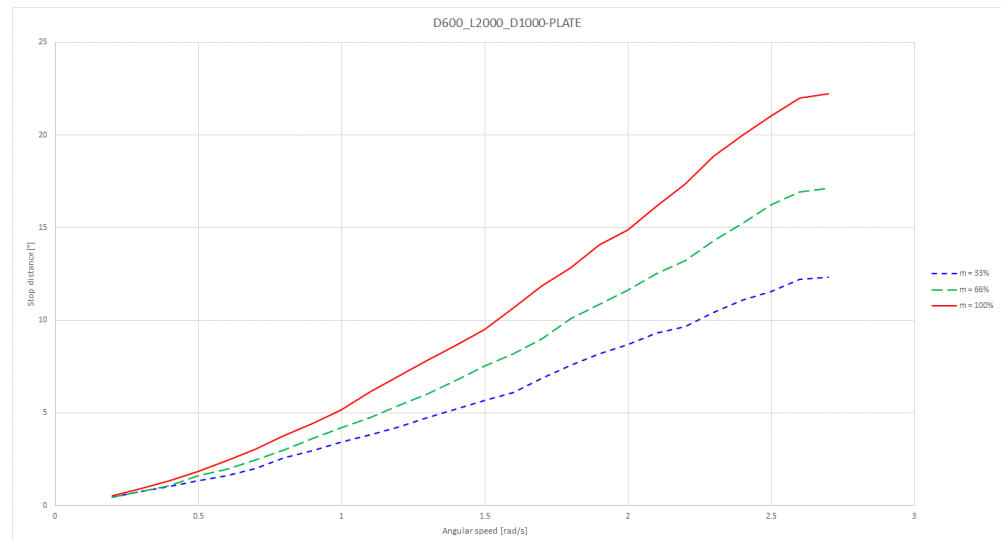
Stopping distance and stopping time



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Category 0, PLATE

Stopping distance and stopping time



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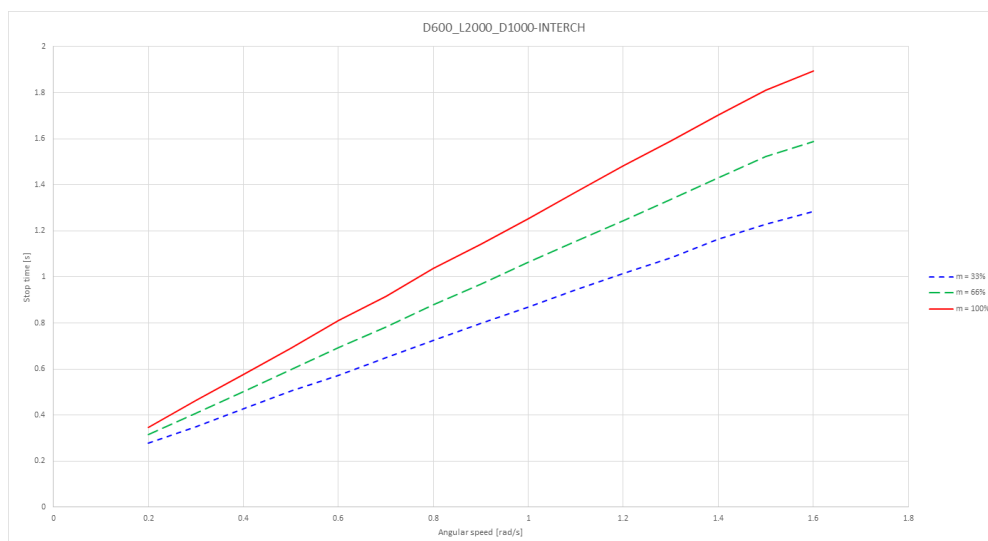
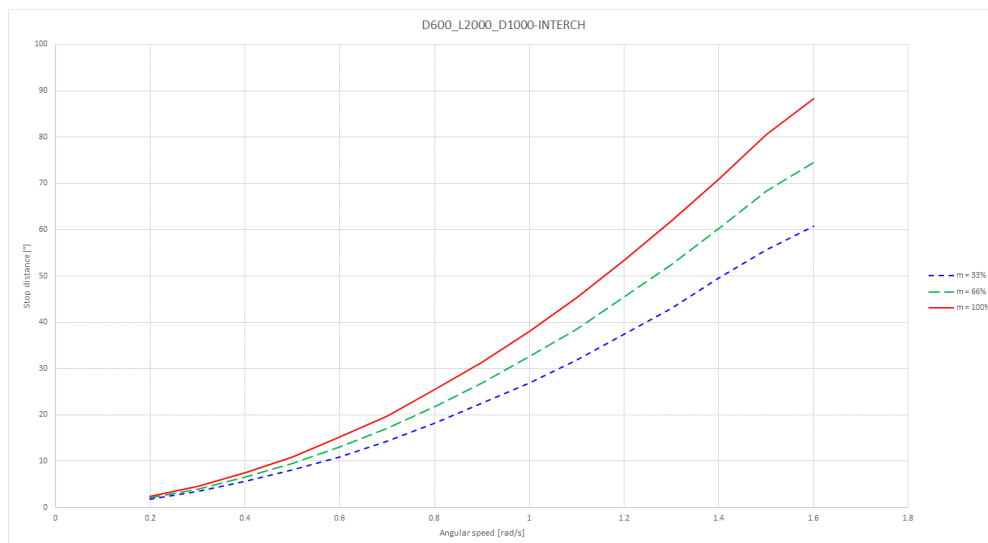
23 IRBP D

23.5 D600_L2000_D1000

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Category 1, INTERCH

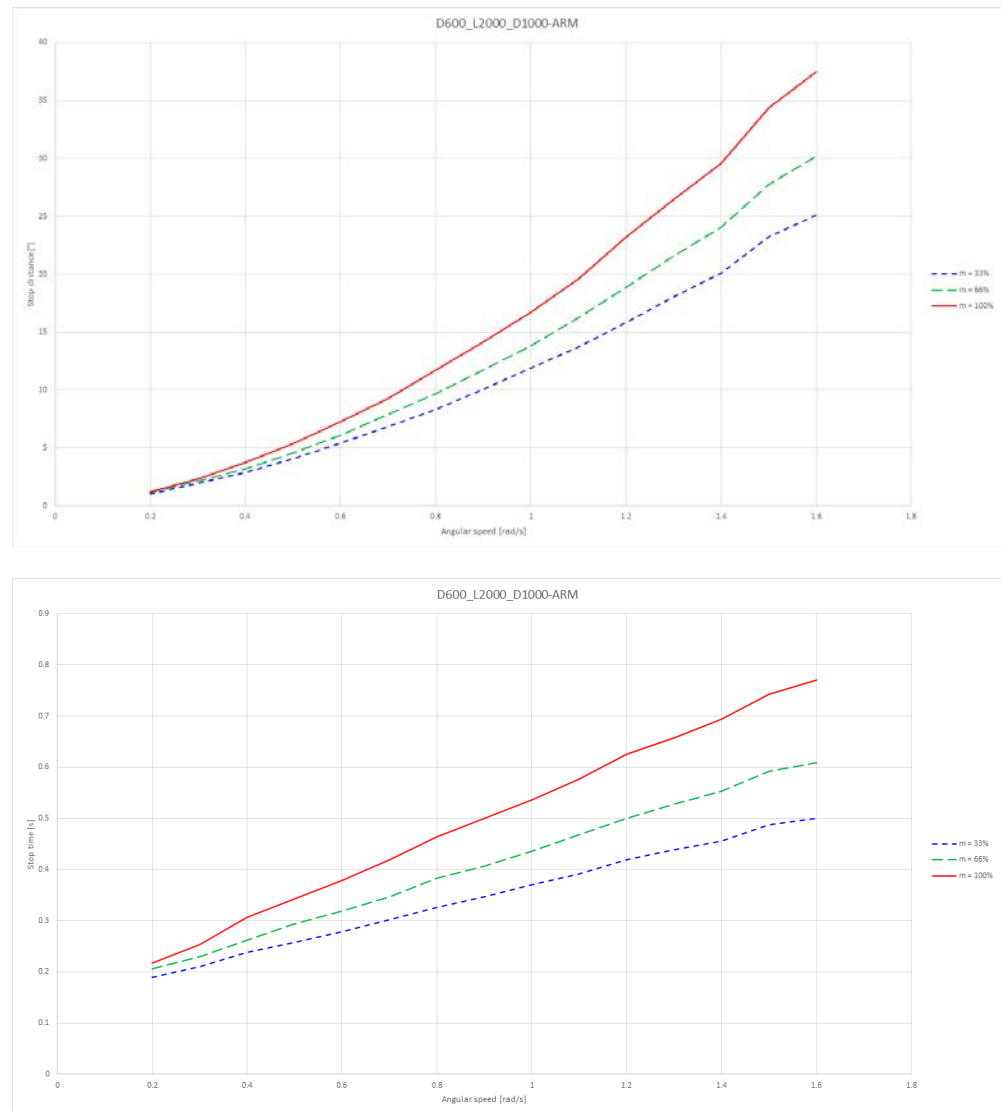
Stopping distance and stopping time



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Category 1, ARM

Stopping distance and stopping time



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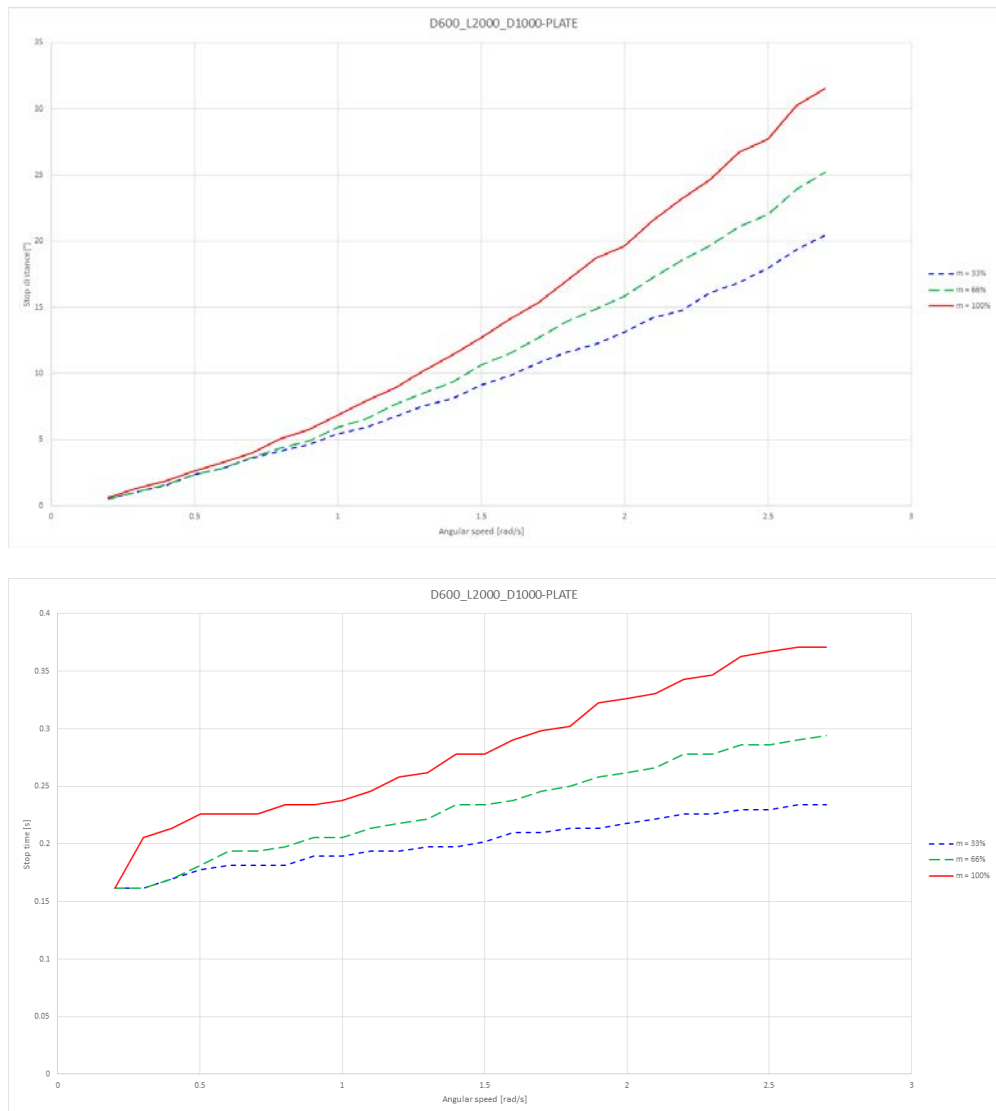
23 IRBP D

23.5 D600_L2000_D1000

Continued

Category 1, PLATE

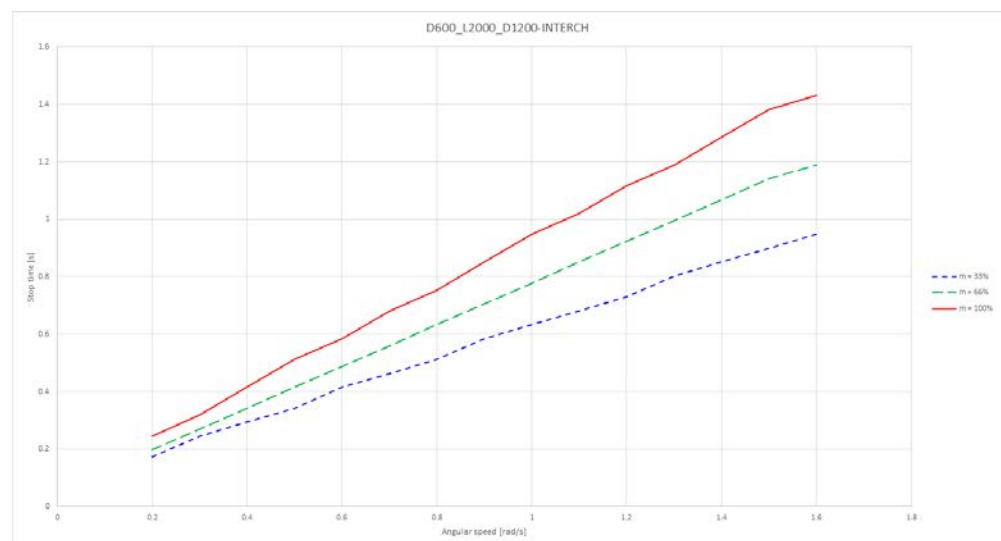
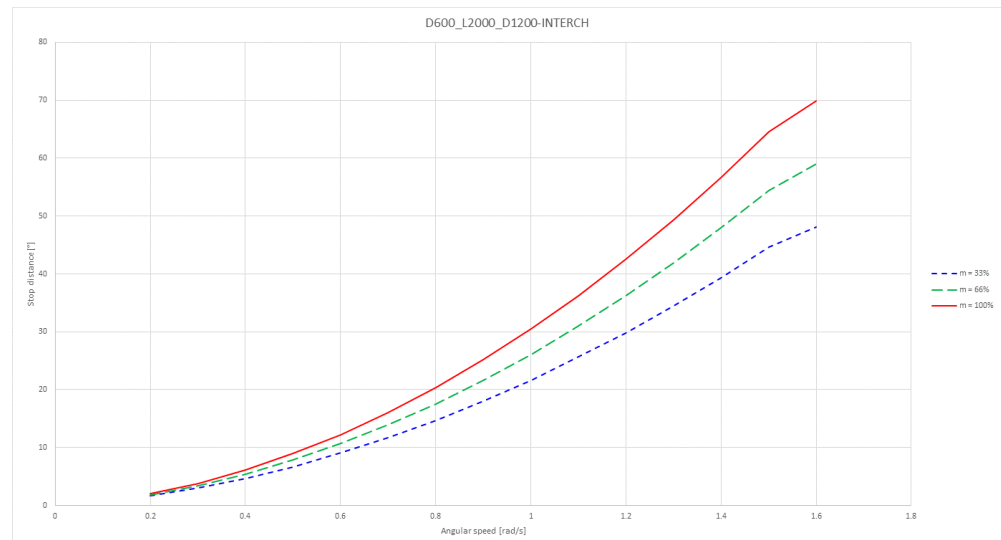
Stopping distance and stopping time



23.6 D600_L2000_D1200

Category 0, INTERCH

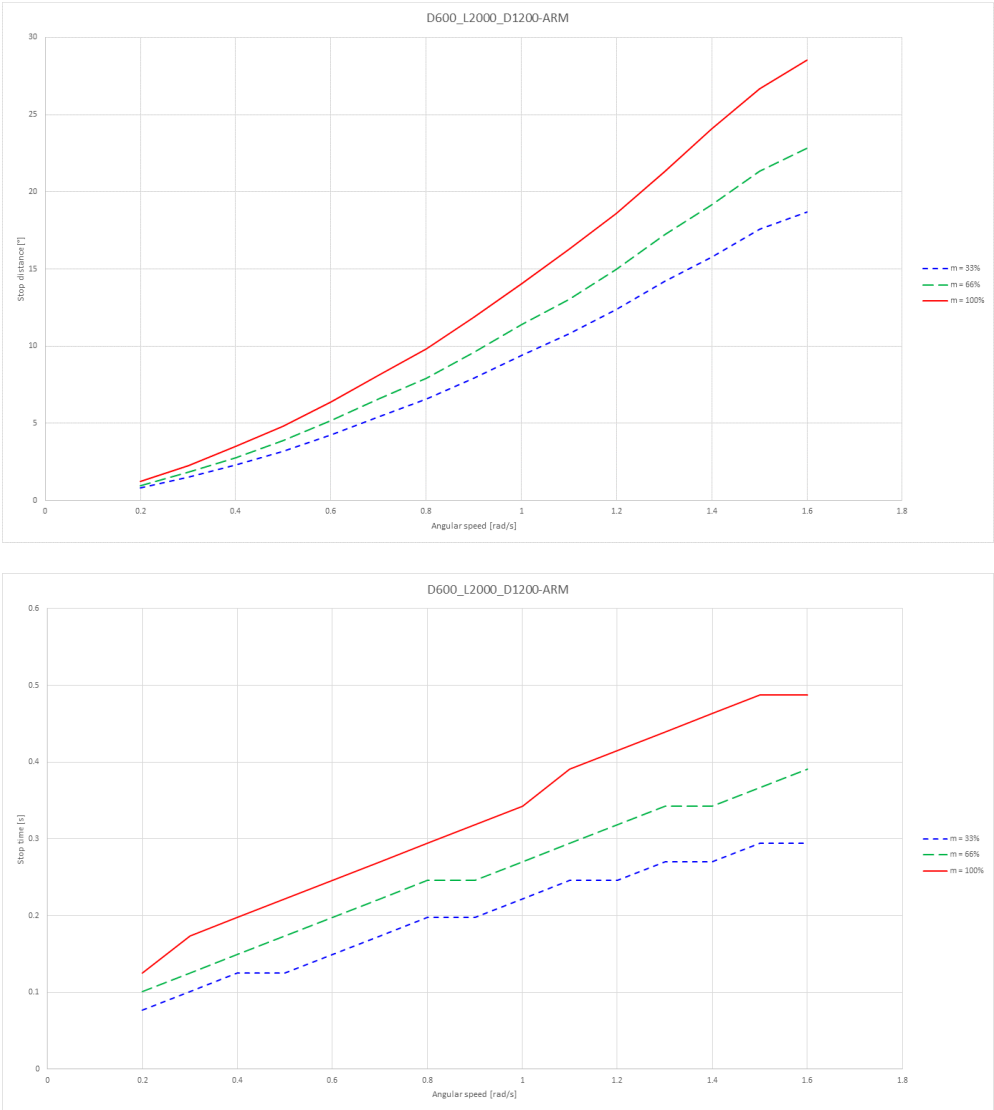
Stopping distance and stopping time



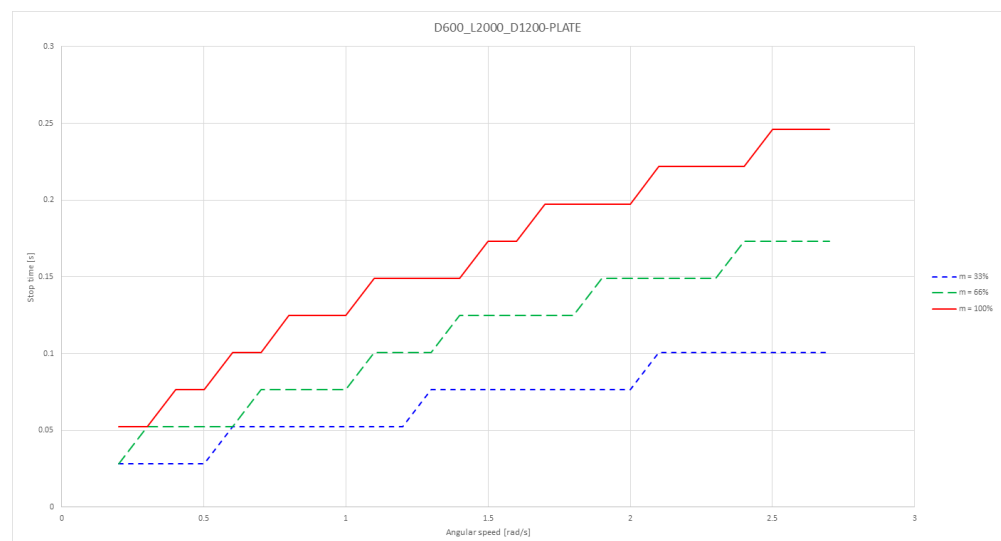
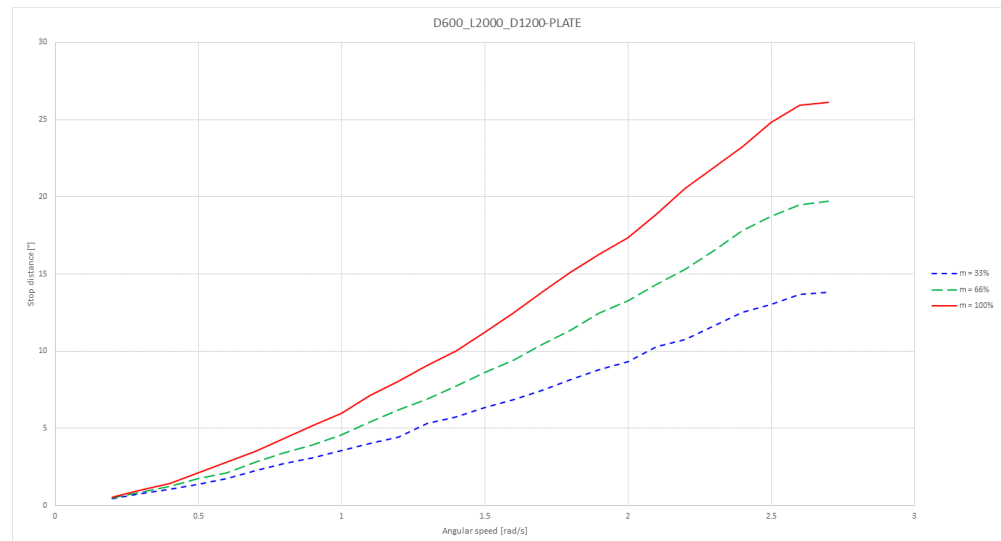
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Category 0, ARM

Stopping distance and stopping time

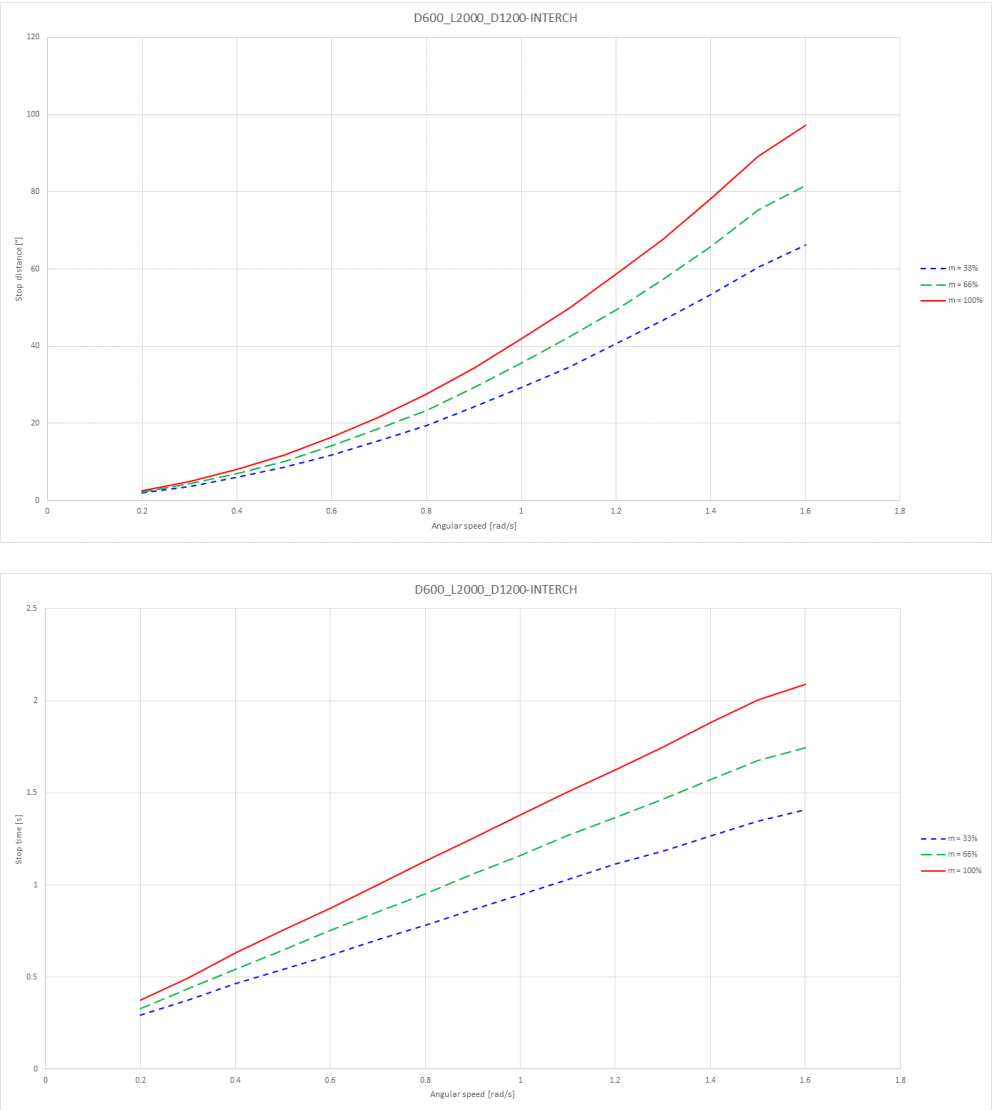


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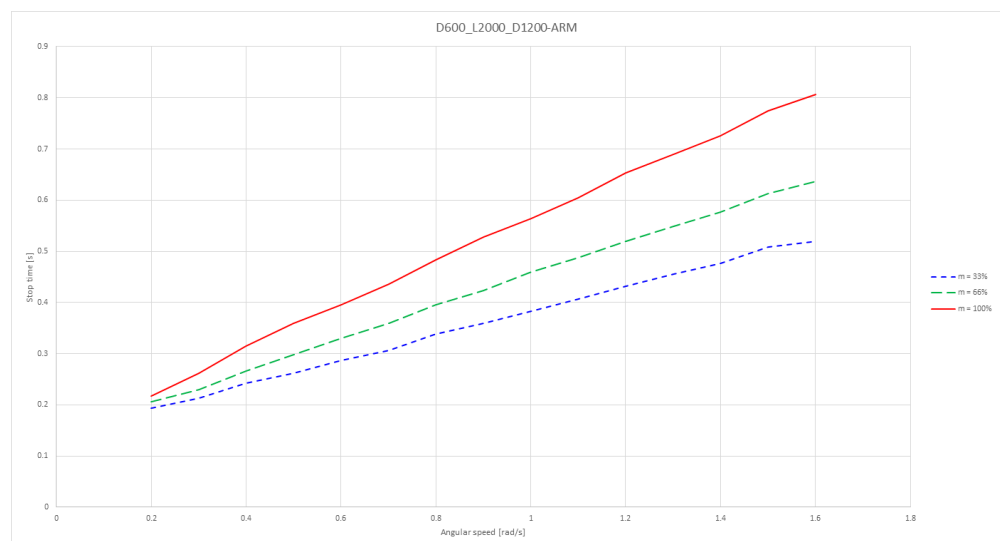
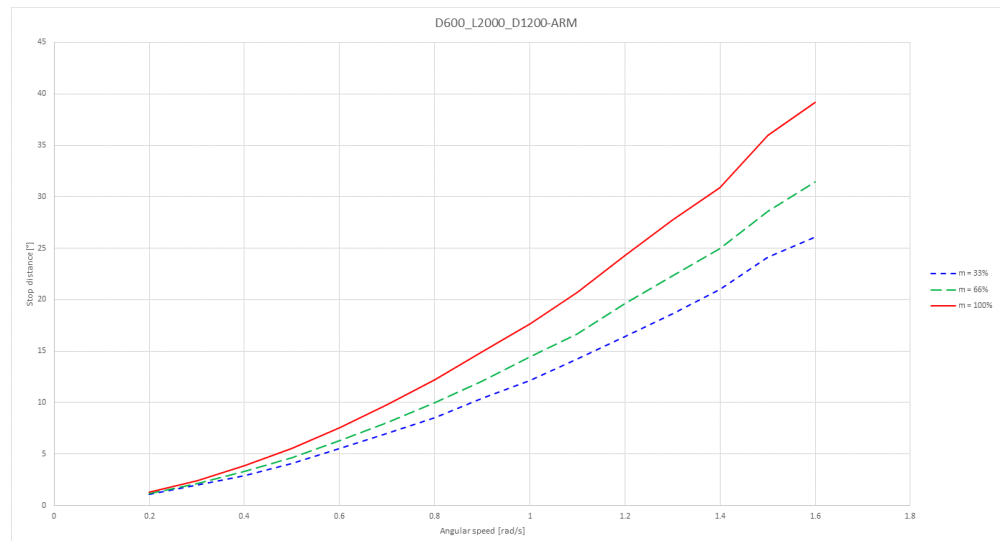
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Category 1, INTERCH

Stopping distance and stopping time

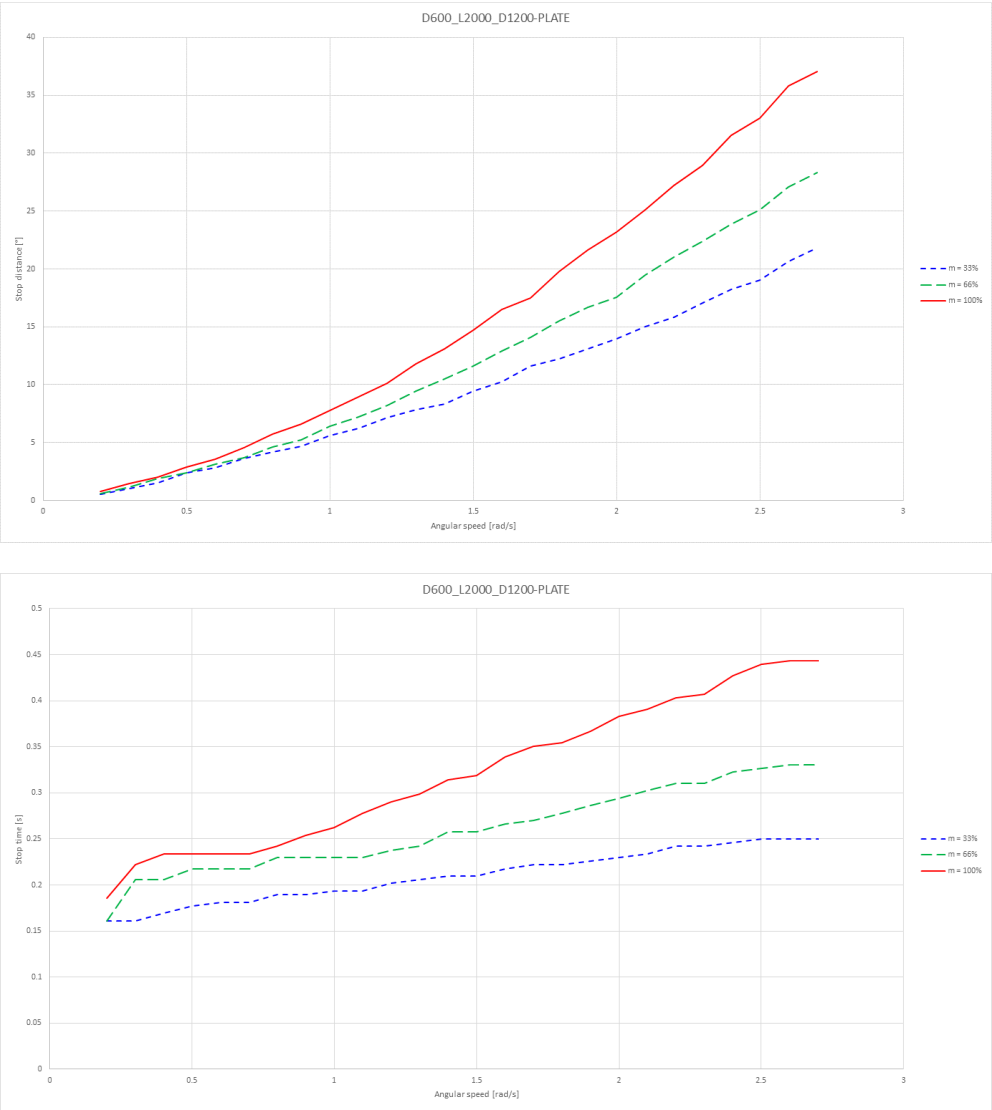


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Category 1, ARM**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

Stopping distance and stopping time

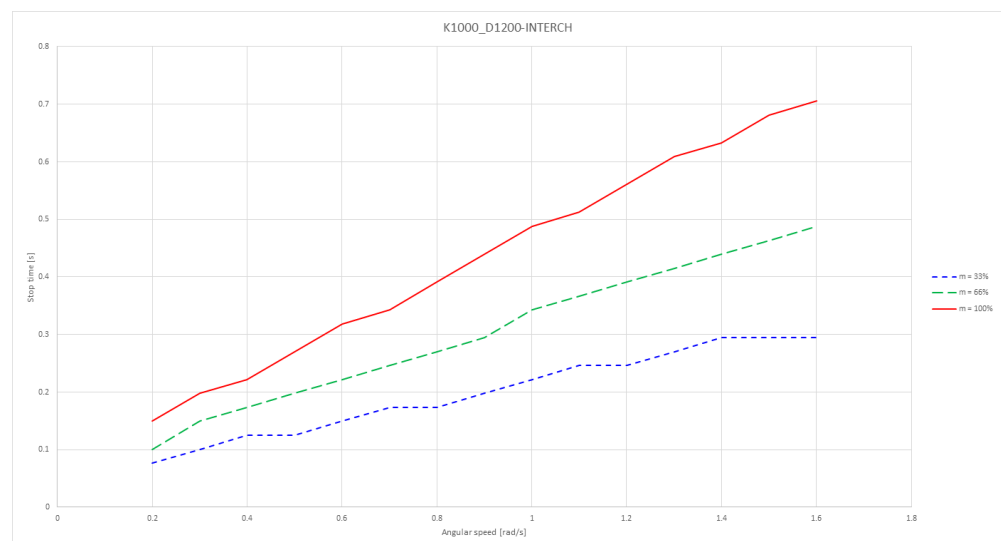
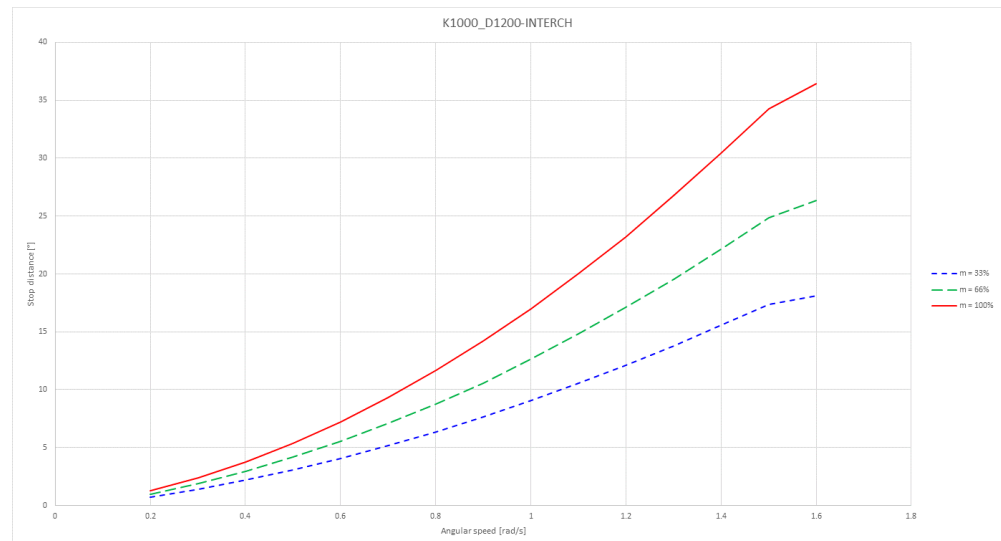


24 IRBP K

24.1 K1000_D1200

Category 0, INTERCH

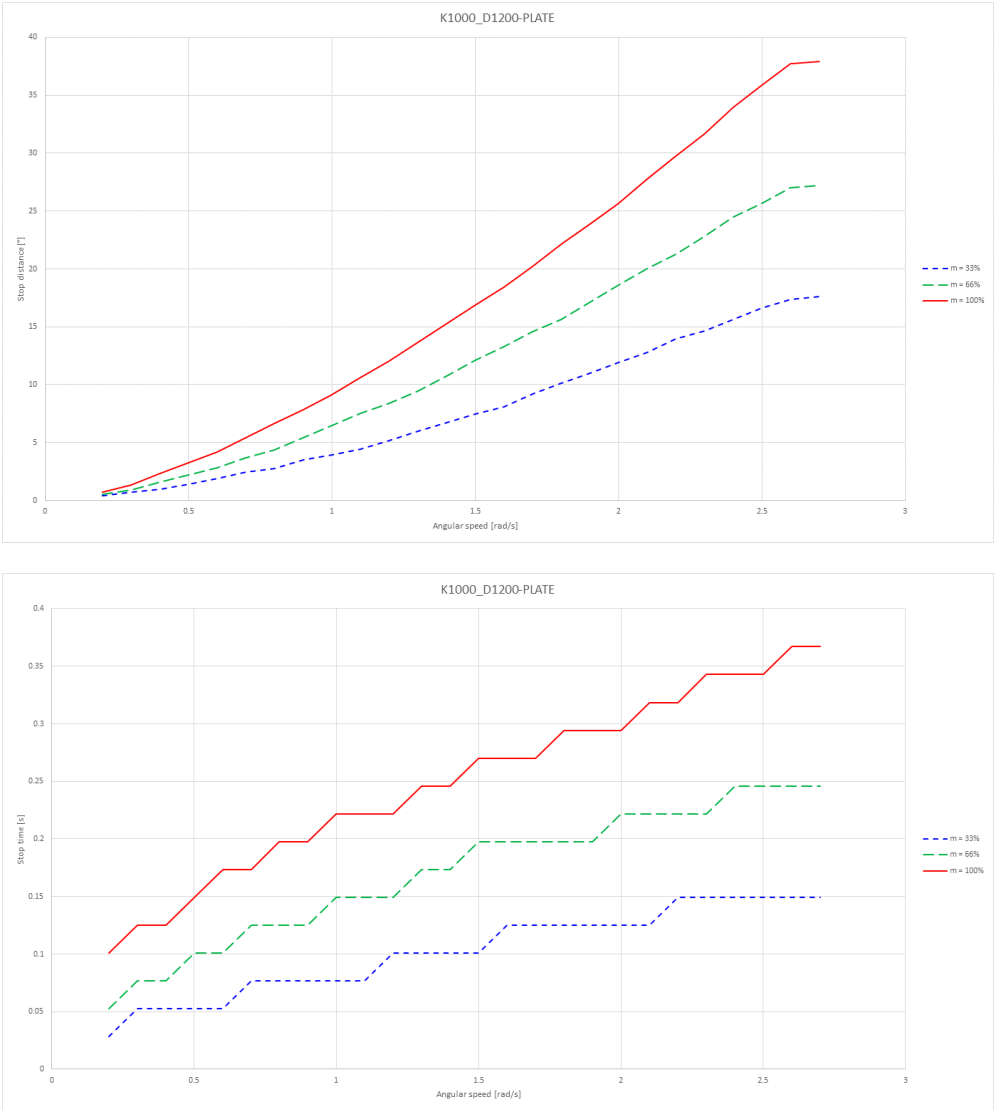
Stopping distance and stopping time



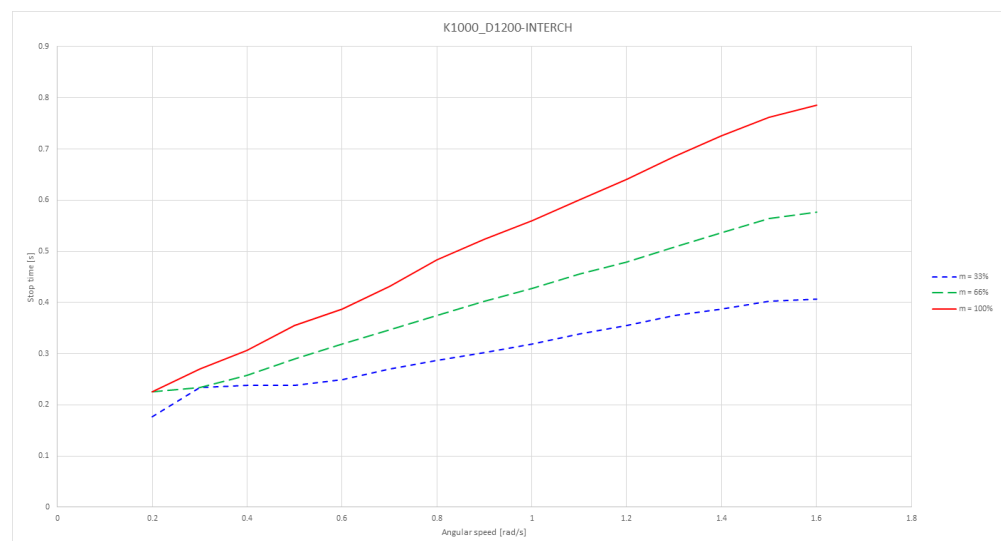
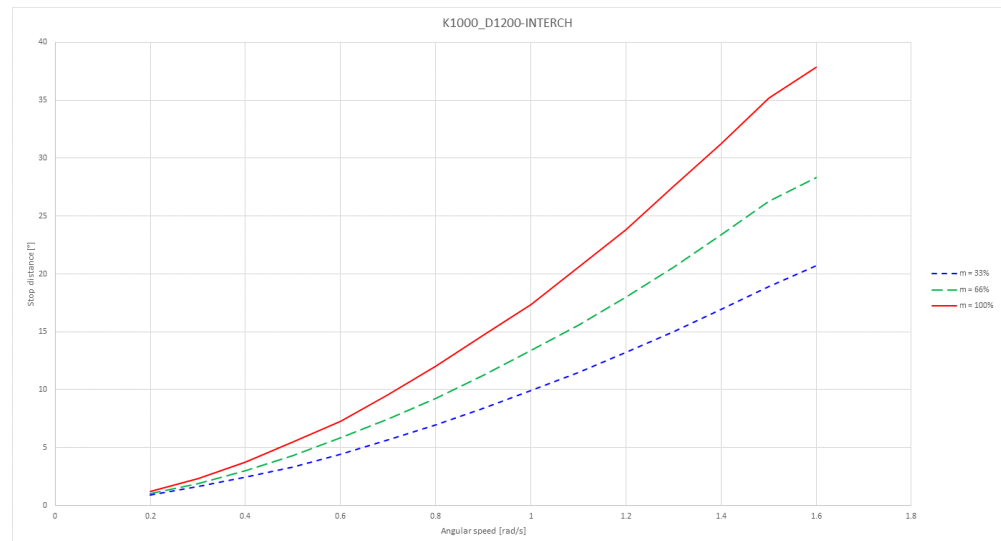
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Category 0, PLATE

Stopping distance and stopping time

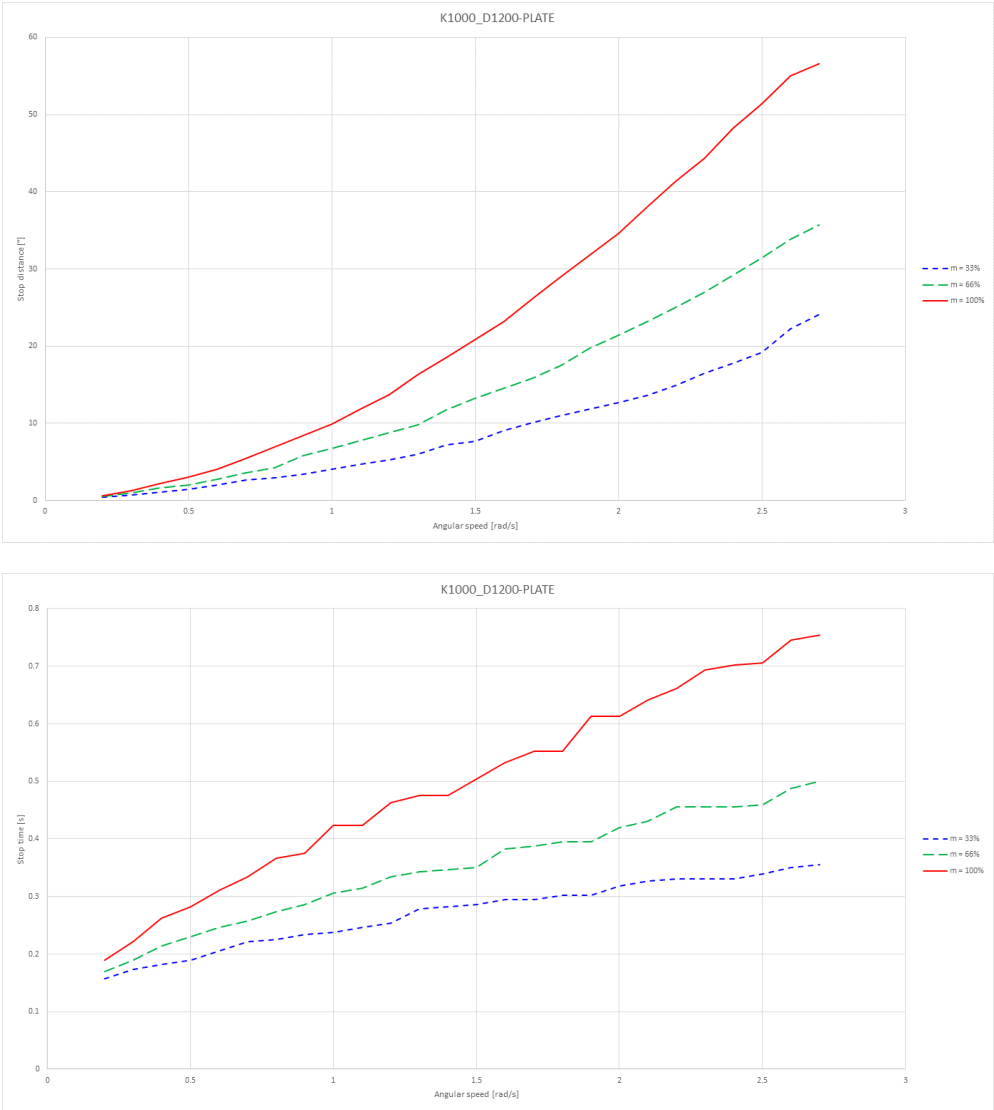


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Category 1, INTERCH**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

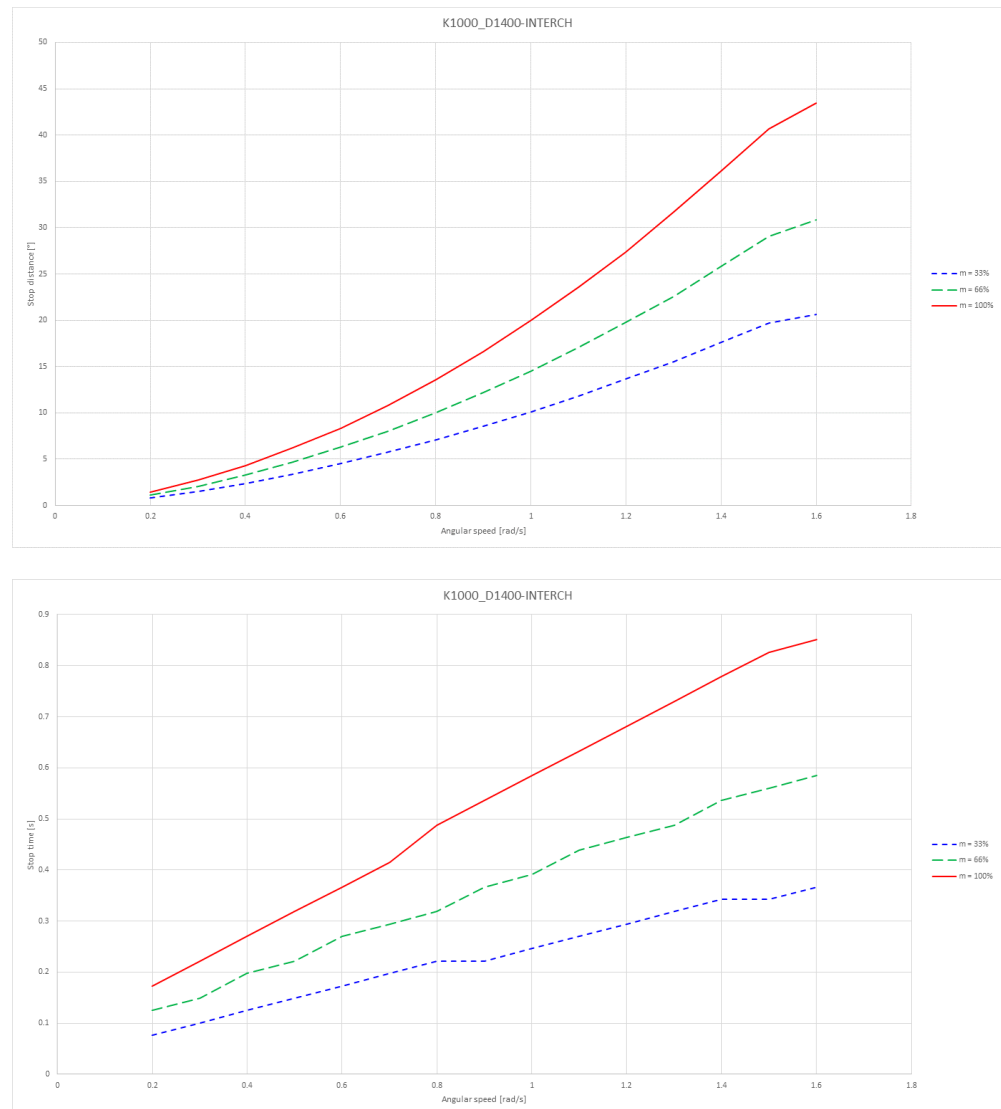
Stopping distance and stopping time



24.2 K1000_D1400

Category 0, INTERCH

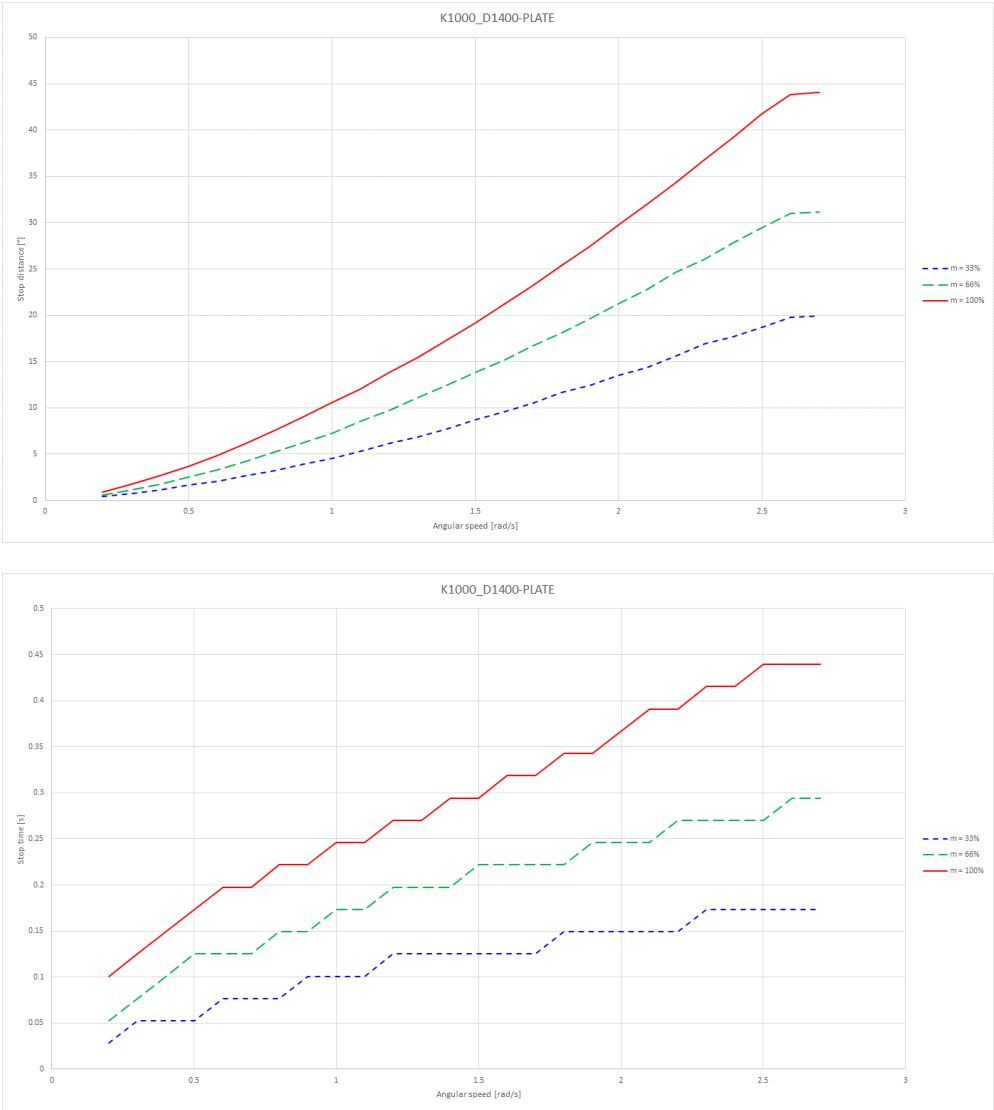
Stopping distance and stopping time



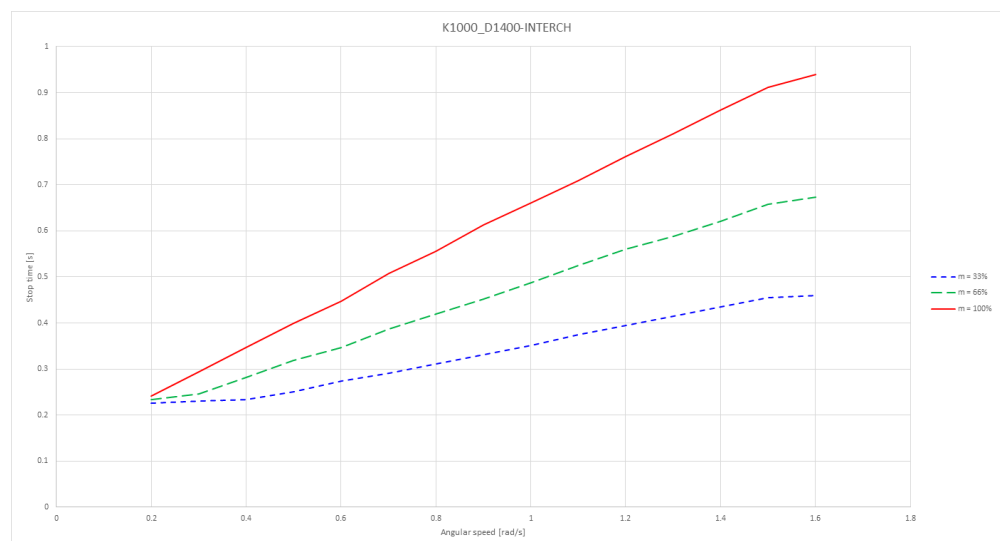
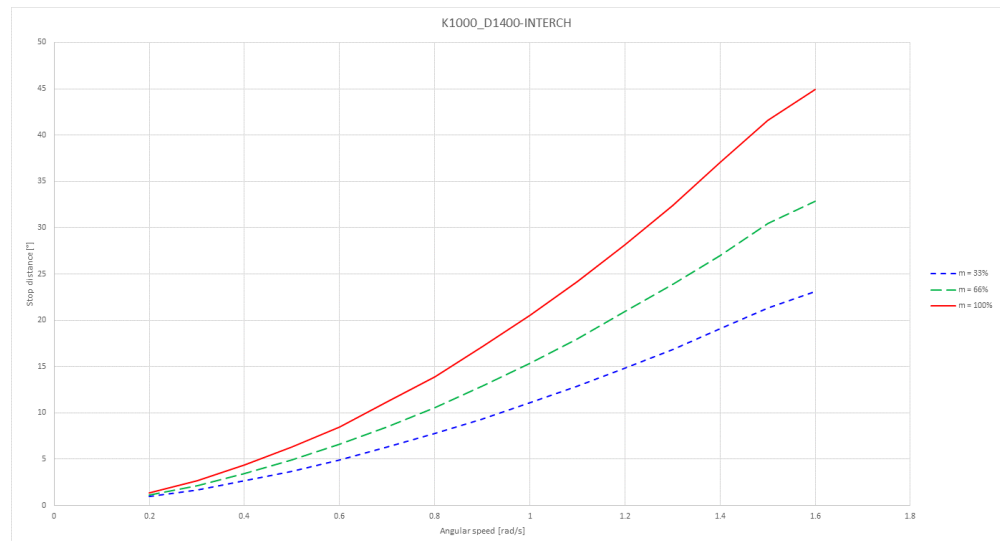
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Category 0, PLATE

Stopping distance and stopping time

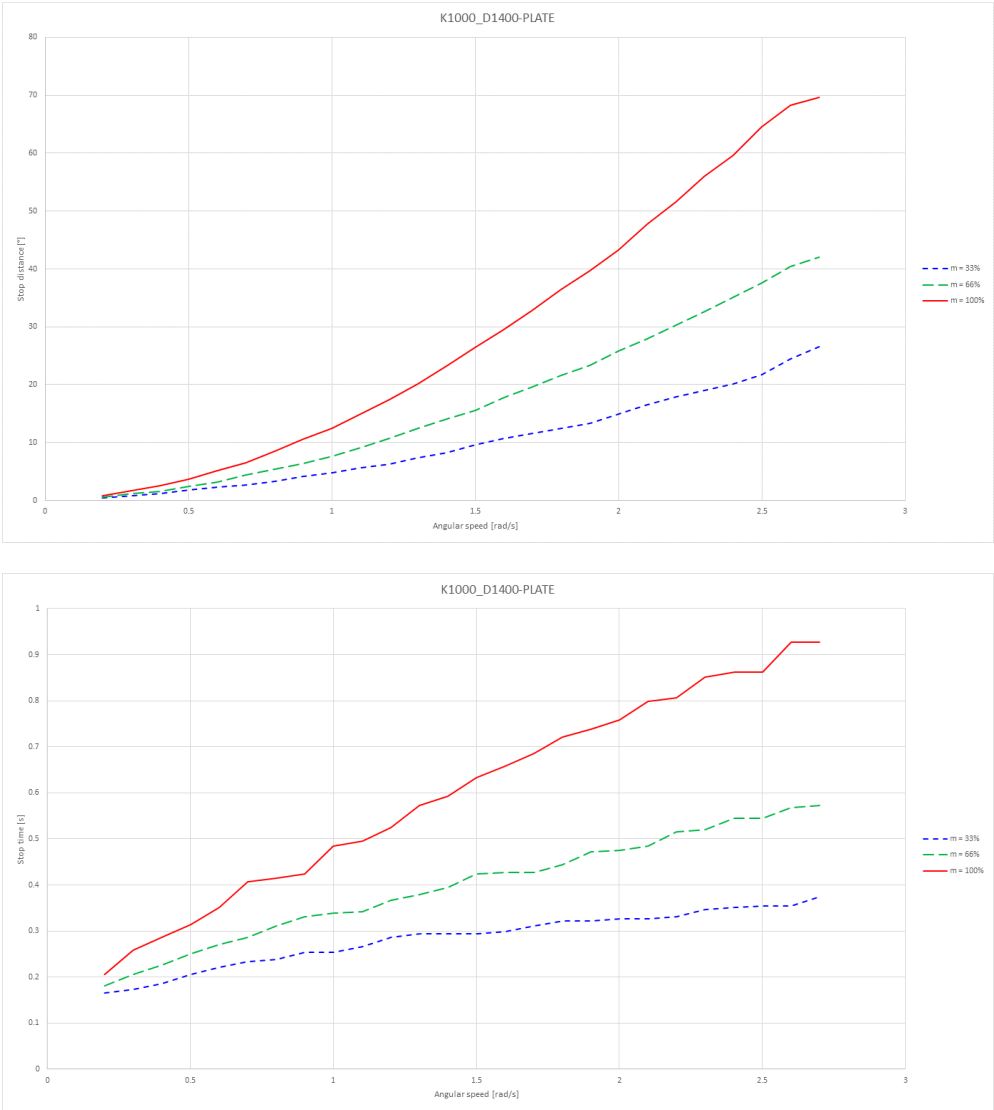


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Category 1, INTERCH**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

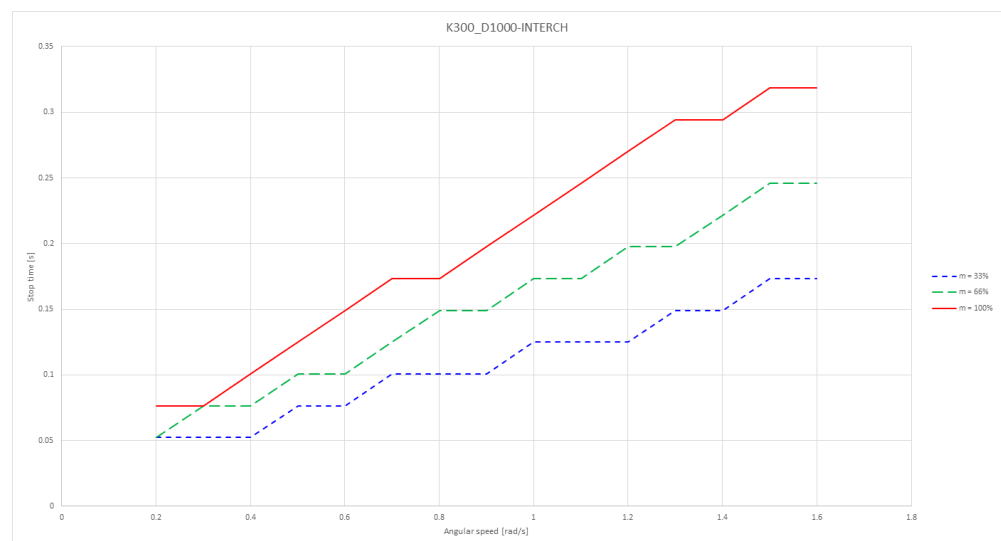
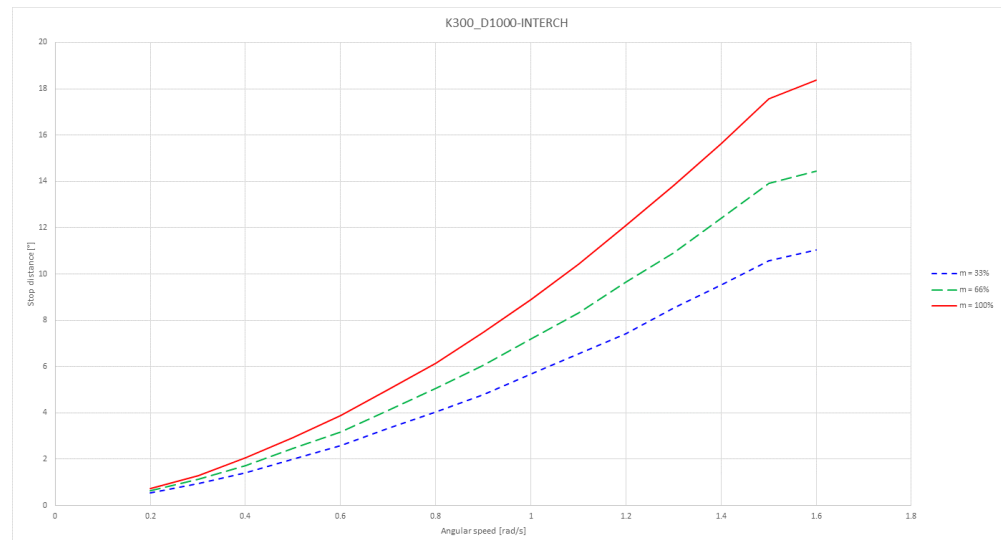
Stopping distance and stopping time



24.3 K300_D1000

Category 0, INTERCH

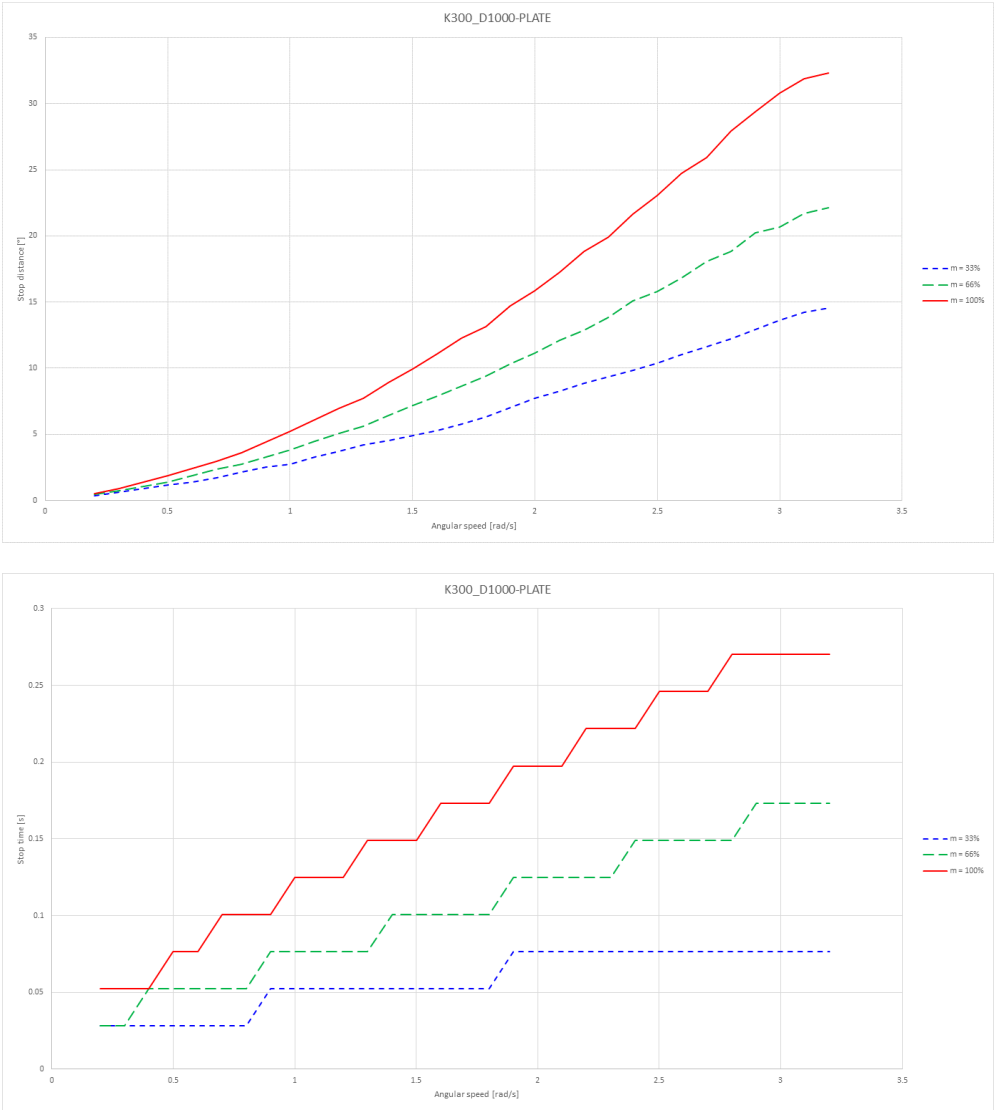
Stopping distance and stopping time



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Category 0, PLATE

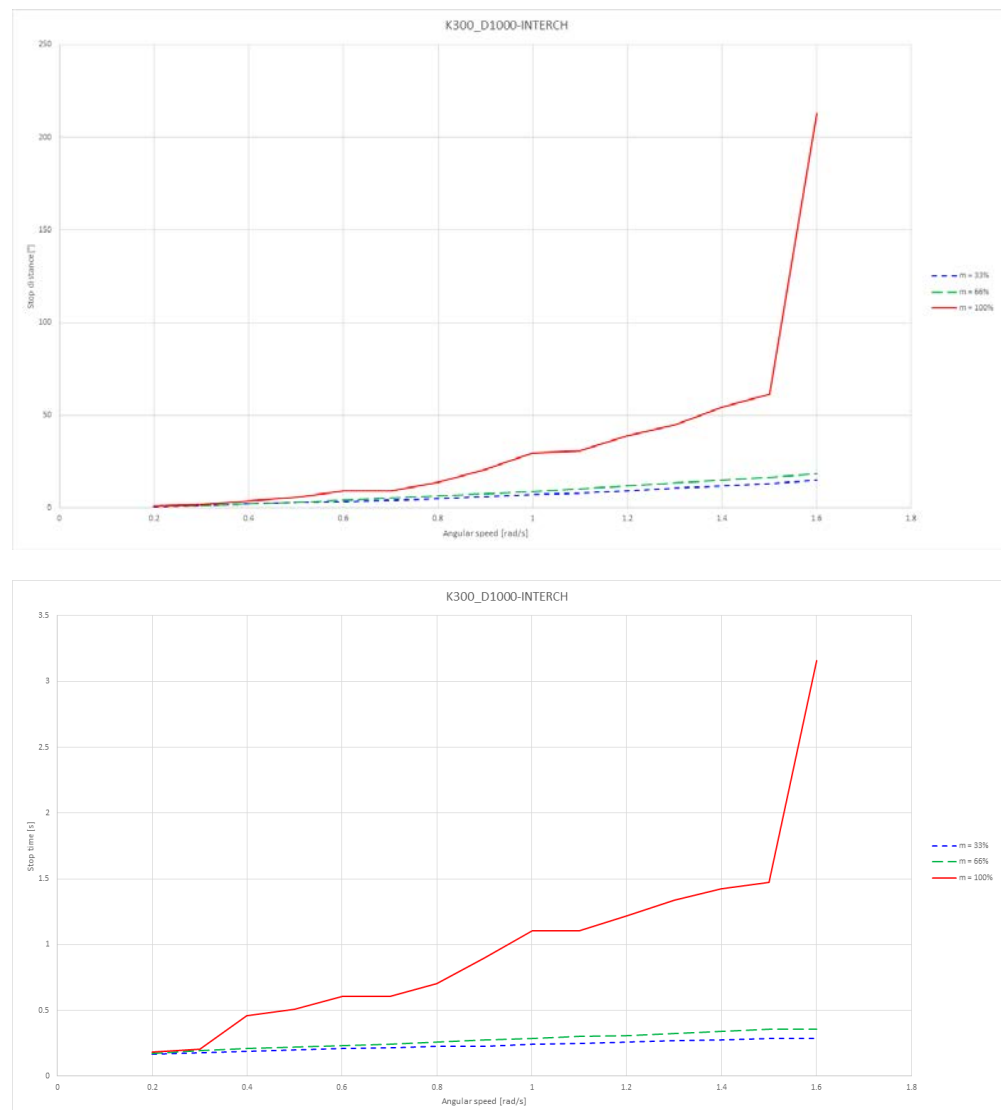
Stopping distance and stopping time



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Category 1, INTERCH

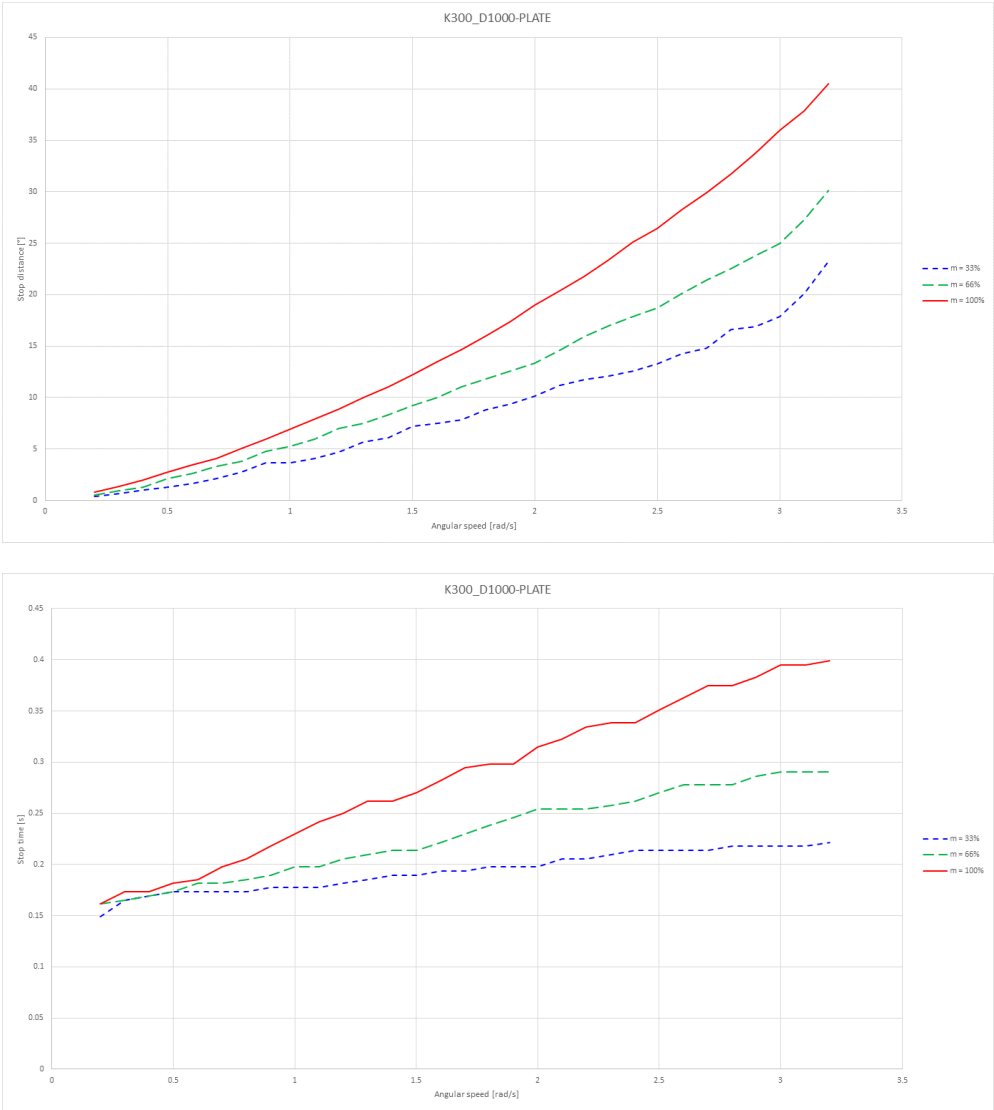
Stopping distance and stopping time



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Category 1, PLATE

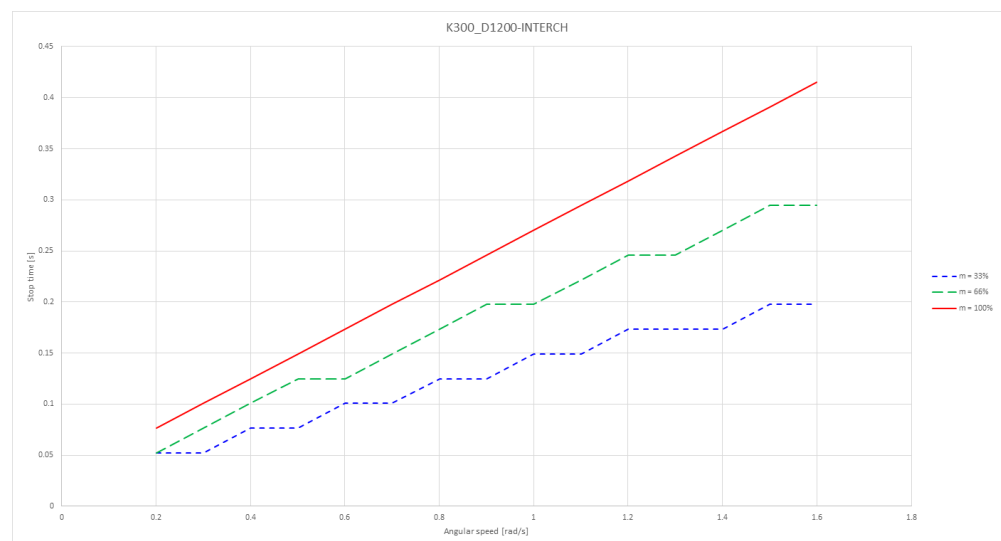
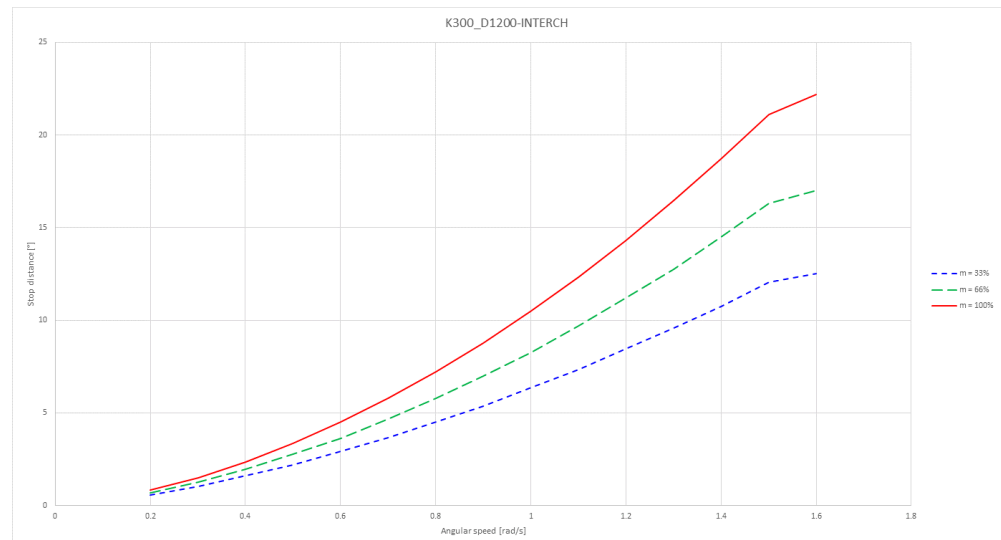
Stopping distance and stopping time



24.4 K300_D1200

Category 0, INTERCH

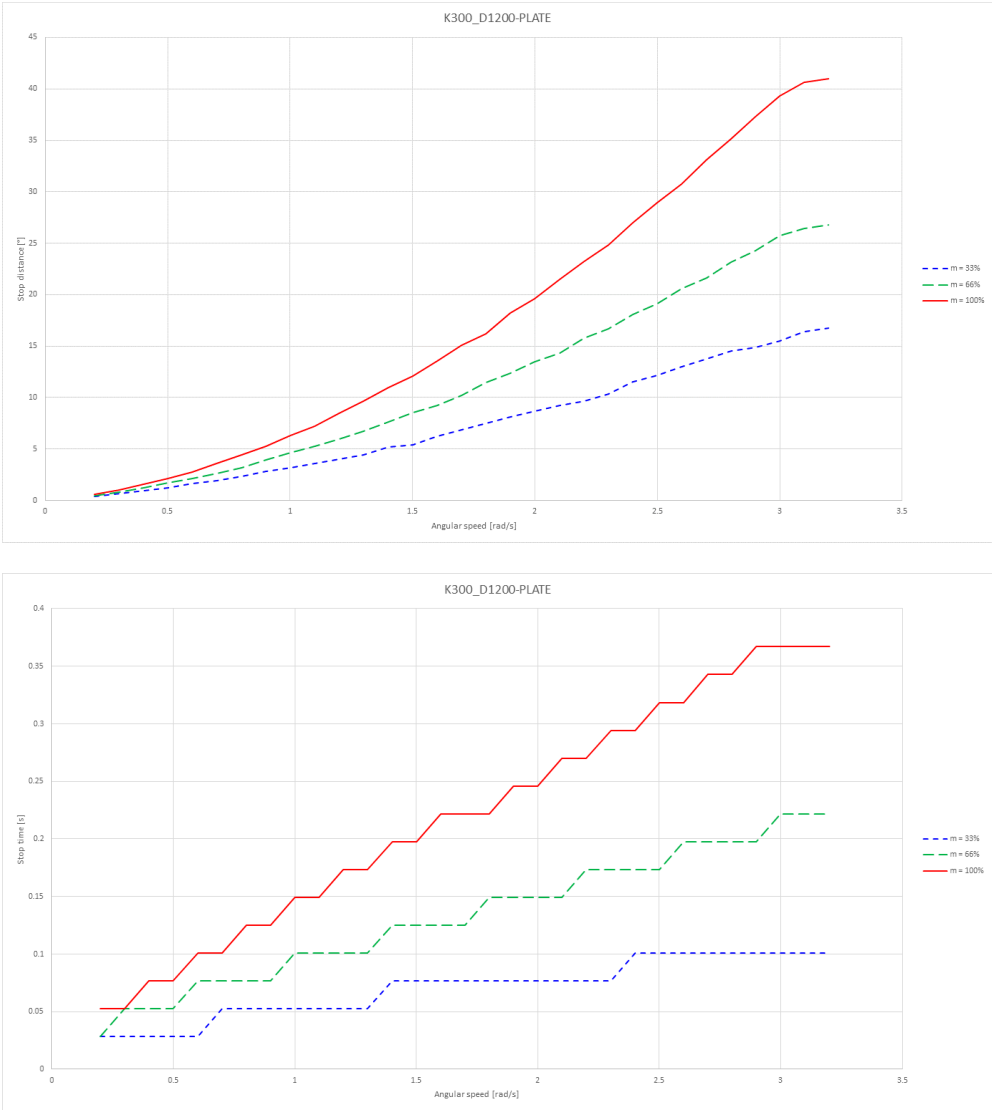
Stopping distance and stopping time



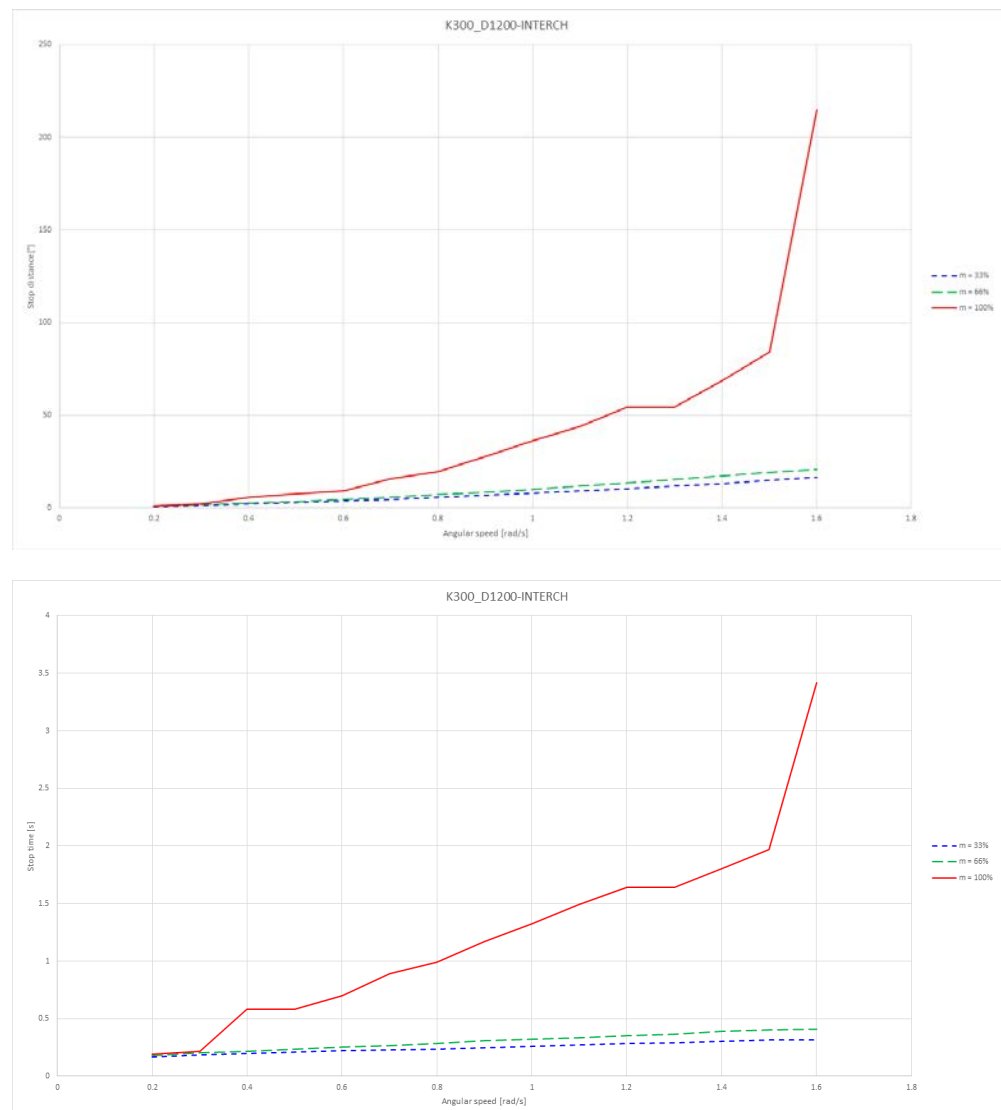
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Category 0, PLATE

Stopping distance and stopping time

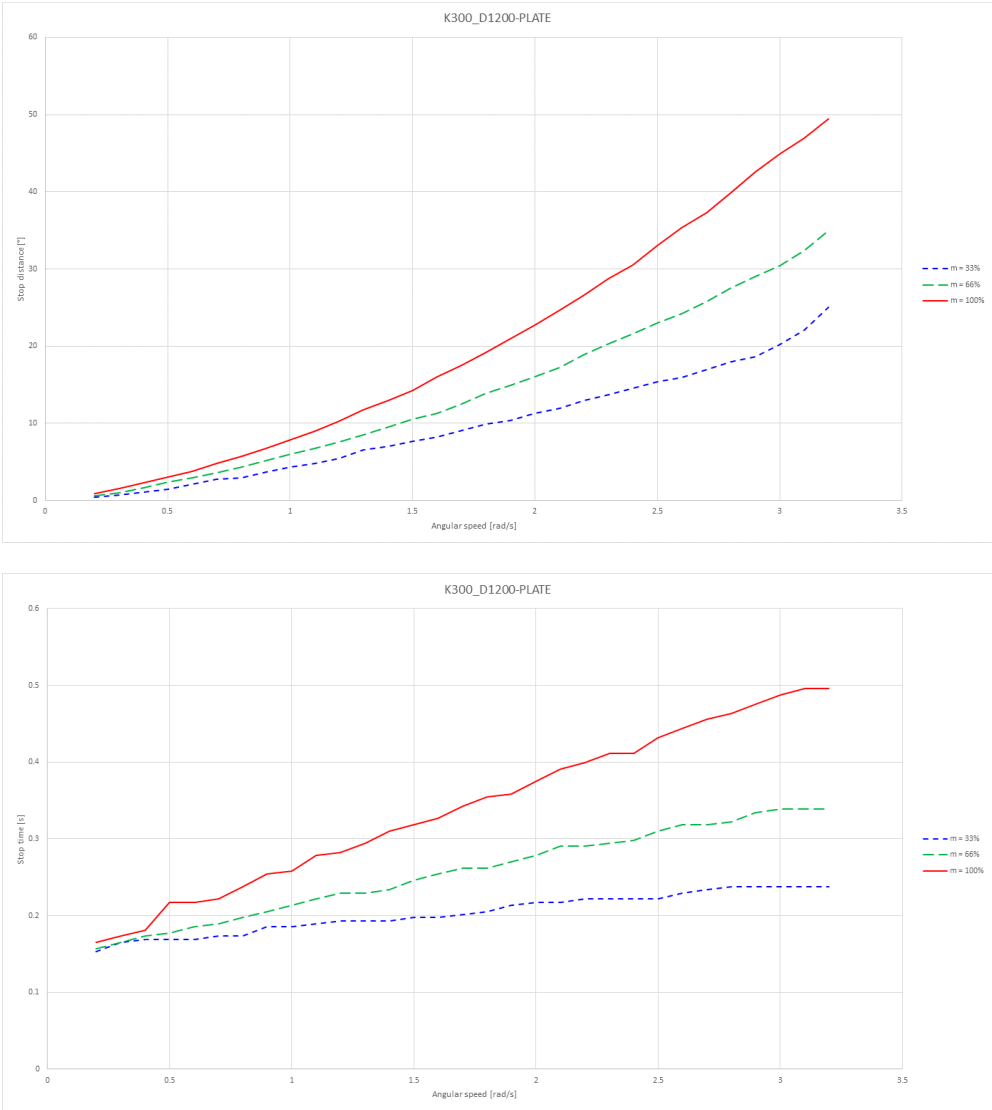


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Category 1, INTERCH**Stopping distance and stopping time***Continues on next page*

Category 1, PLATE

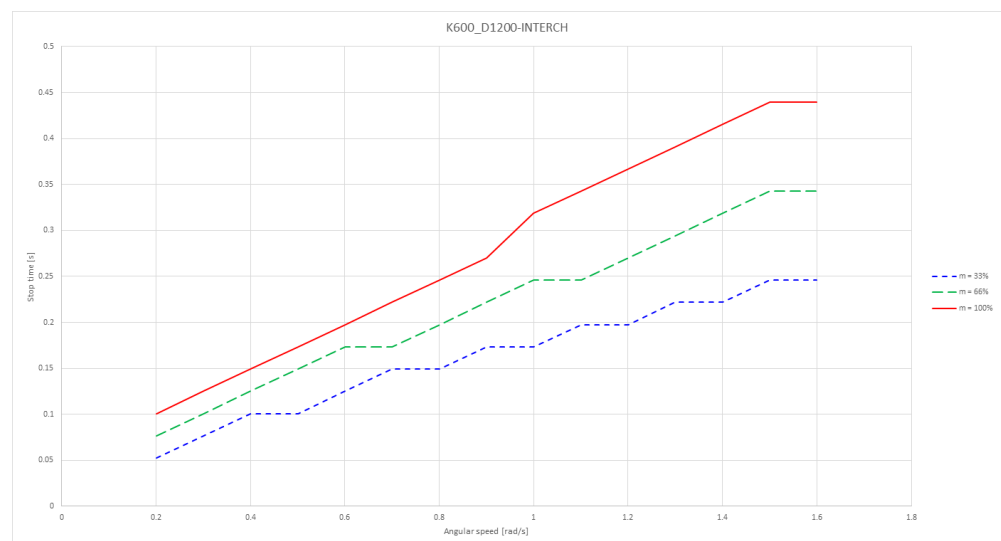
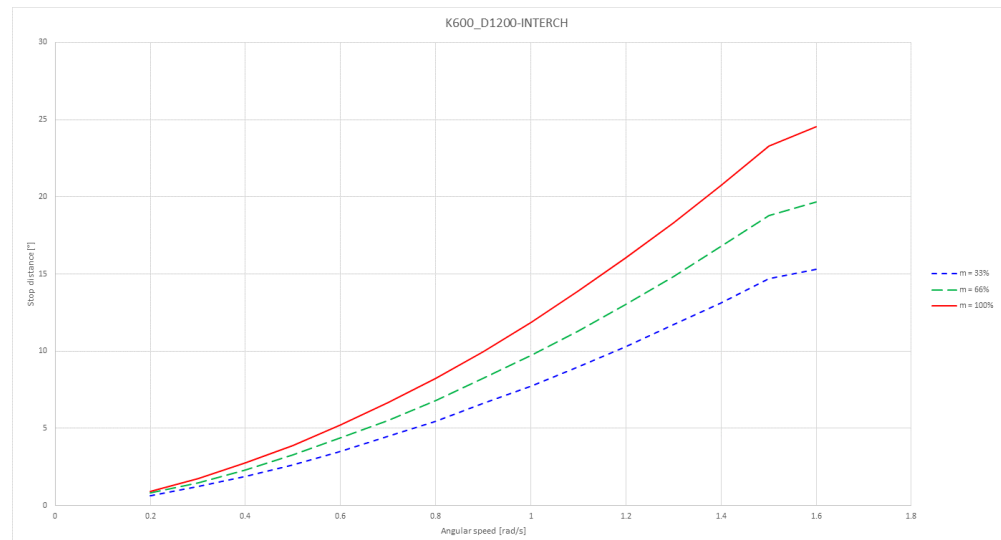
Stopping distance and stopping time



24.5 K600_D1200

Category 0, INTERCH

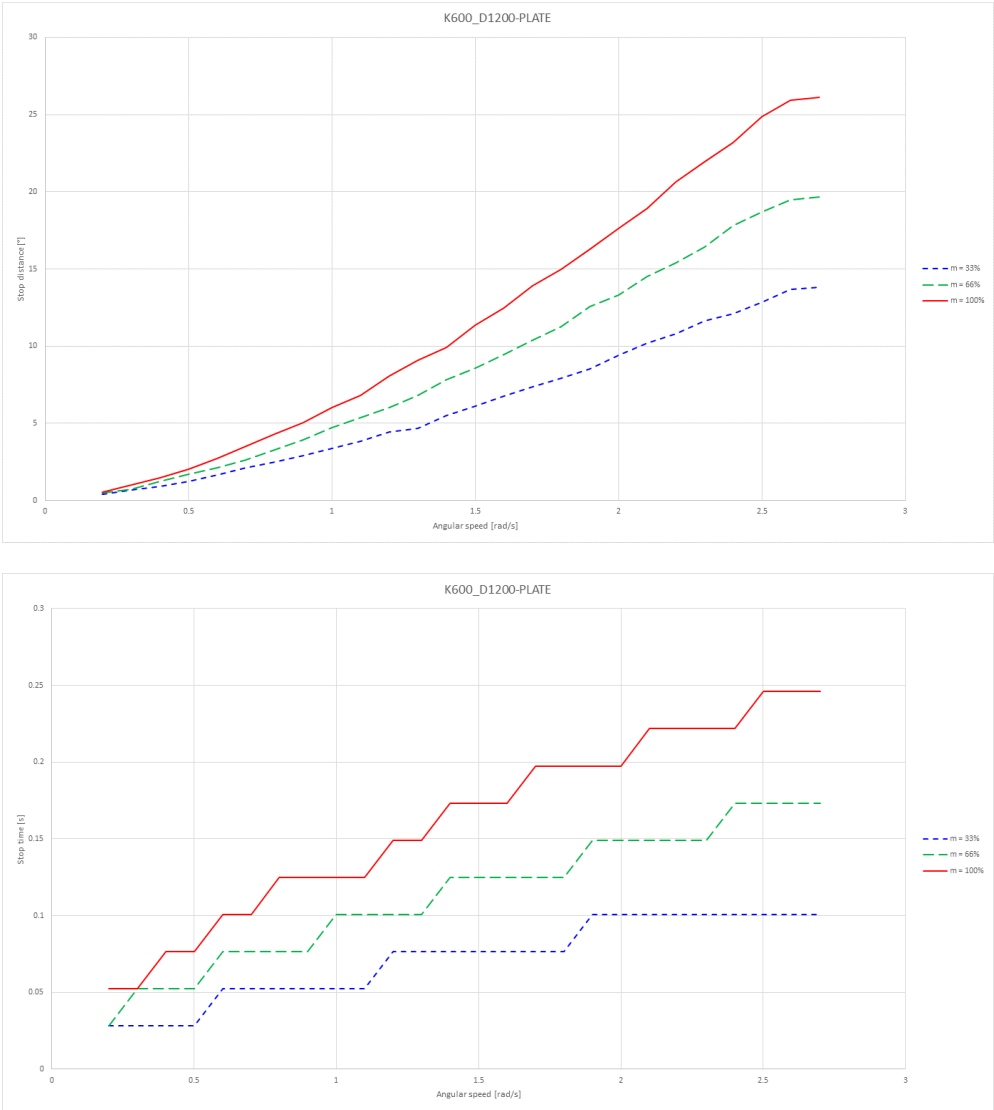
Stopping distance and stopping time



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Category 0, PLATE

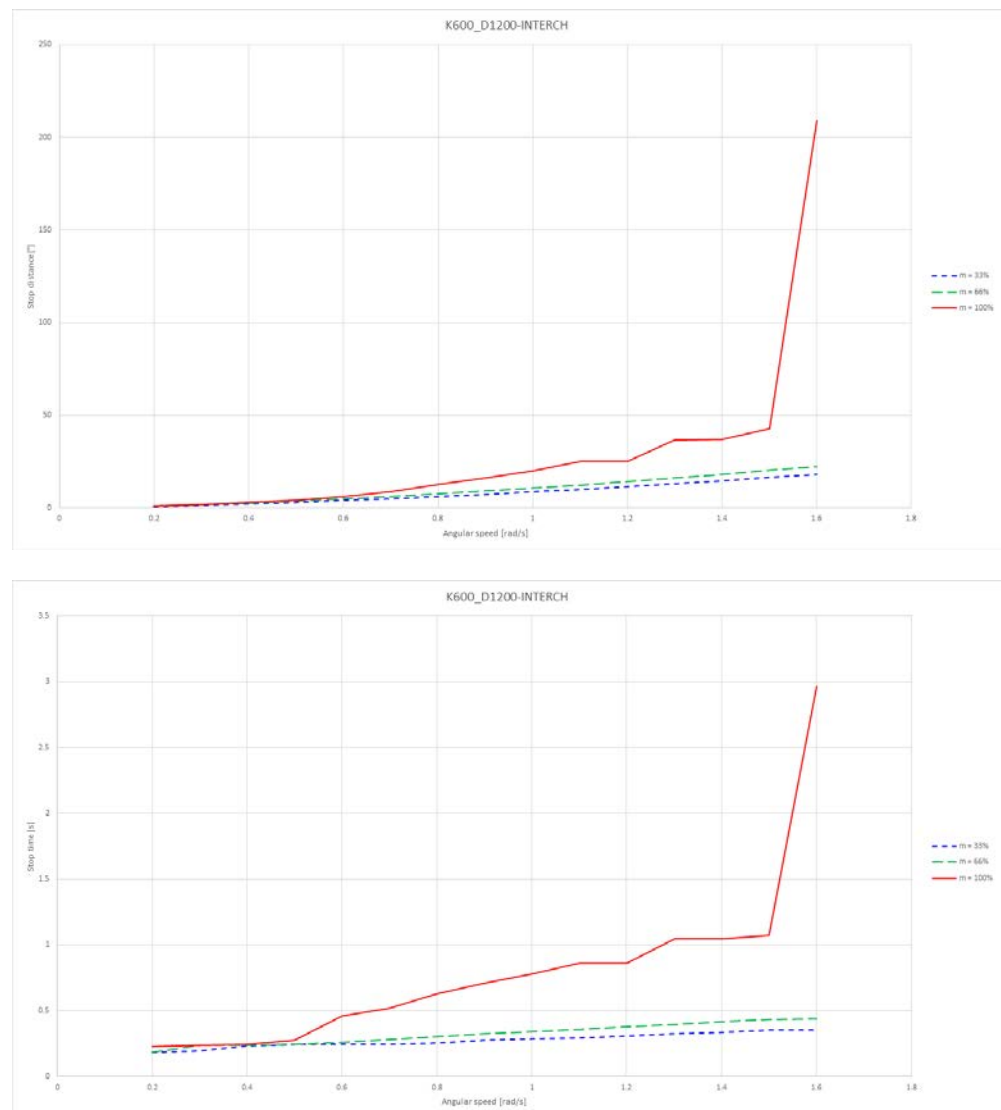
Stopping distance and stopping time



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Category 1, INTERCH

Stopping distance and stopping time



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Category 1, PLATE

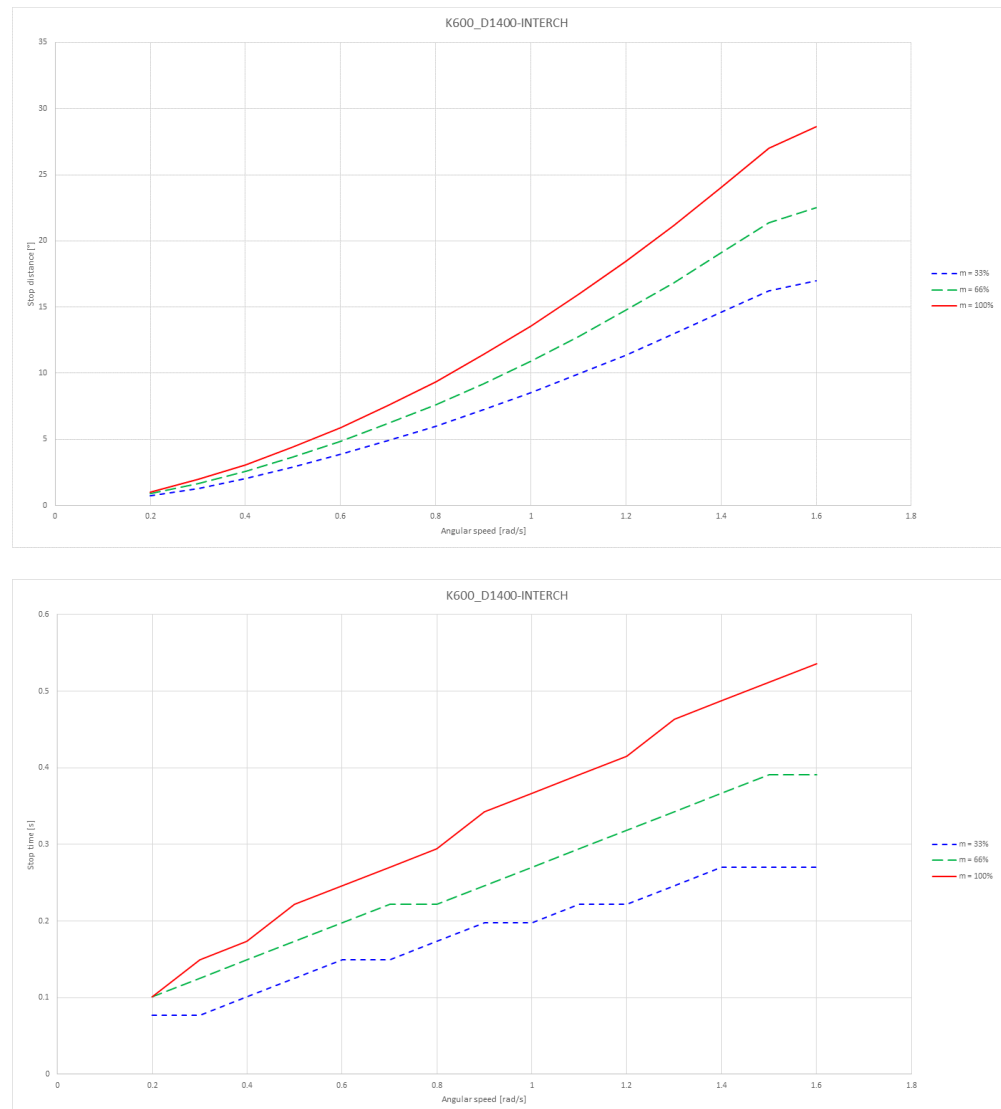
Stopping distance and stopping time



24.6 K600_D1400

Category 0, INTERCH

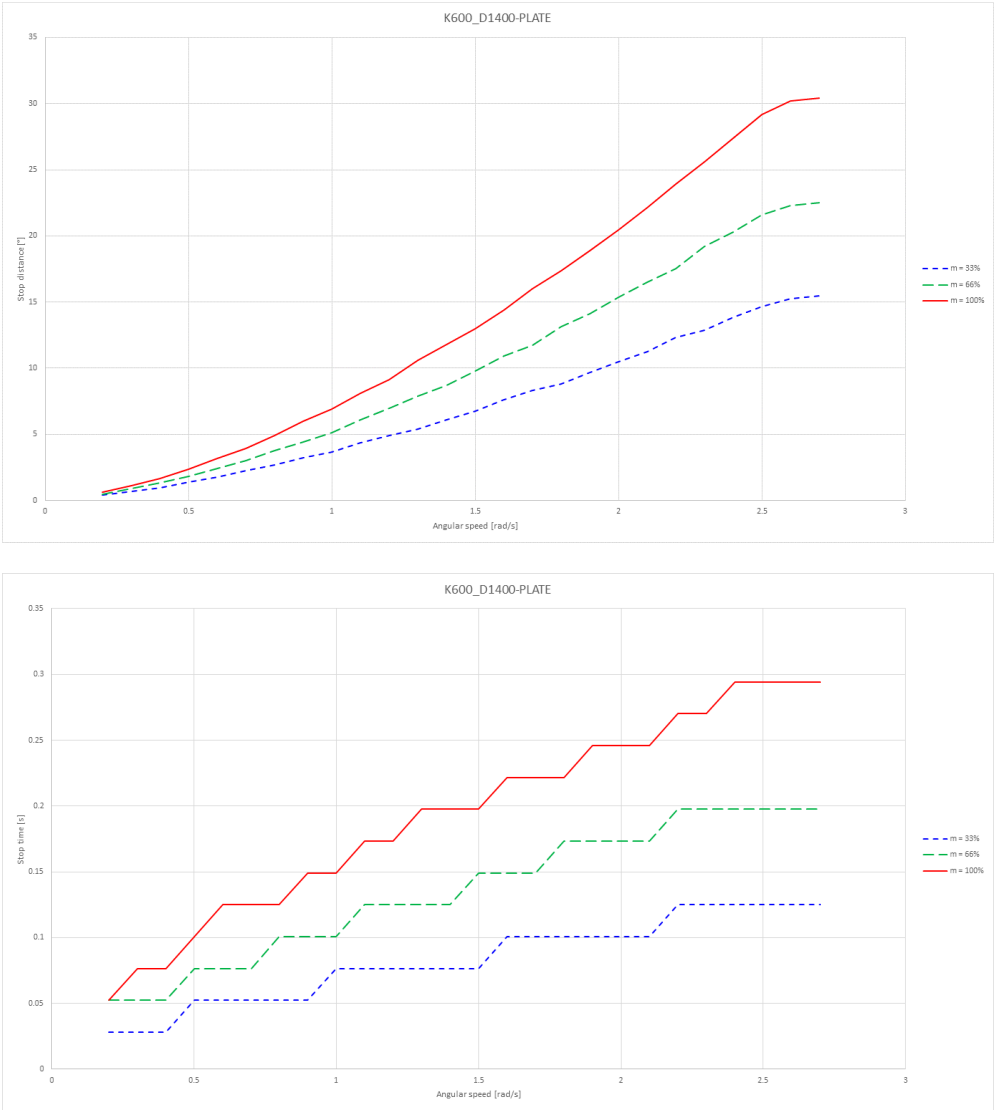
Stopping distance and stopping time



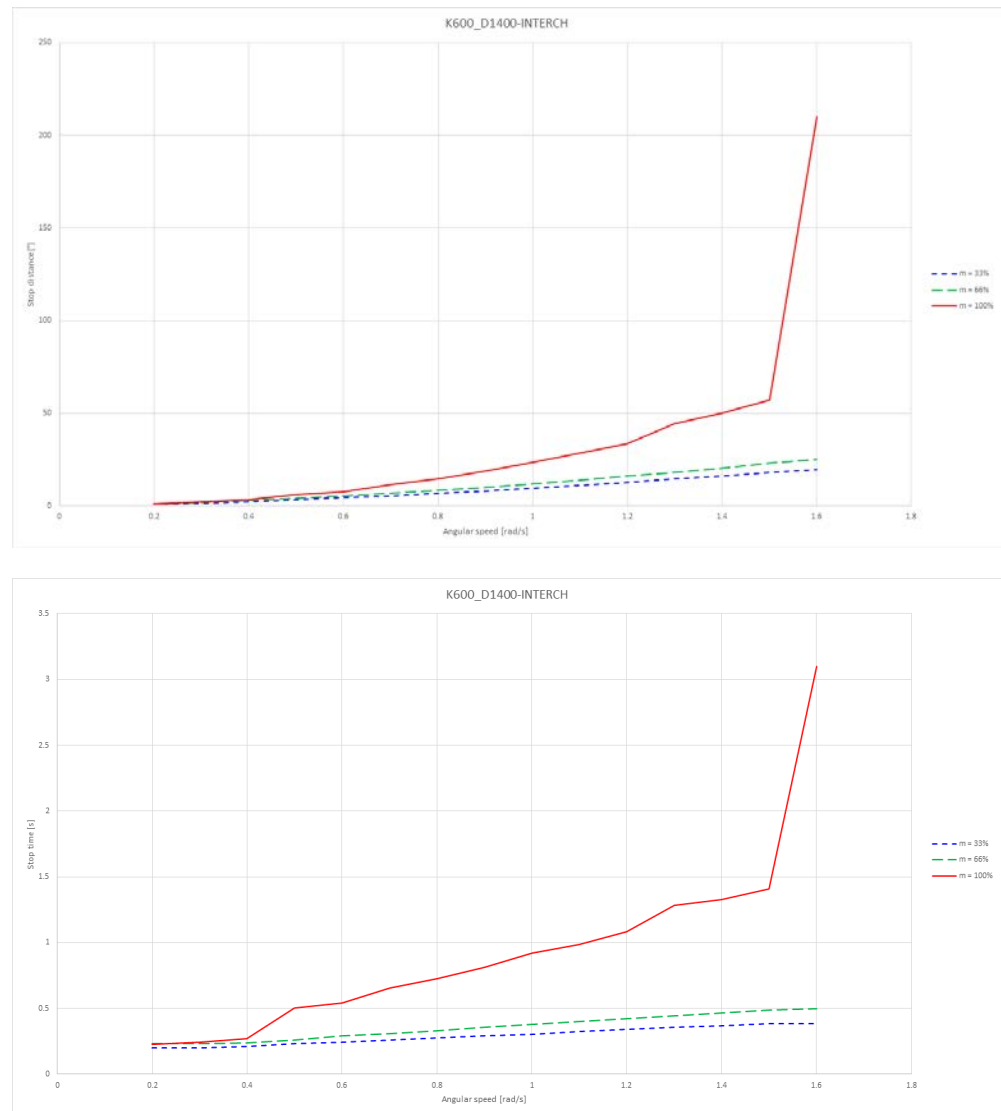
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Category 0, PLATE

Stopping distance and stopping time

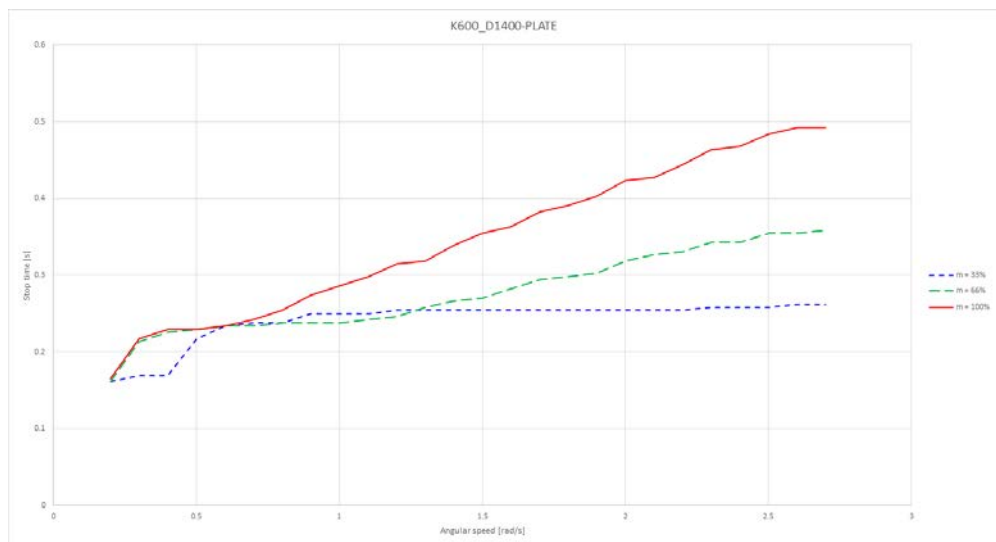
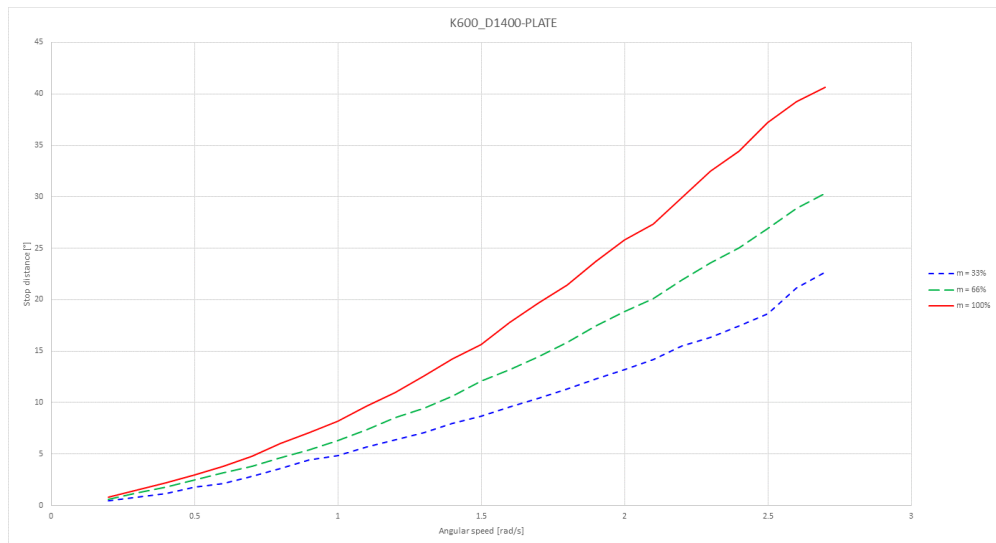


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Category 1, PLATE

Stopping distance and stopping time

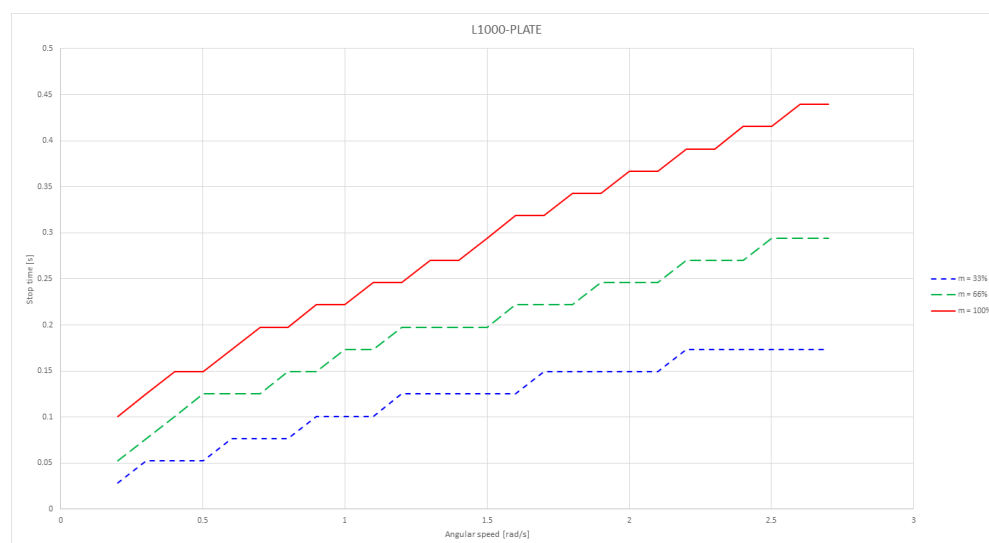
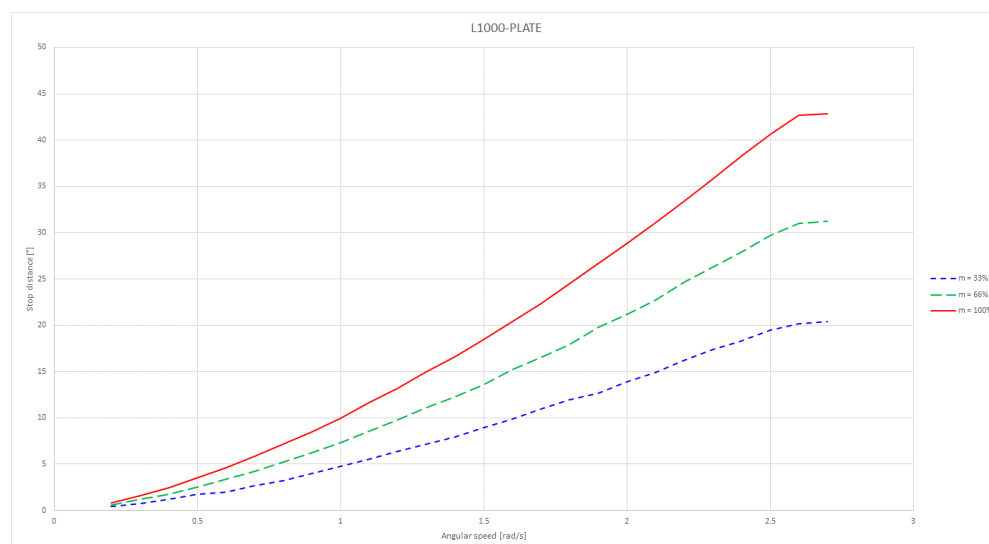


25 IRBP L

25.1 L1000

Category 0, PLATE

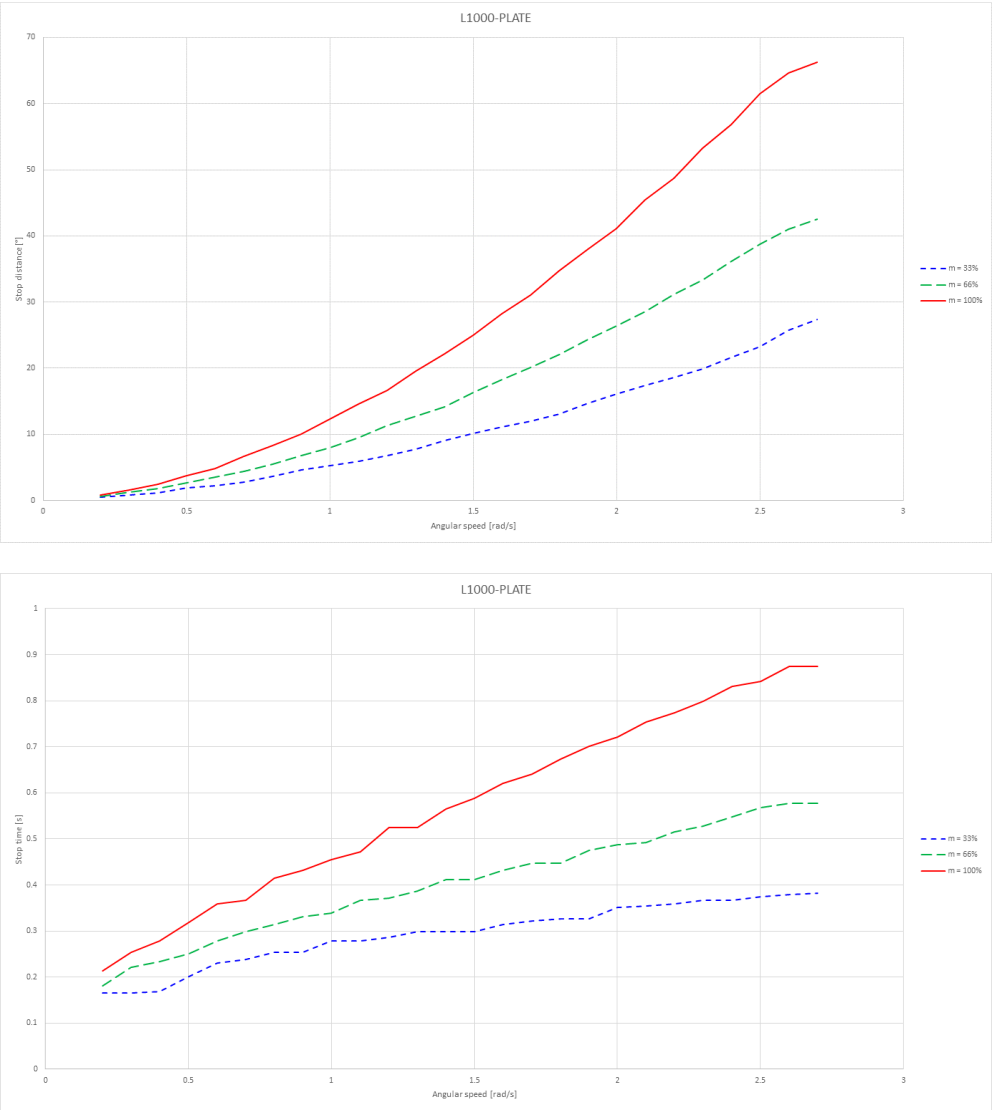
Stopping distance and stopping time



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Category 1, PLATE

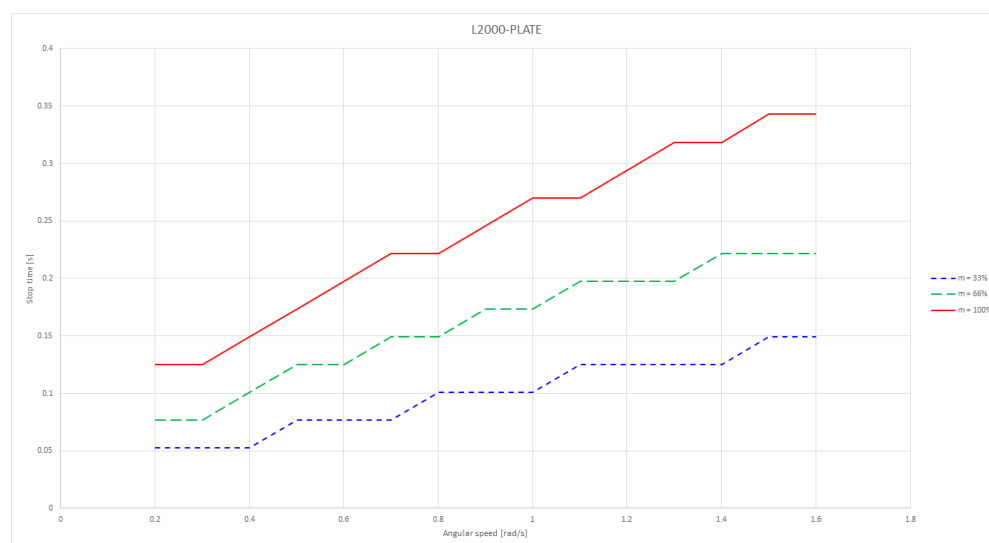
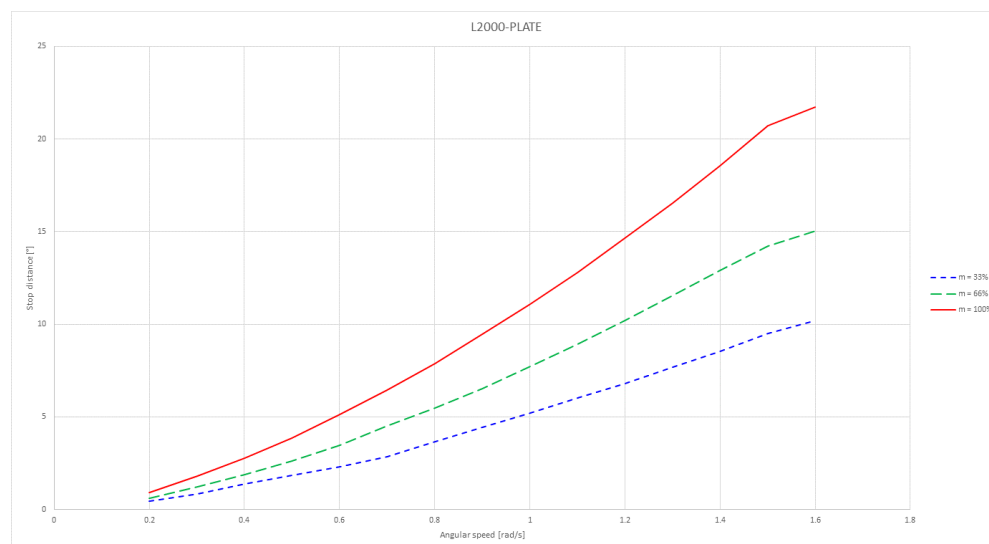
Stopping distance and stopping time



25.2 L2000

Category 0, PLATE

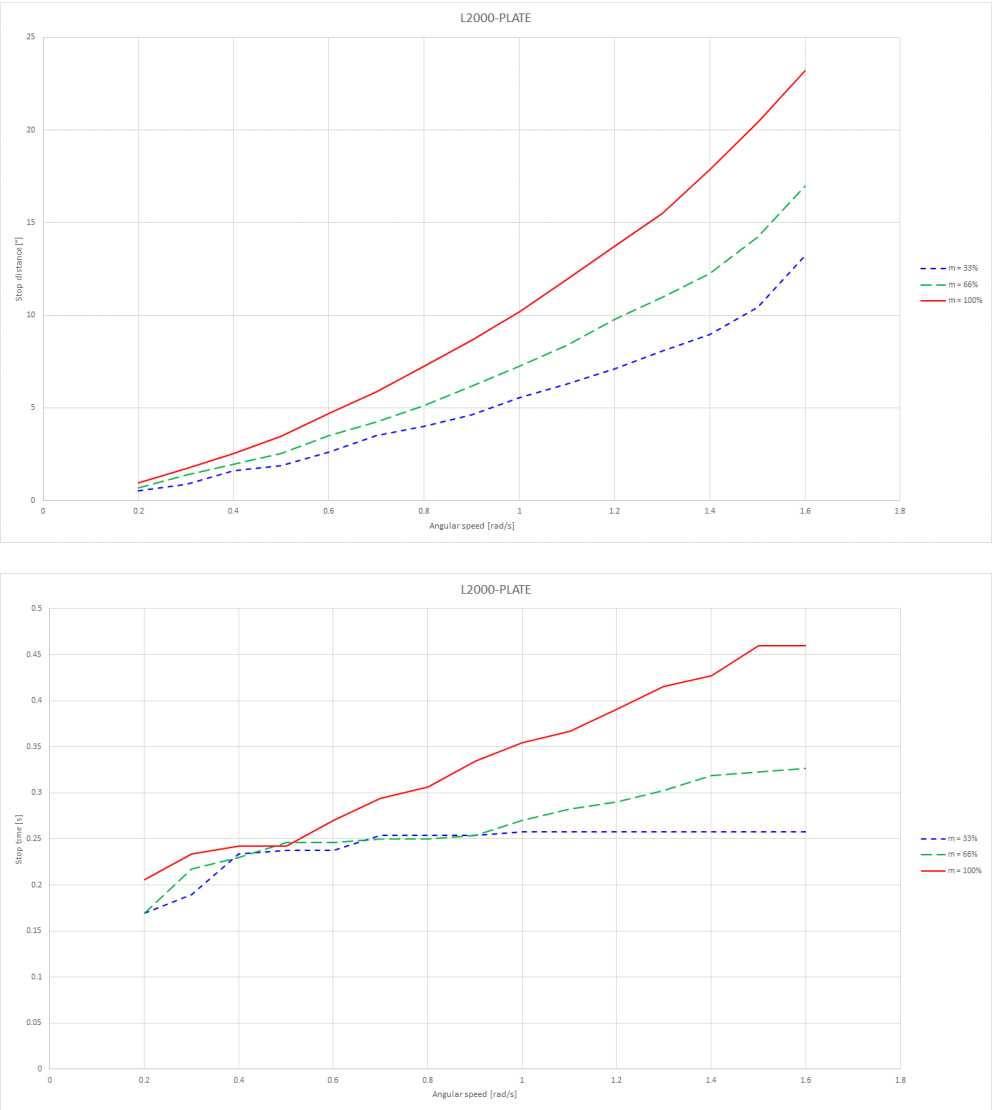
Stopping distance and stopping time



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Category 1, PLATE

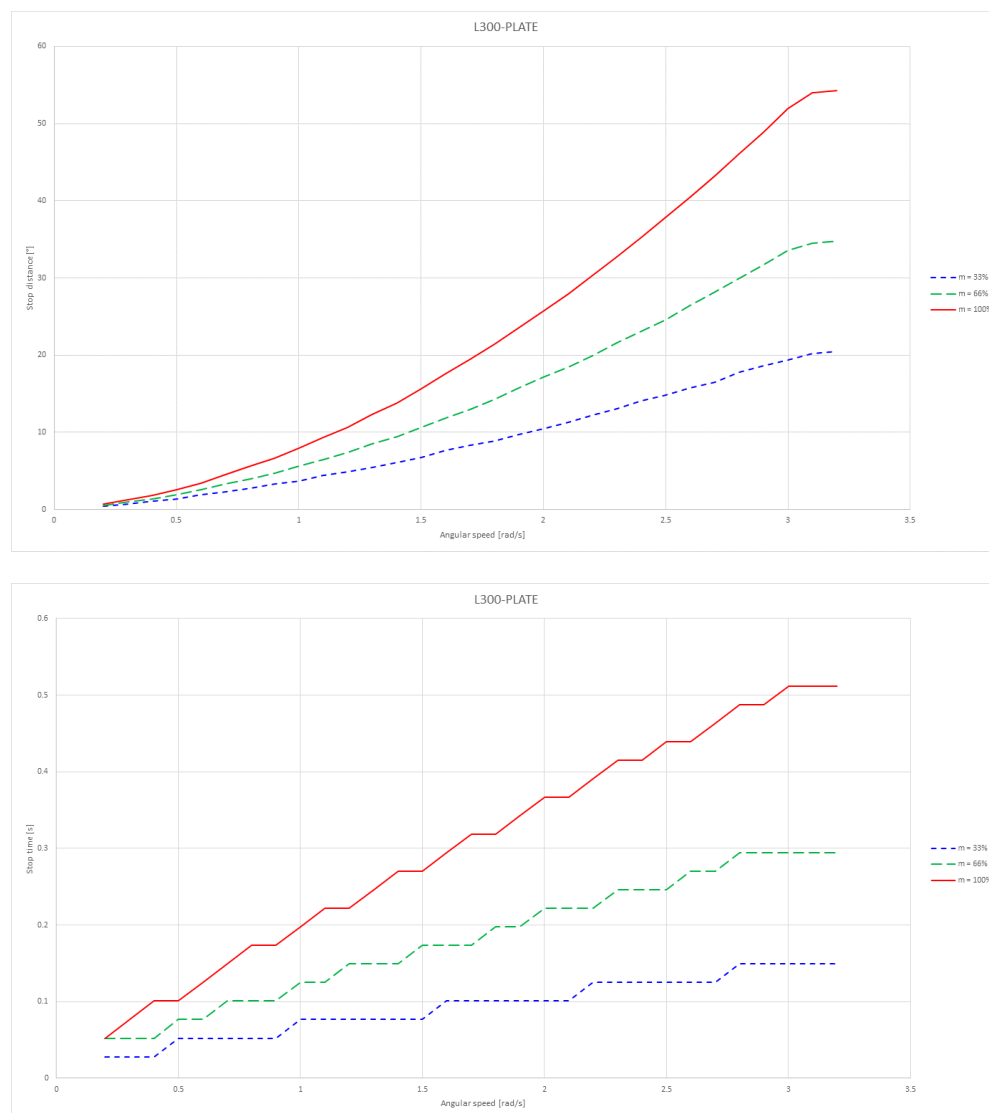
Stopping distance and stopping time



25.3 L300

Category 0, PLATE

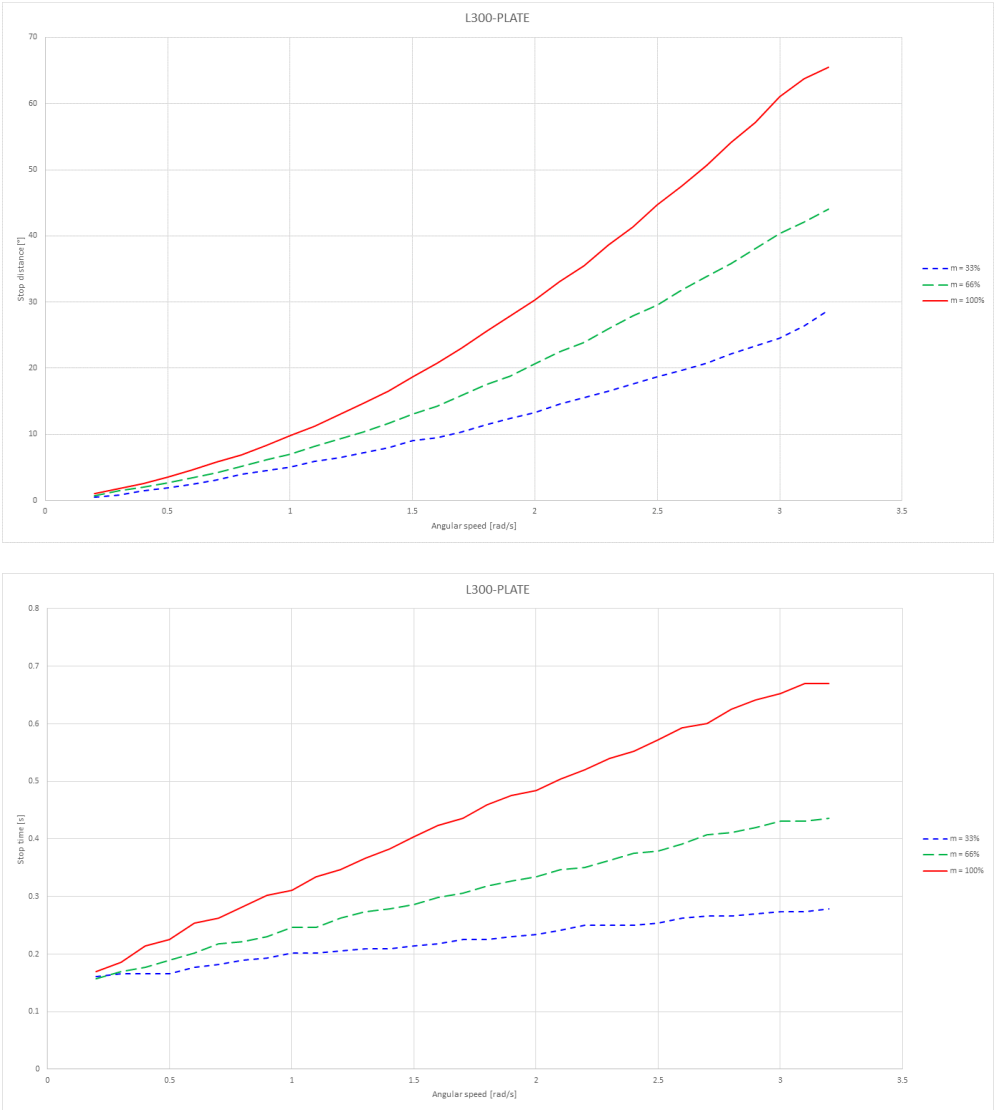
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Category 1, PLATE

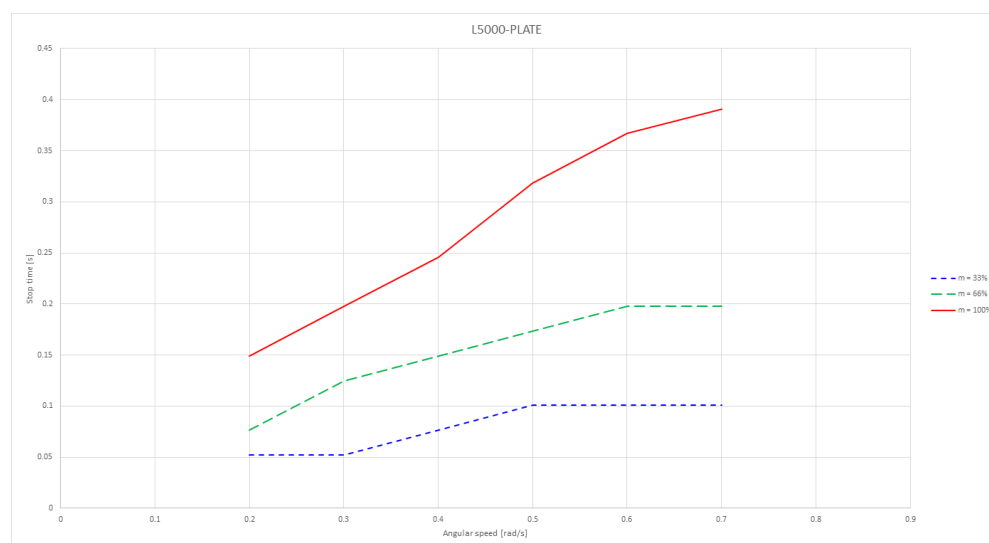
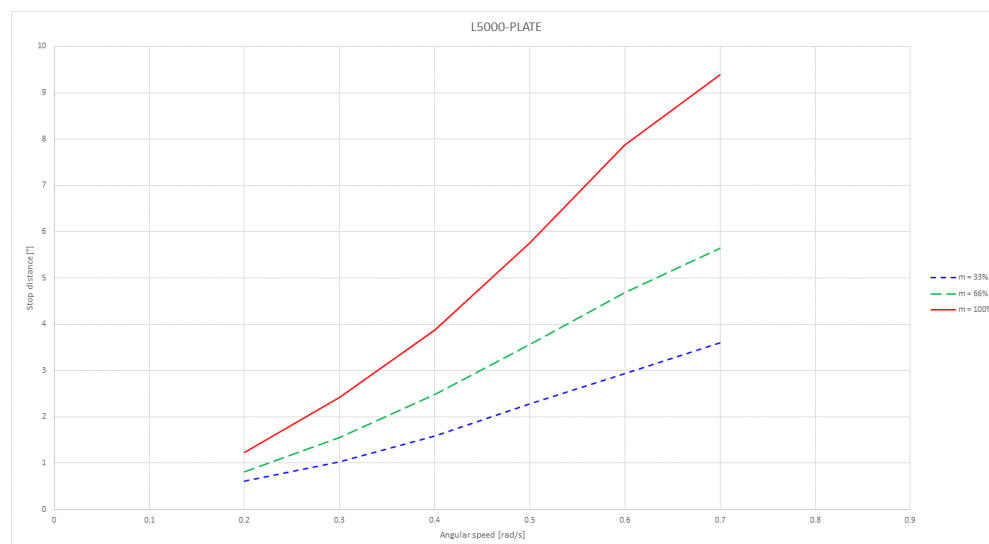
Stopping distance and stopping time



25.4 L5000

Category 0, PLATE

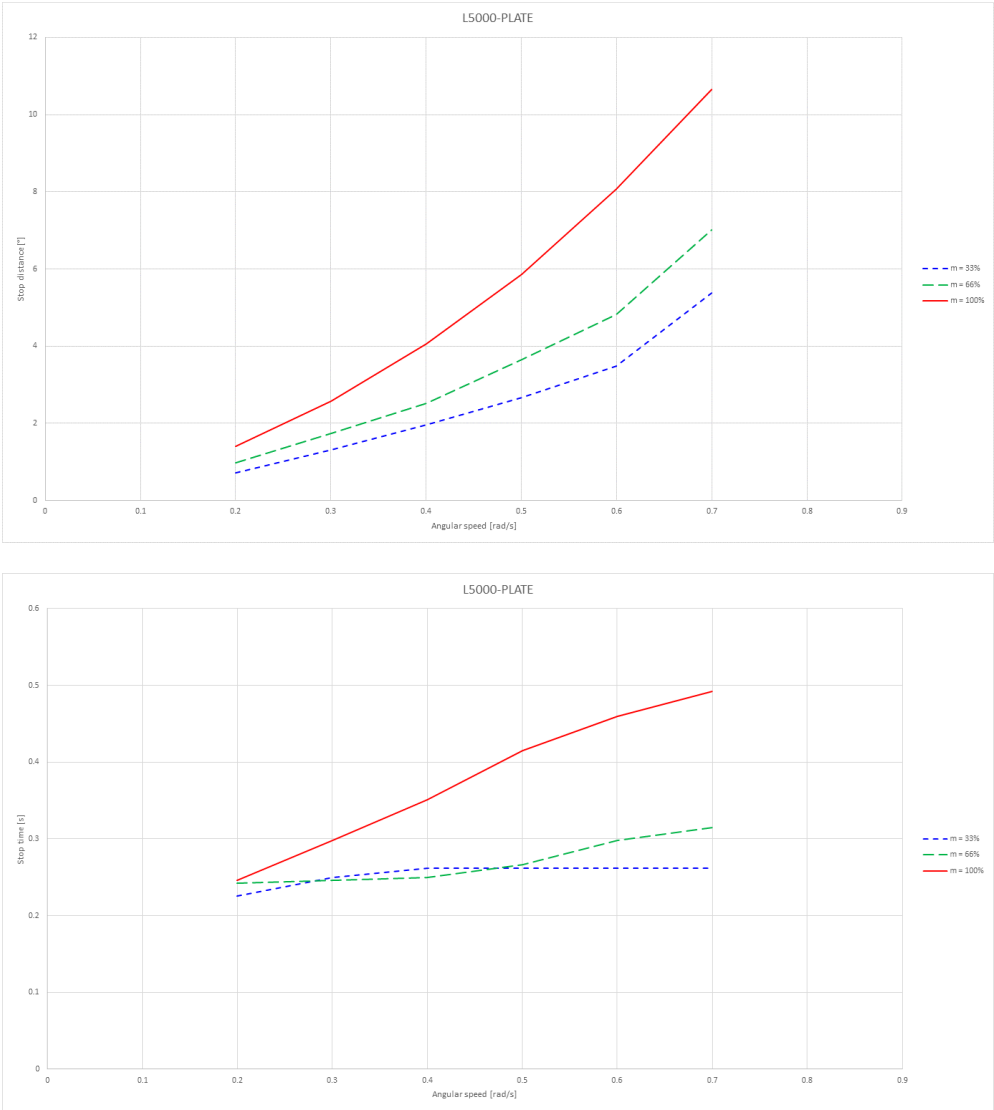
Stopping distance and stopping time



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Category 1, PLATE

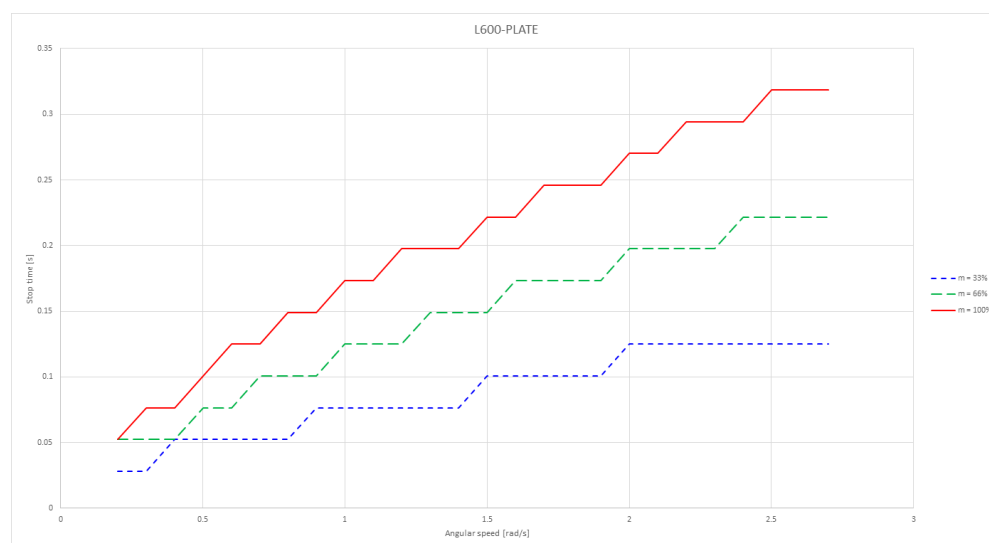
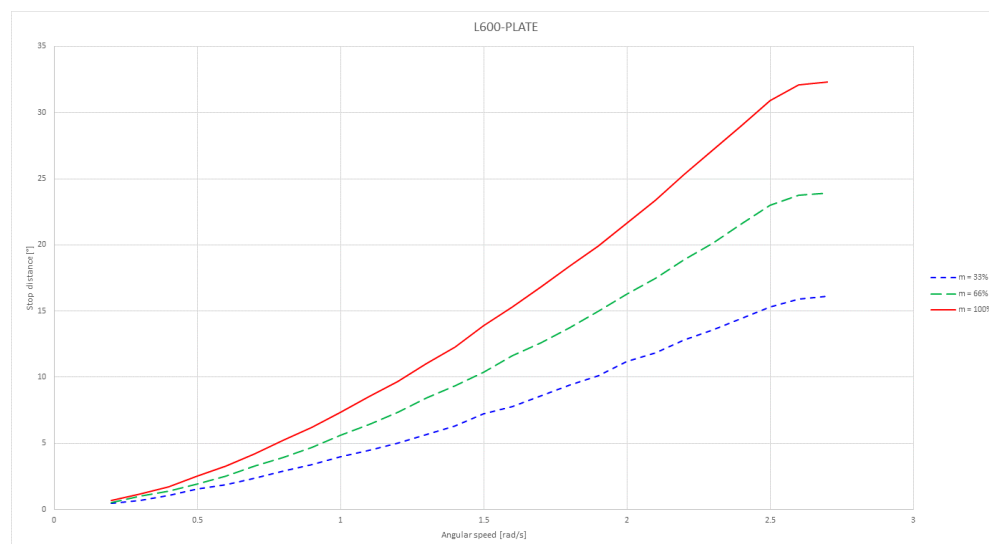
Stopping distance and stopping time



25.5 L600

Category 0, PLATE

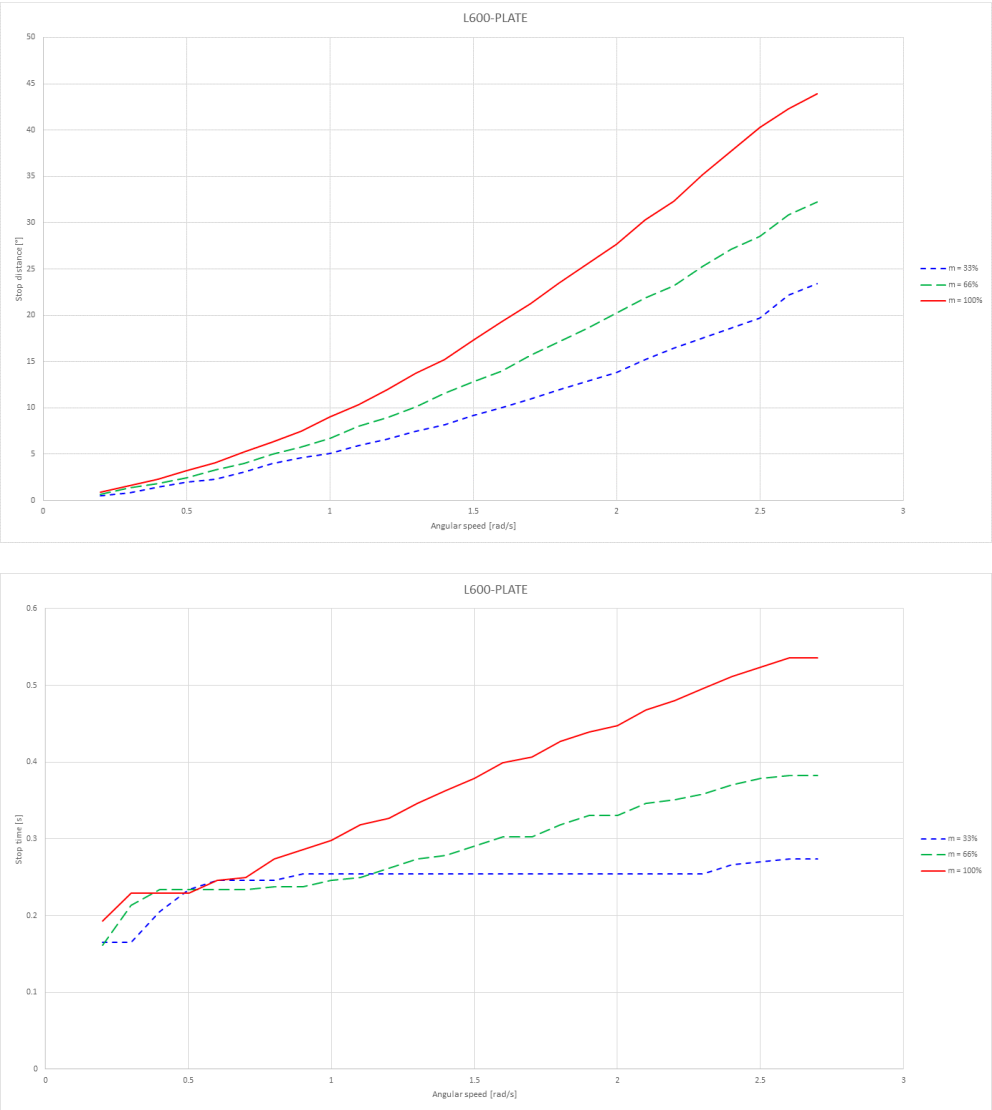
Stopping distance and stopping time



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Category 1, PLATE

Stopping distance and stopping time

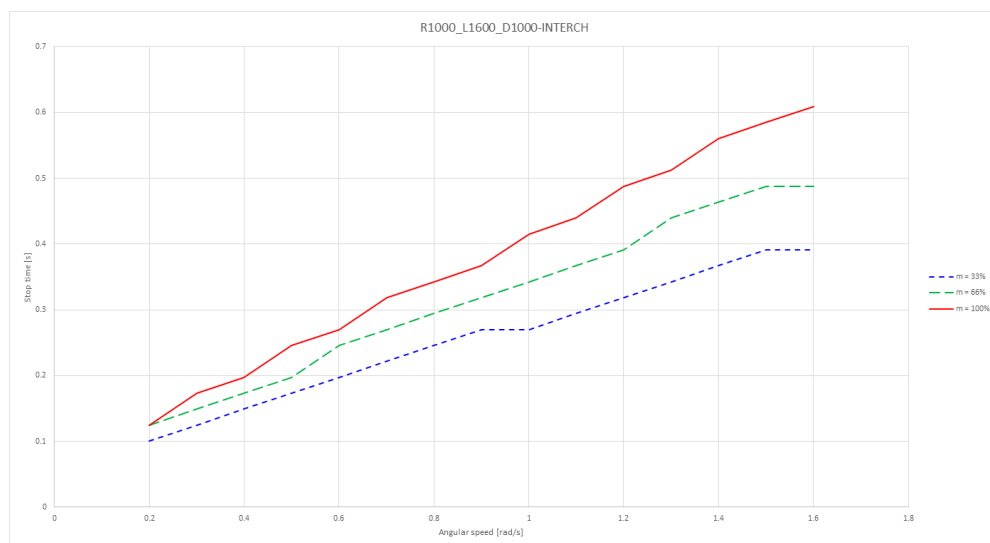
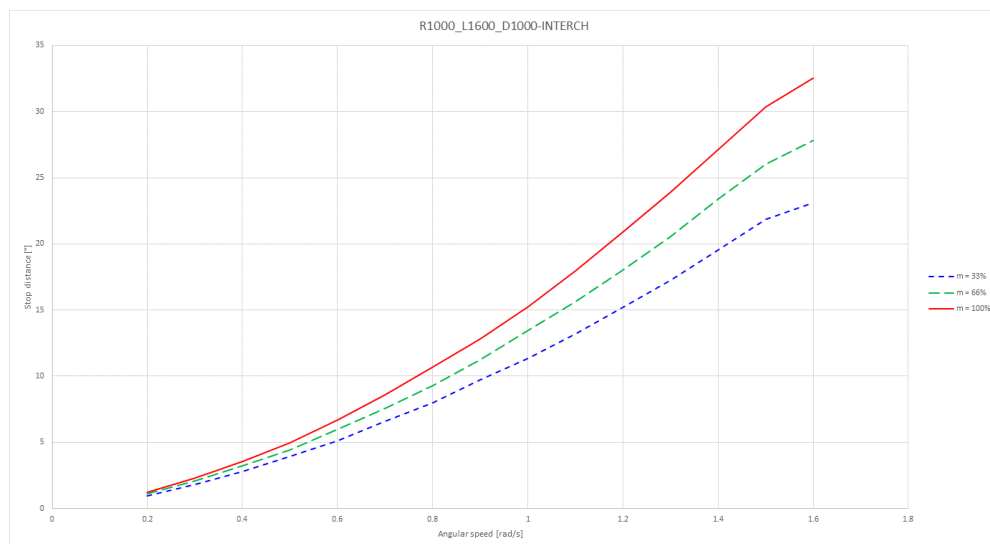


26 IRBP R

26.1 R1000_L1600_D1000

Category 0, INTERCH

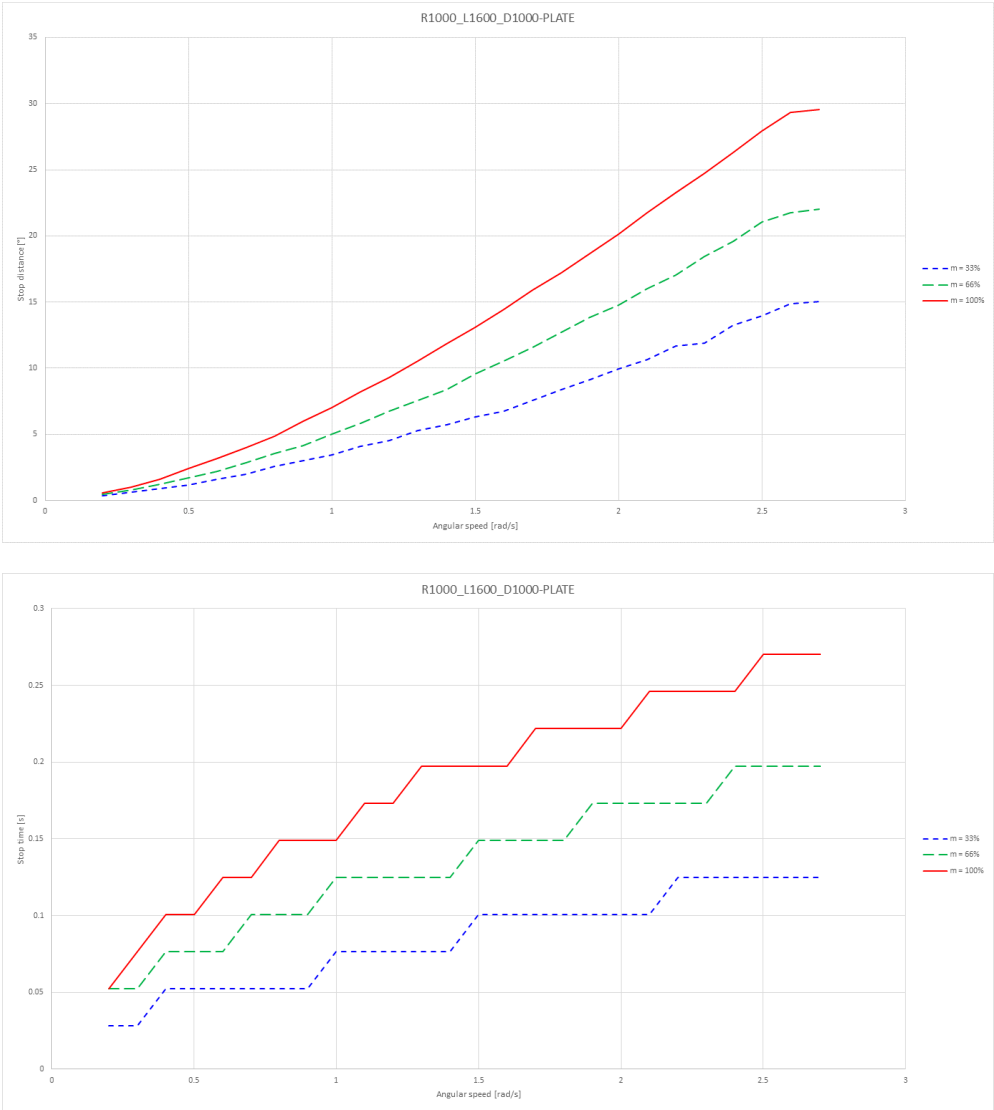
Stopping distance and stopping time



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Category 0, PLATE

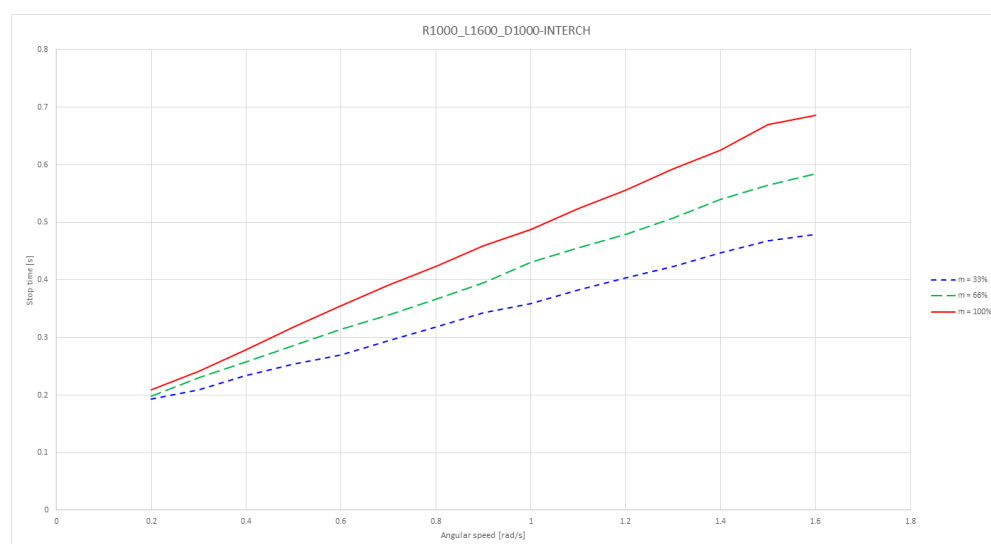
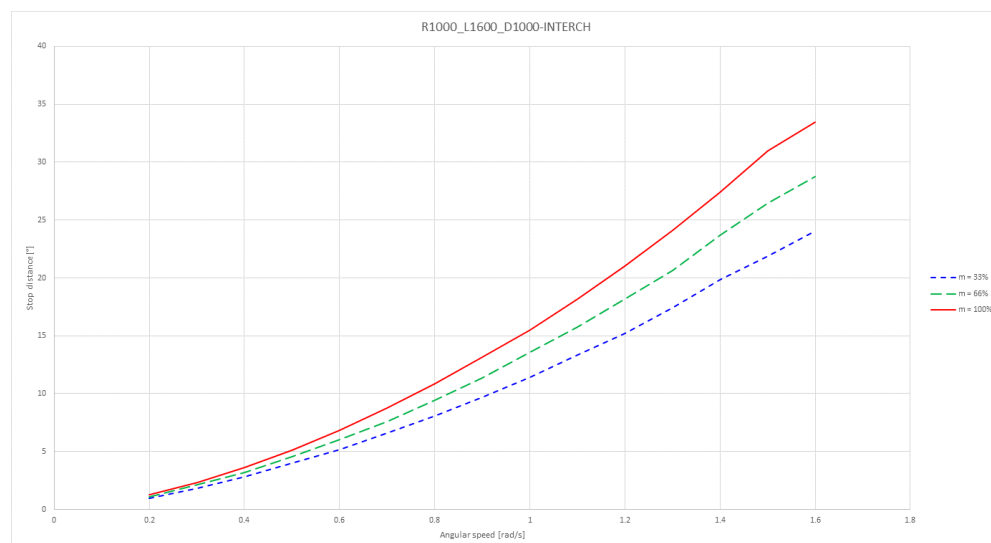
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Category 1, INTERCH

Stopping distance and stopping time



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Category 1, PLATE

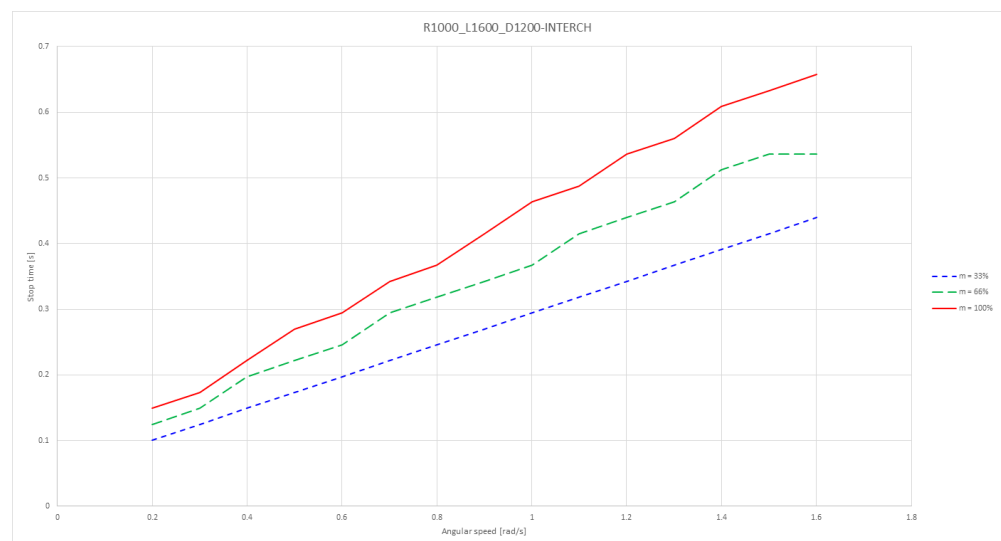
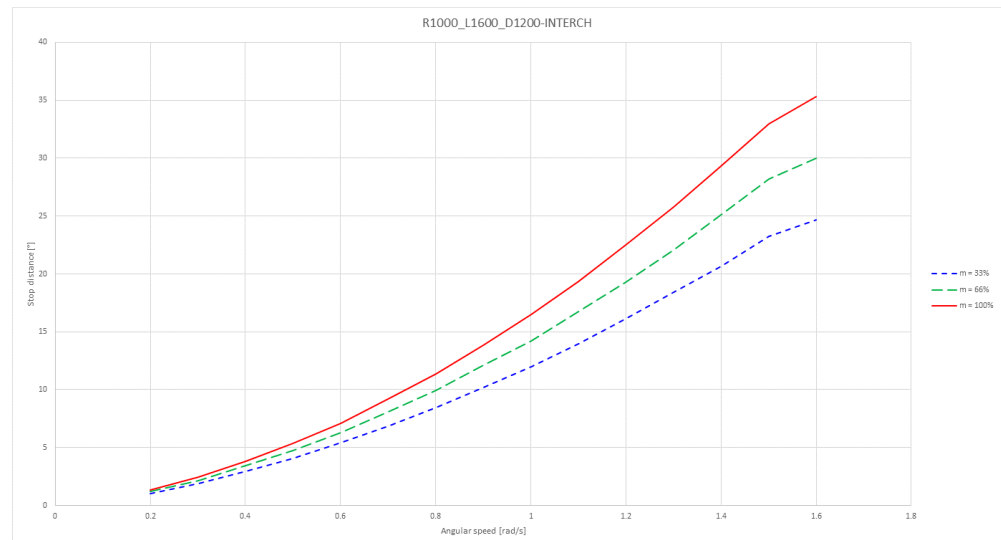
Stopping distance and stopping time



26.2 R1000_L1600_D1200

Category 0, INTERCH

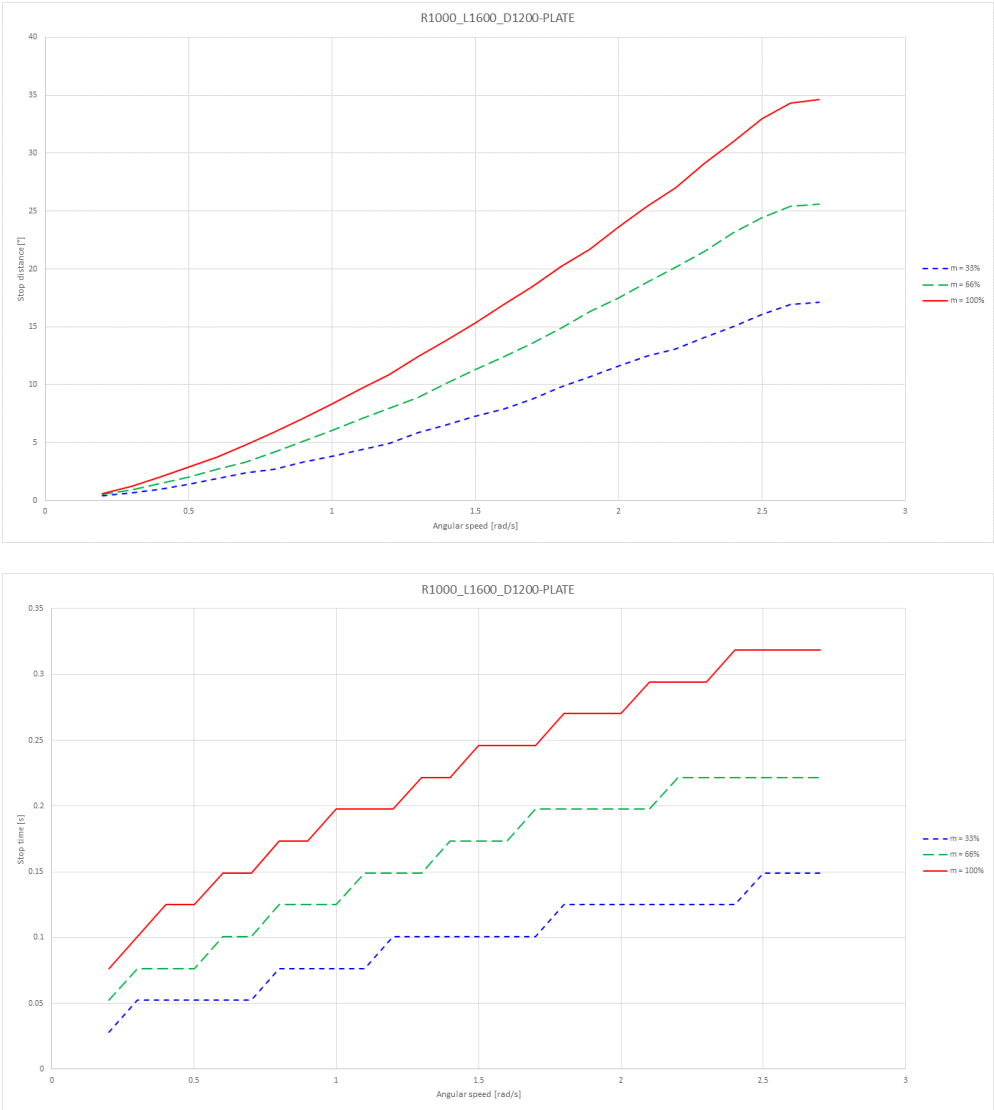
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Category 0, PLATE

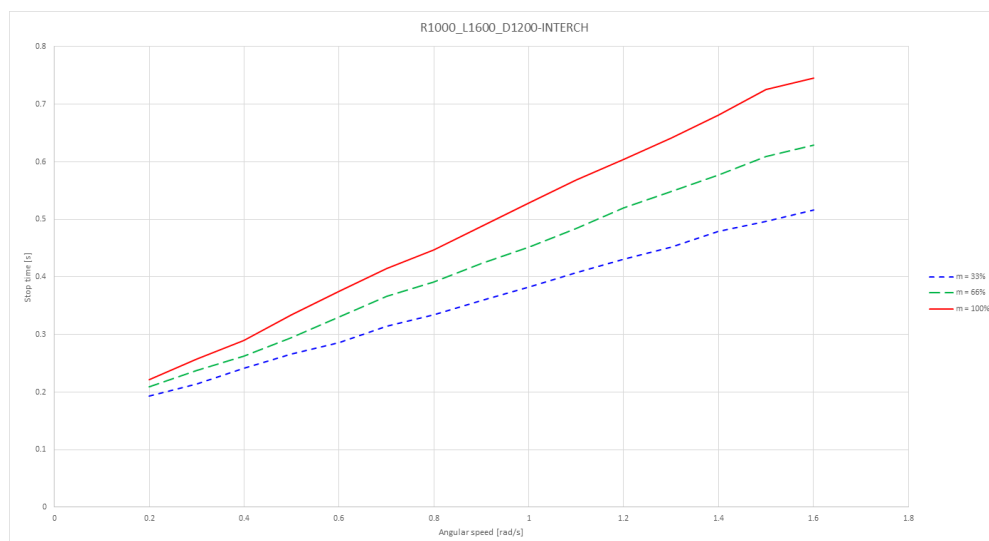
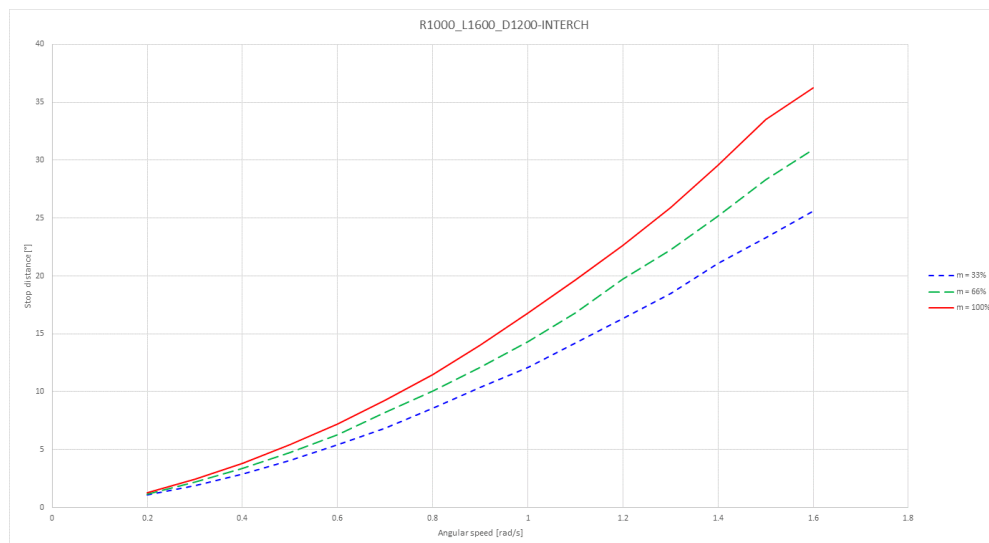
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Category 1, INTERCH

Stopping distance and stopping time



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Category 1, PLATE

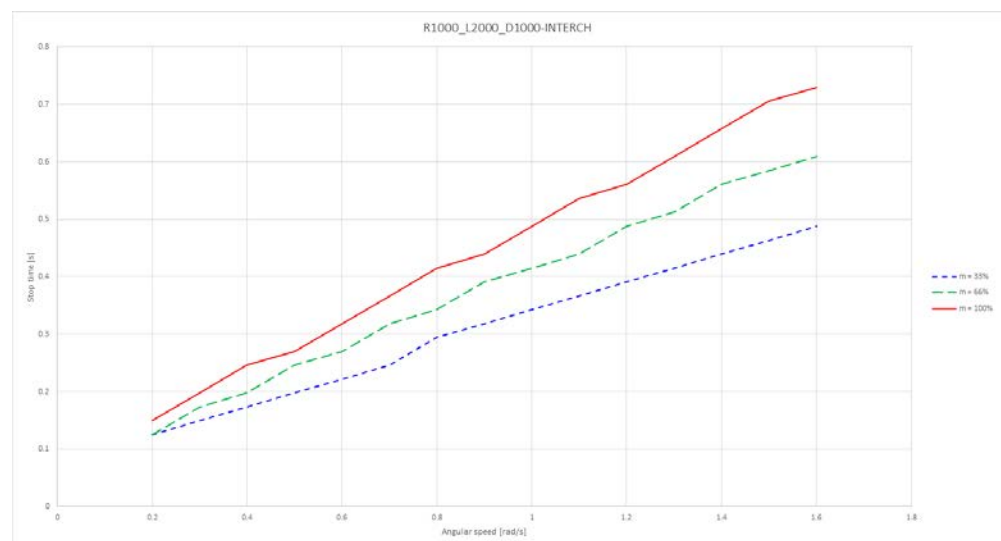
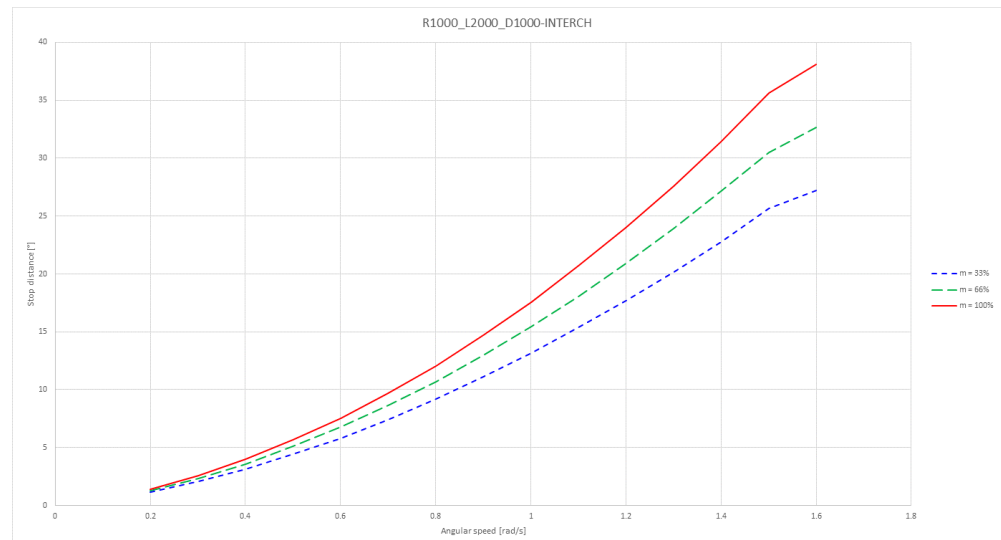
Stopping distance and stopping time



26.3 R1000_L2000_D1000

Category 0, INTERCH

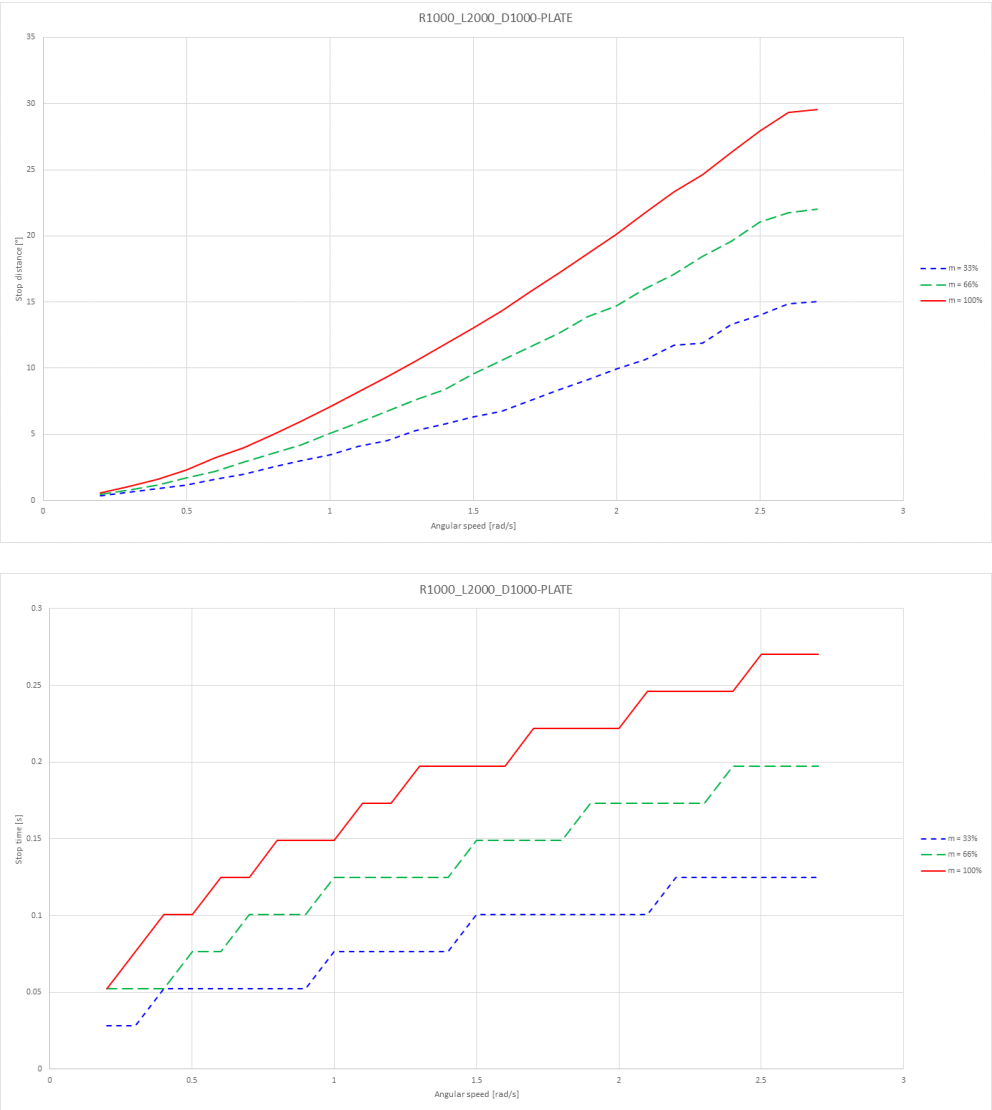
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Category 0, PLATE

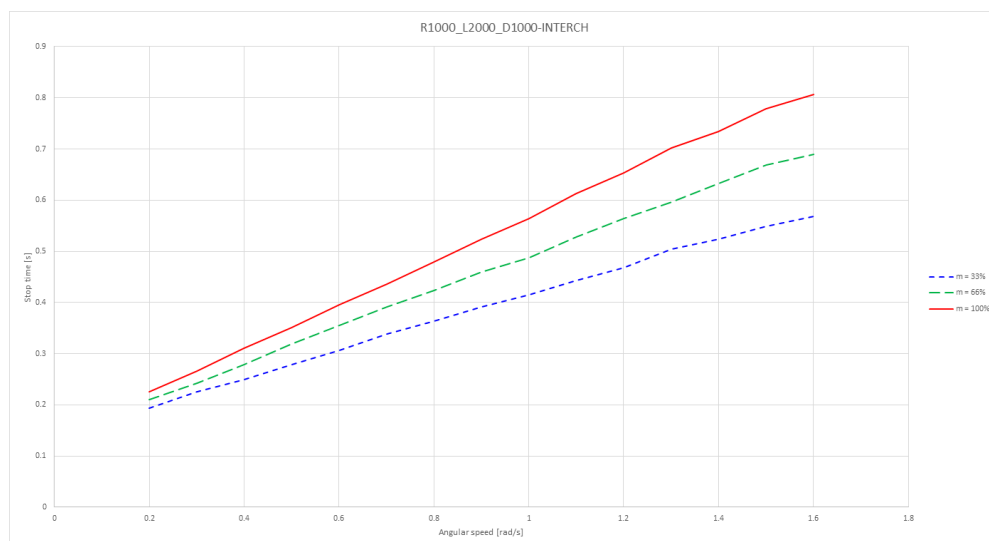
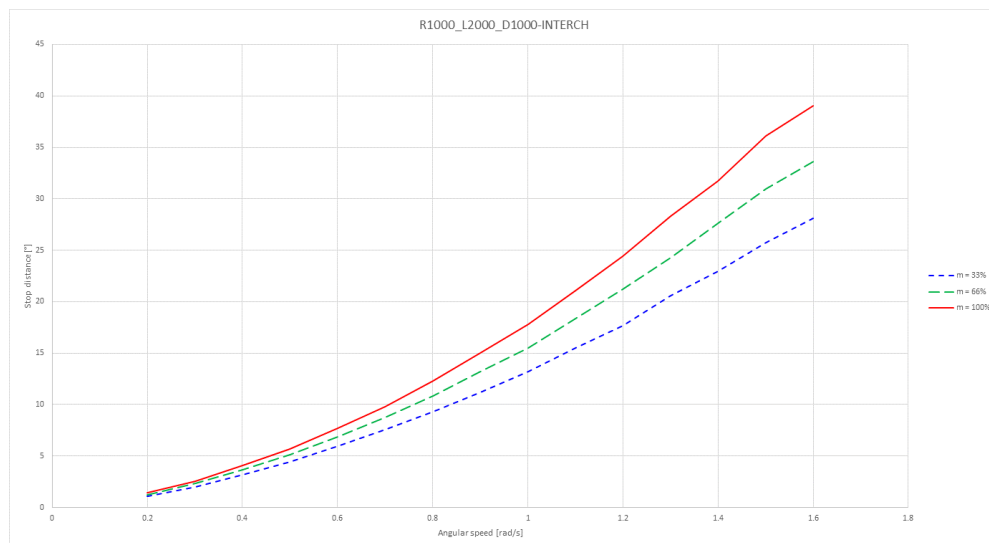
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Category 1, INTERCH

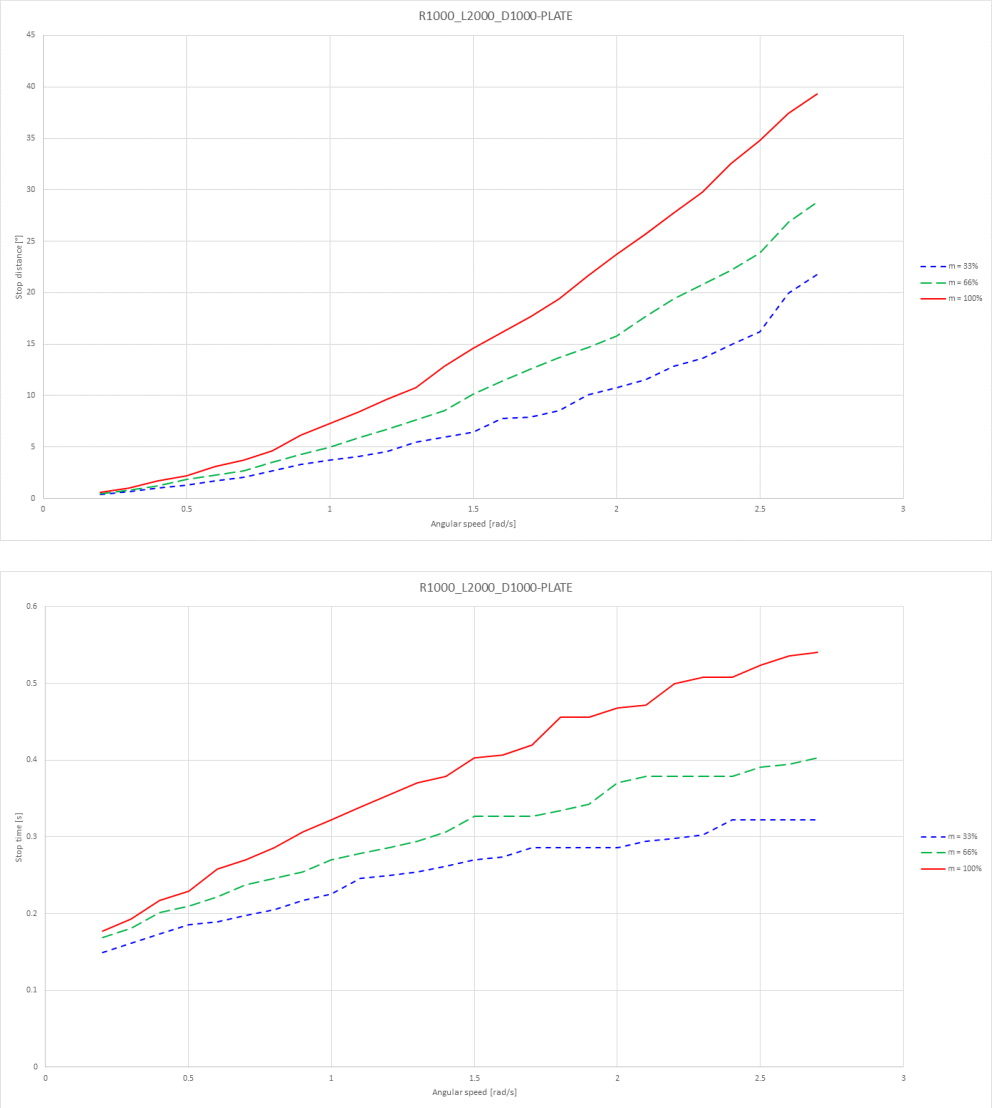
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Category 1, PLATE

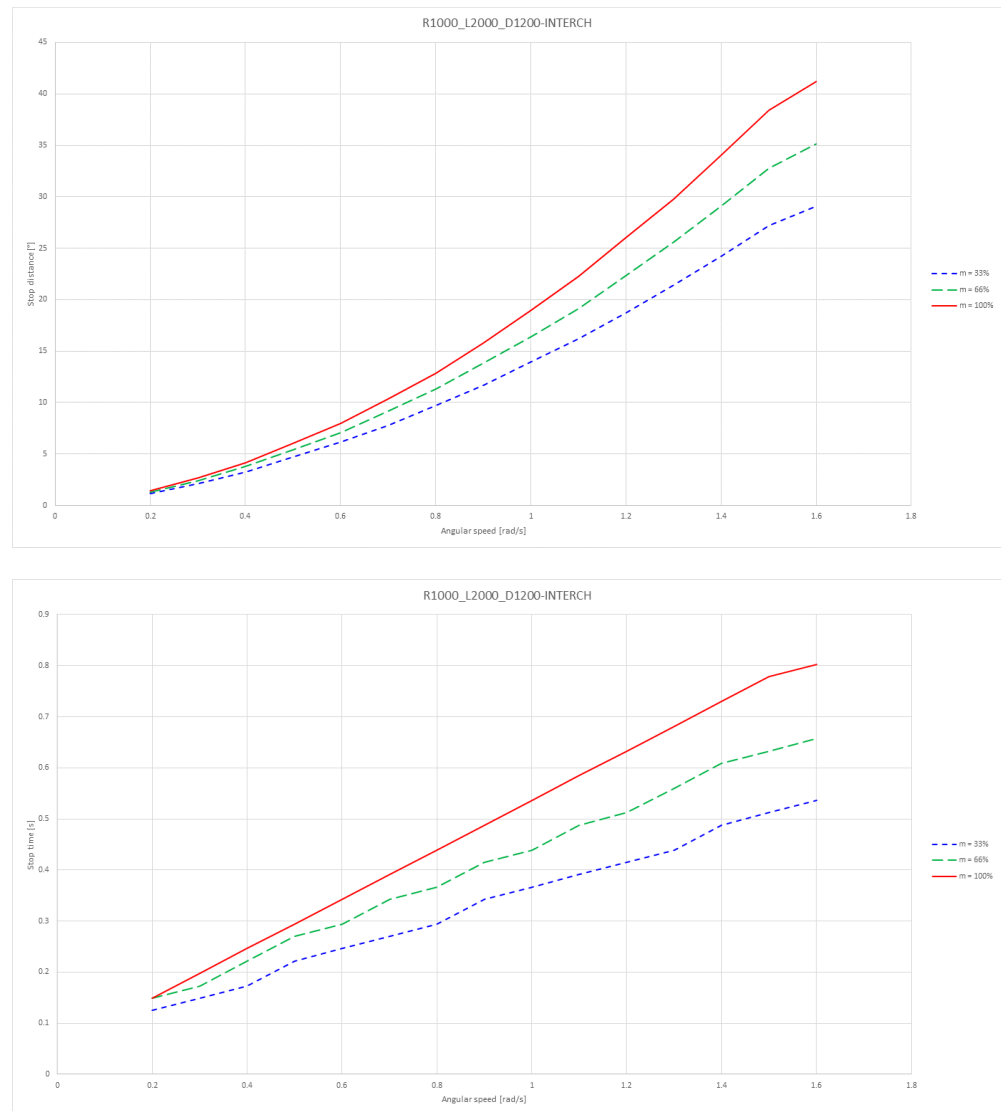
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26.4 R1000_L2000_D1200

Category 0, INTERCH

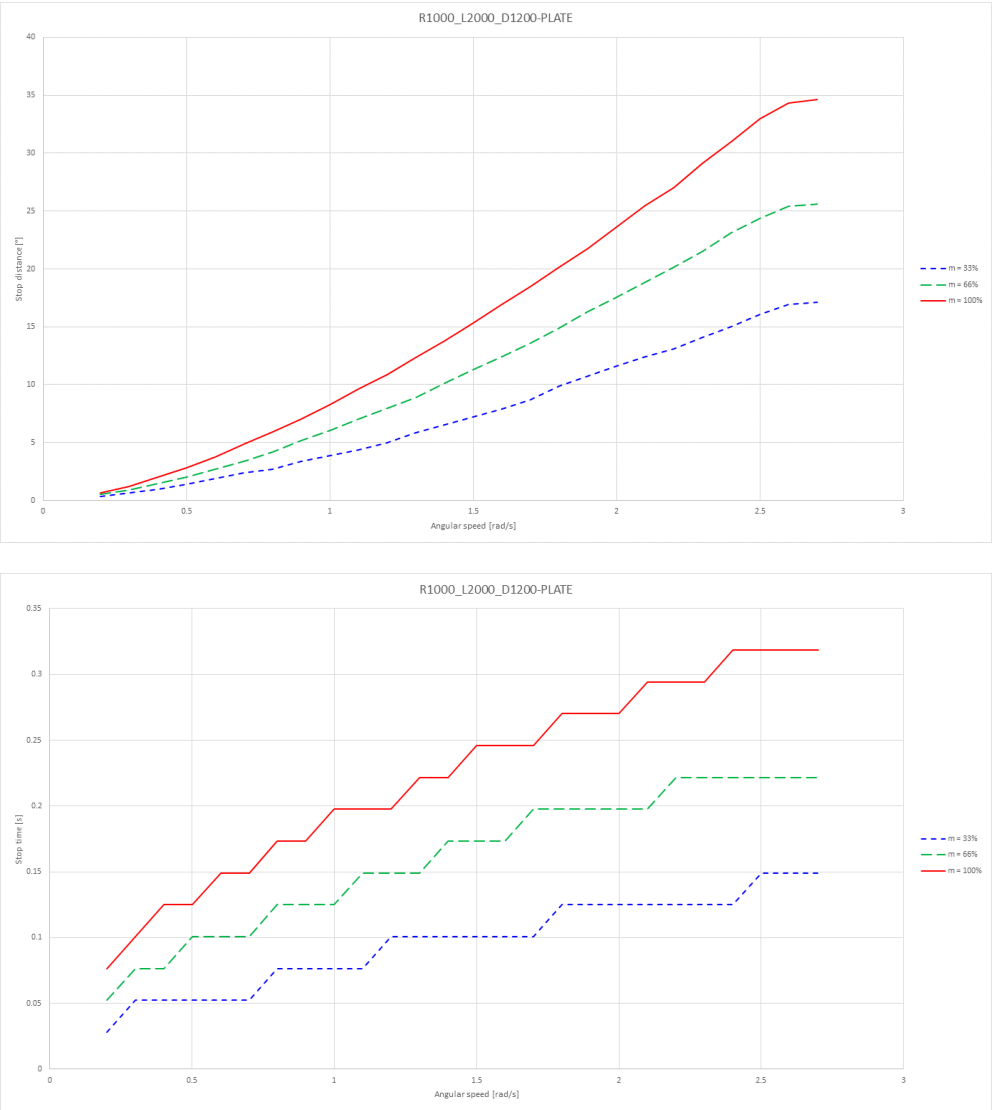
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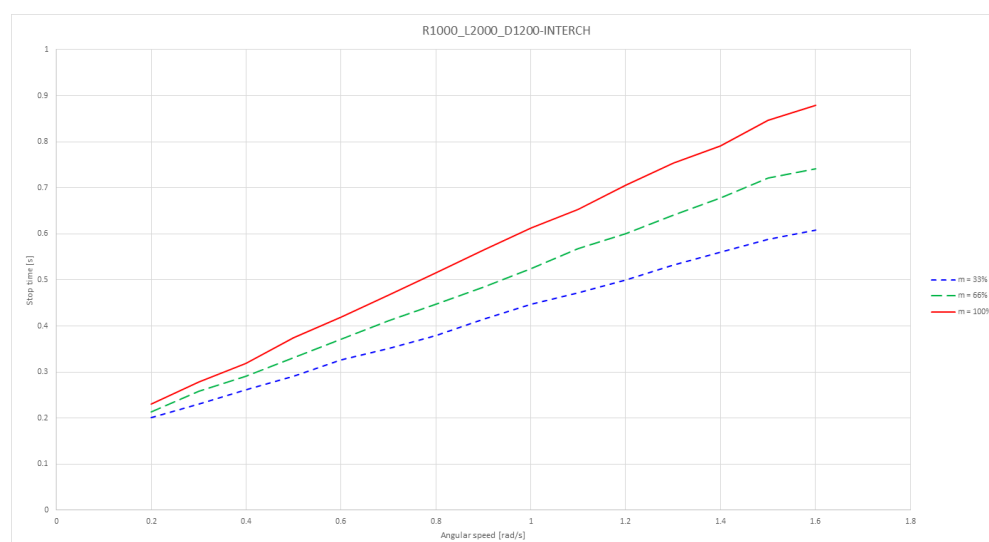
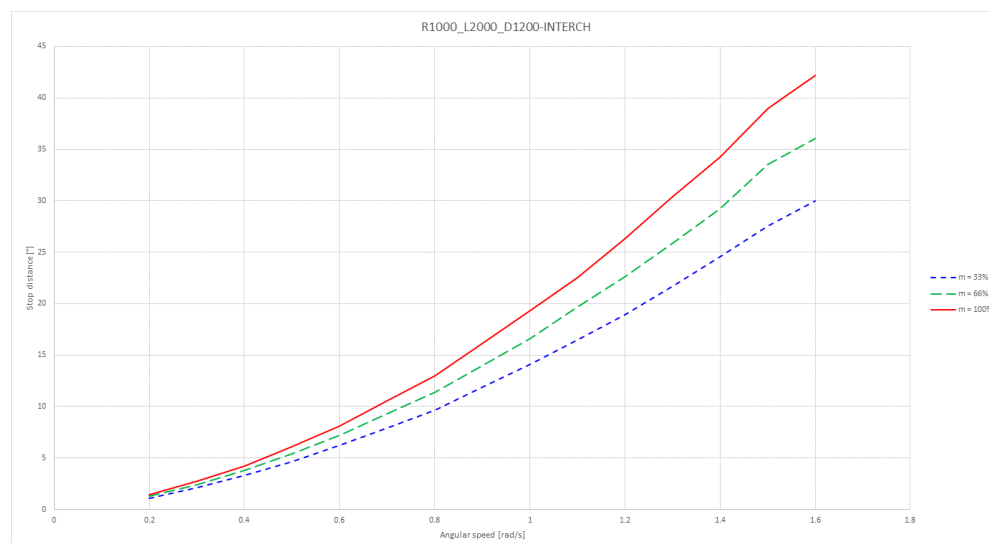
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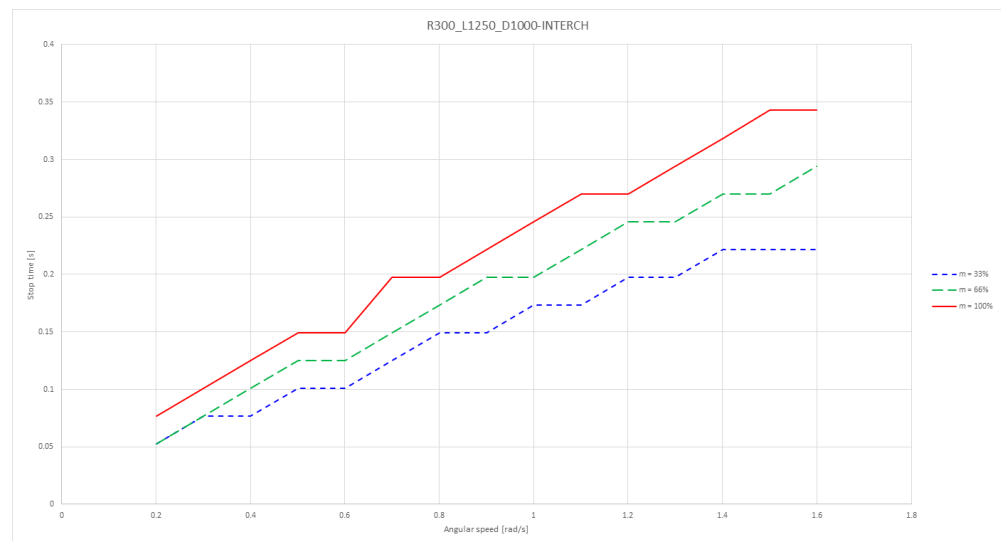
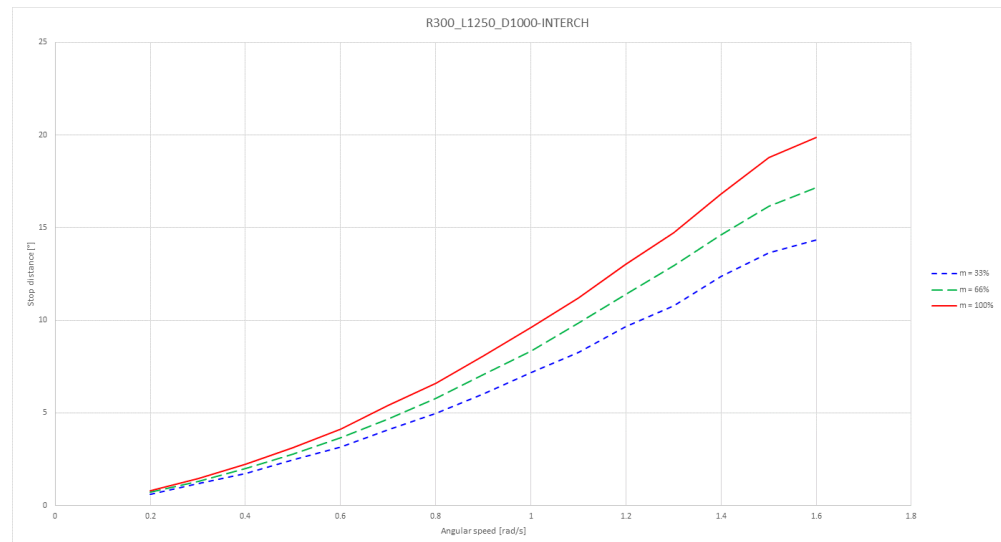
Stopping distance and stopping time



26.5 R300_L1250_D1000

Category 0, INTERCH

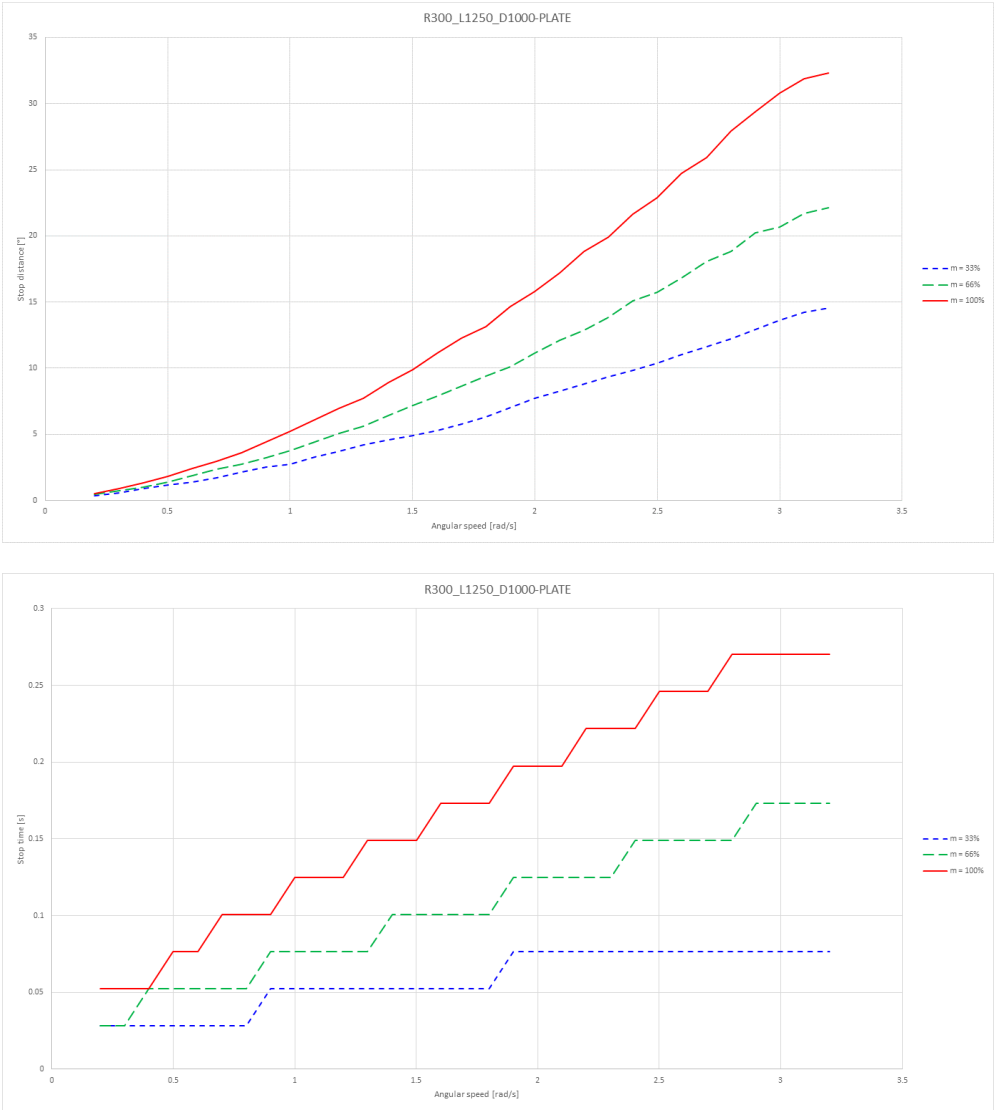
Stopping distance and stopping time



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Category 0, PLATE

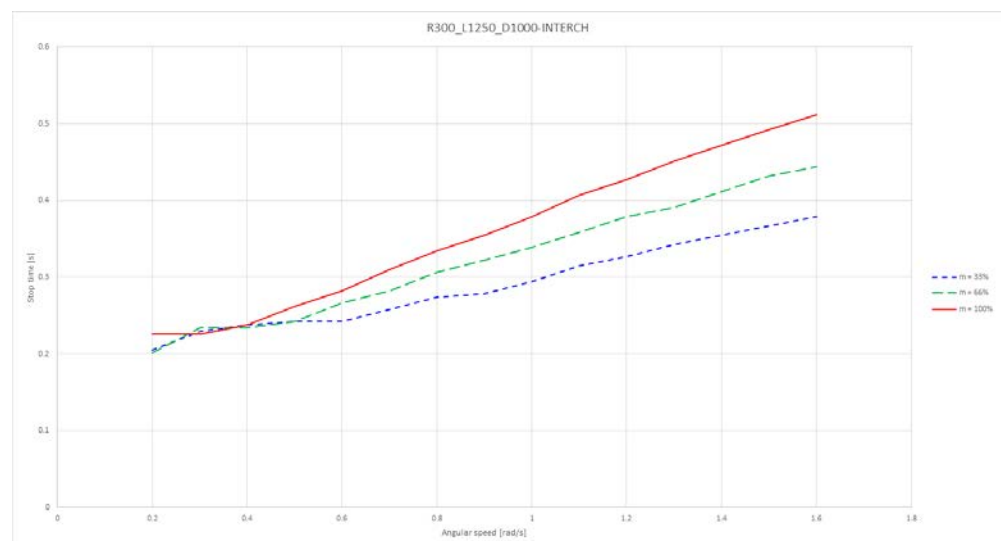
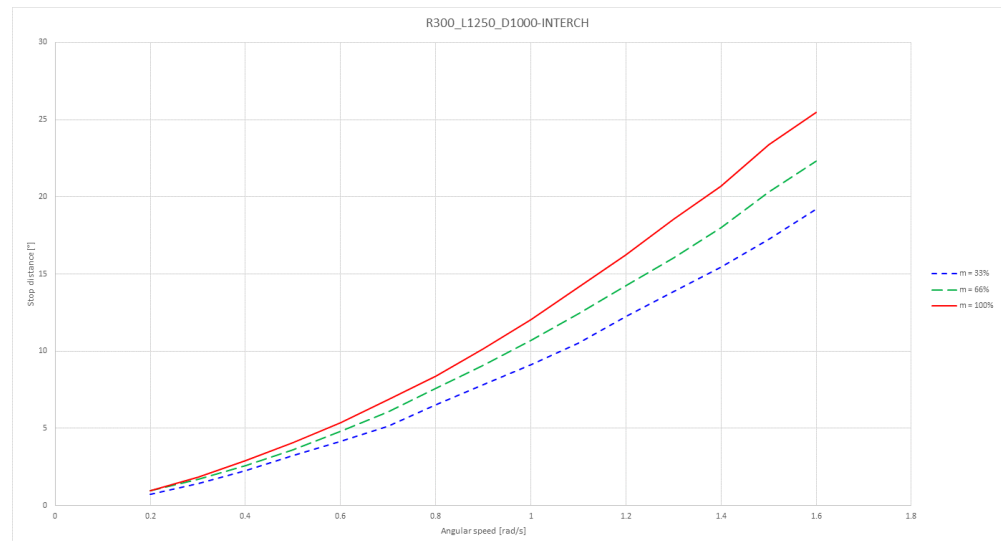
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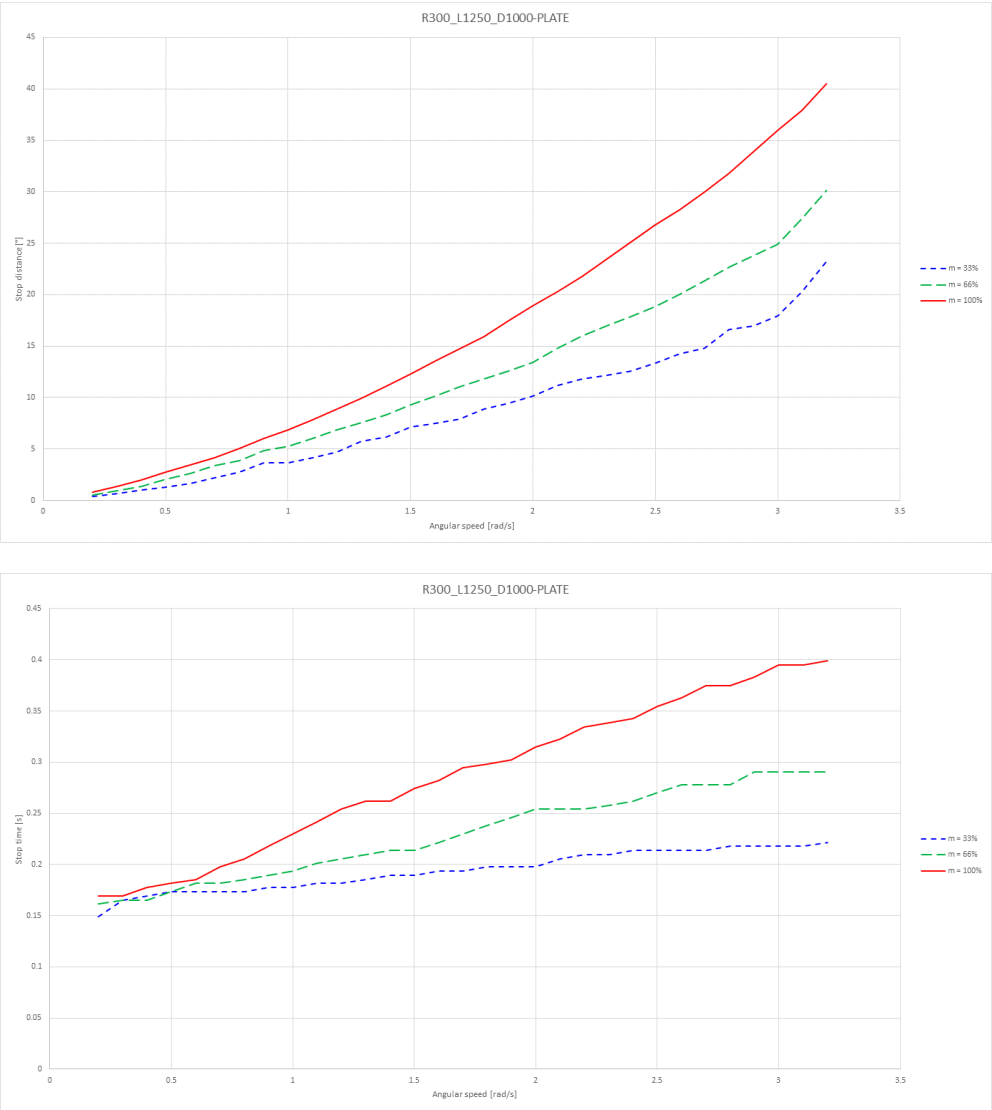
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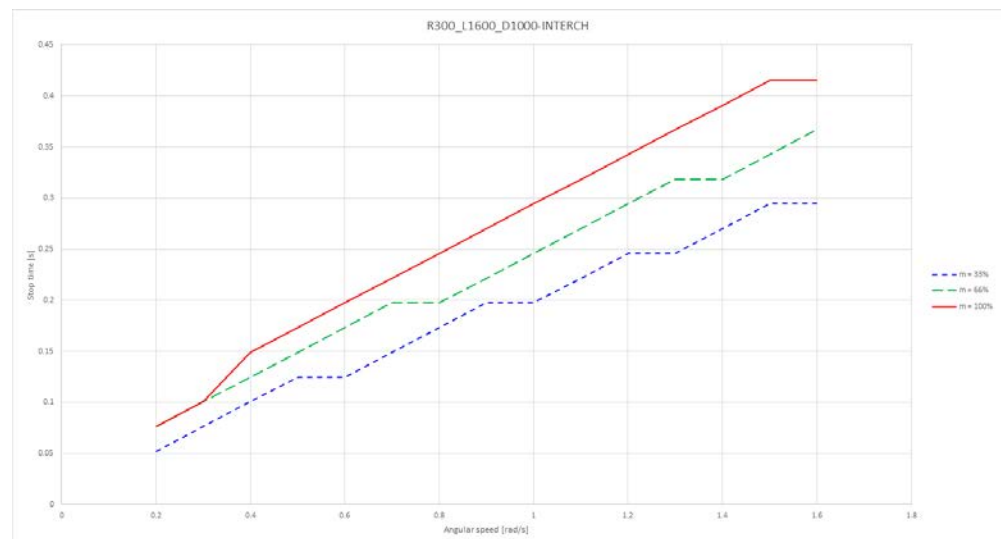
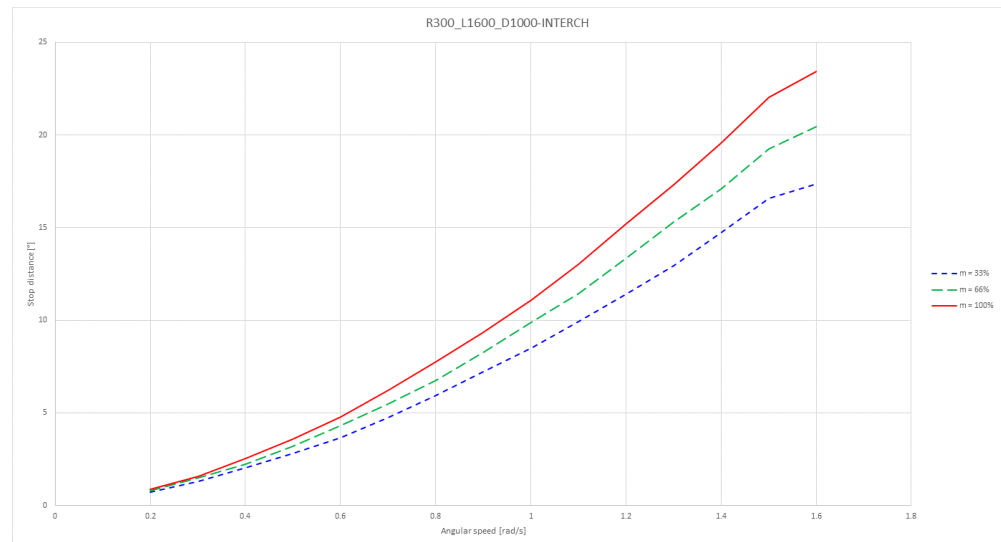
Stopping distance and stopping time



26.6 R300_L1600_D1000

Category 0, INTERCH

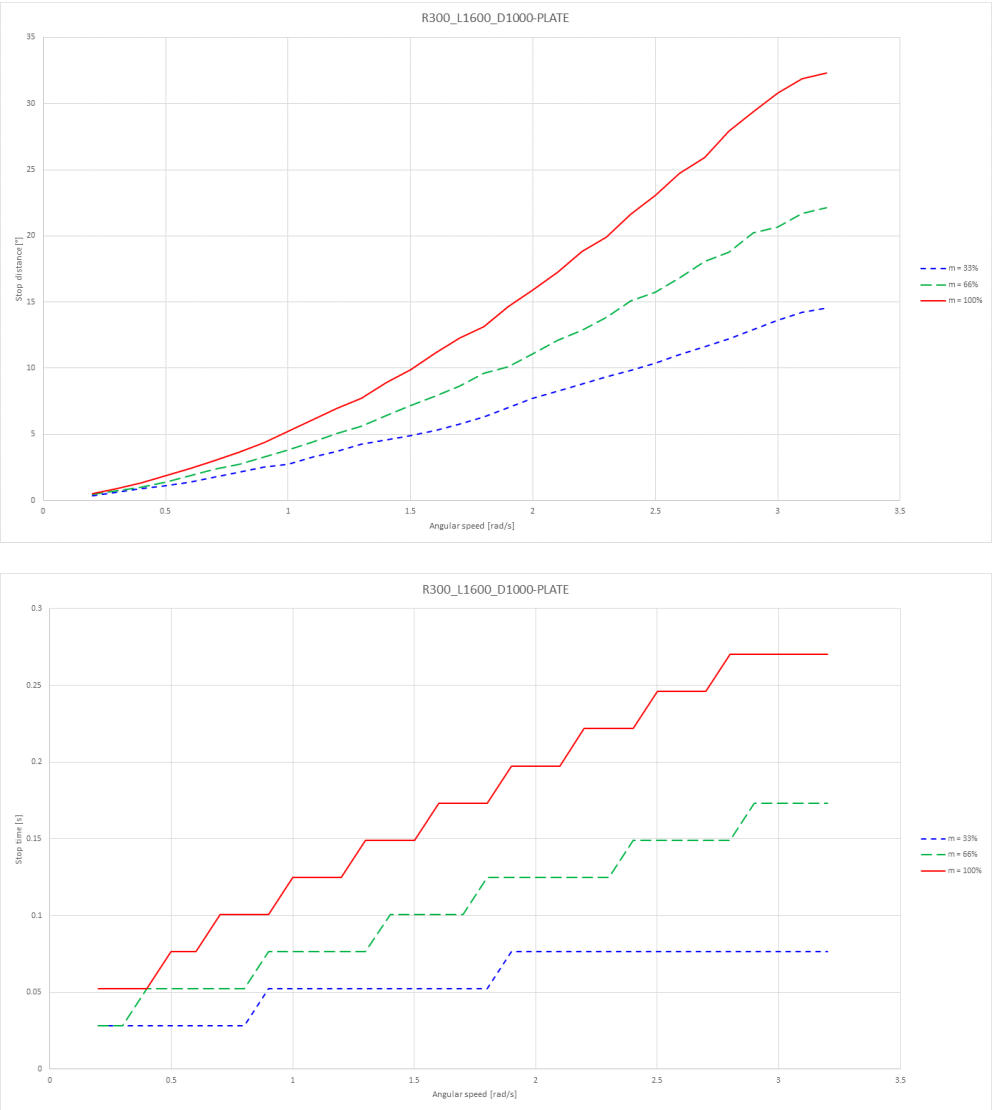
Stopping distance and stopping time



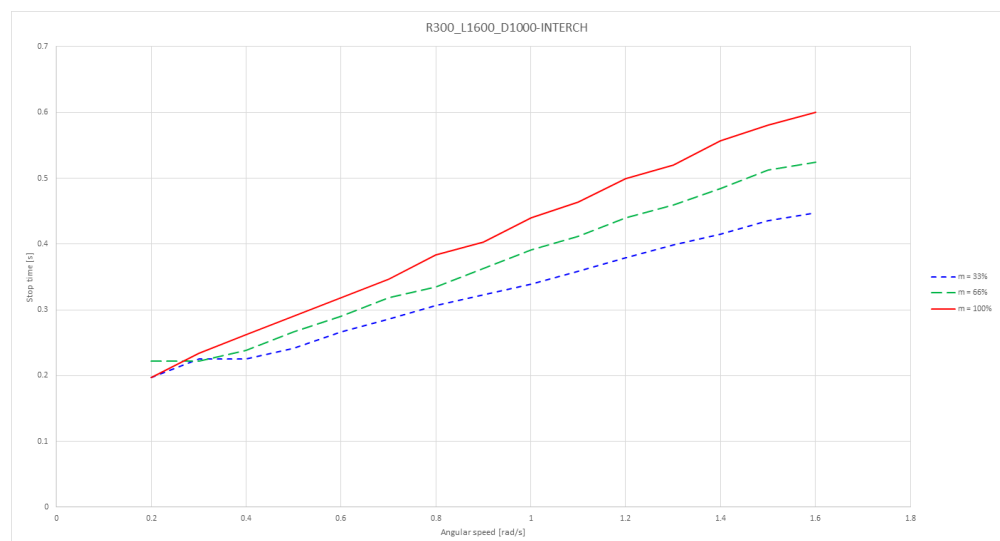
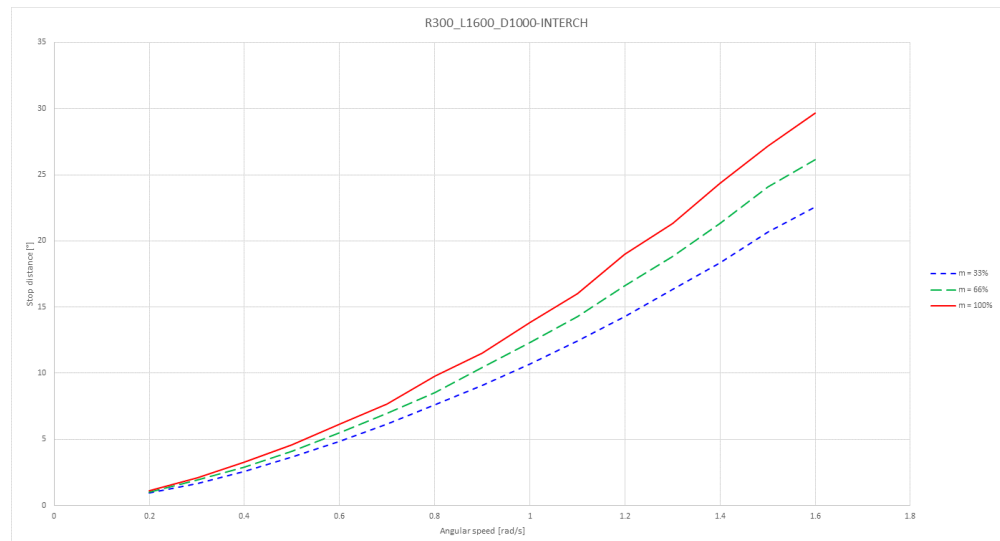
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Stopping distance and stopping time

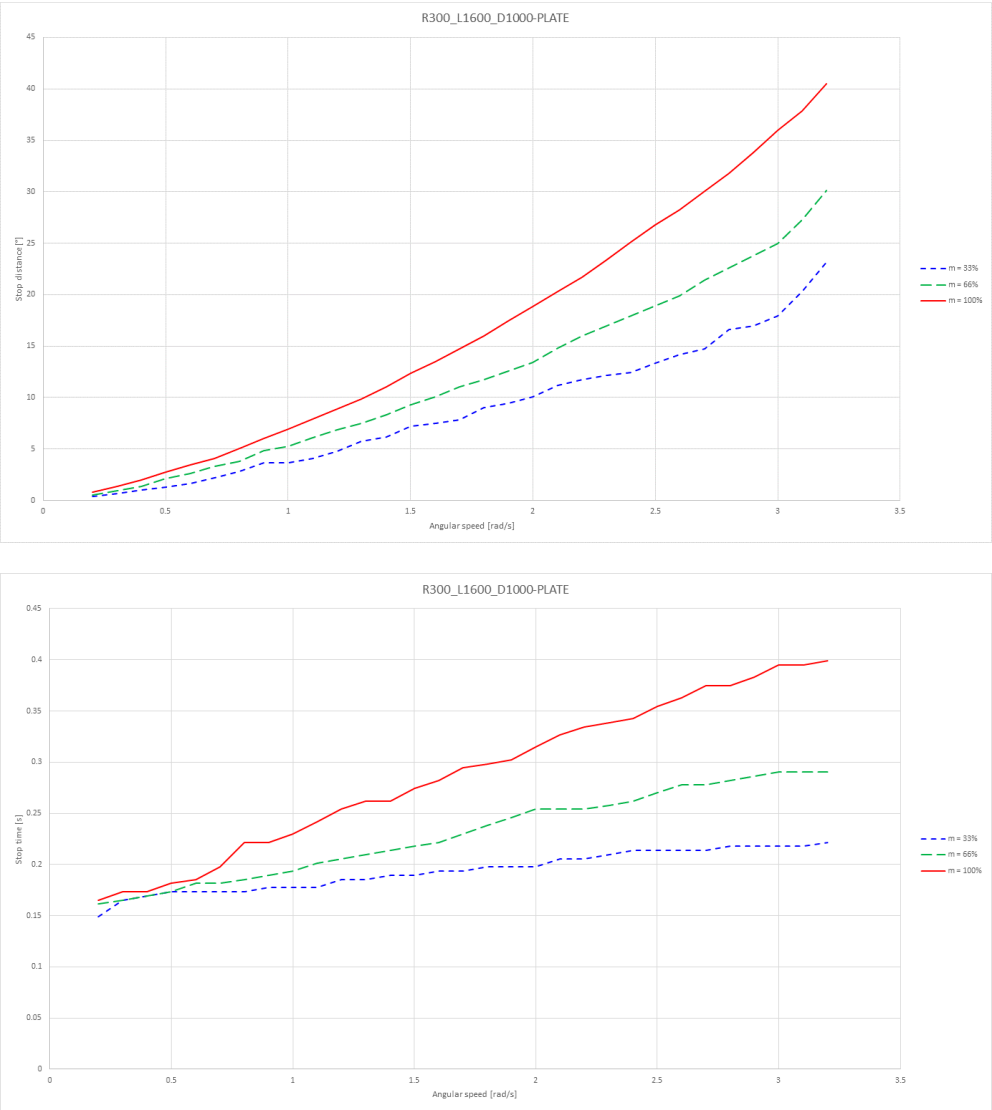


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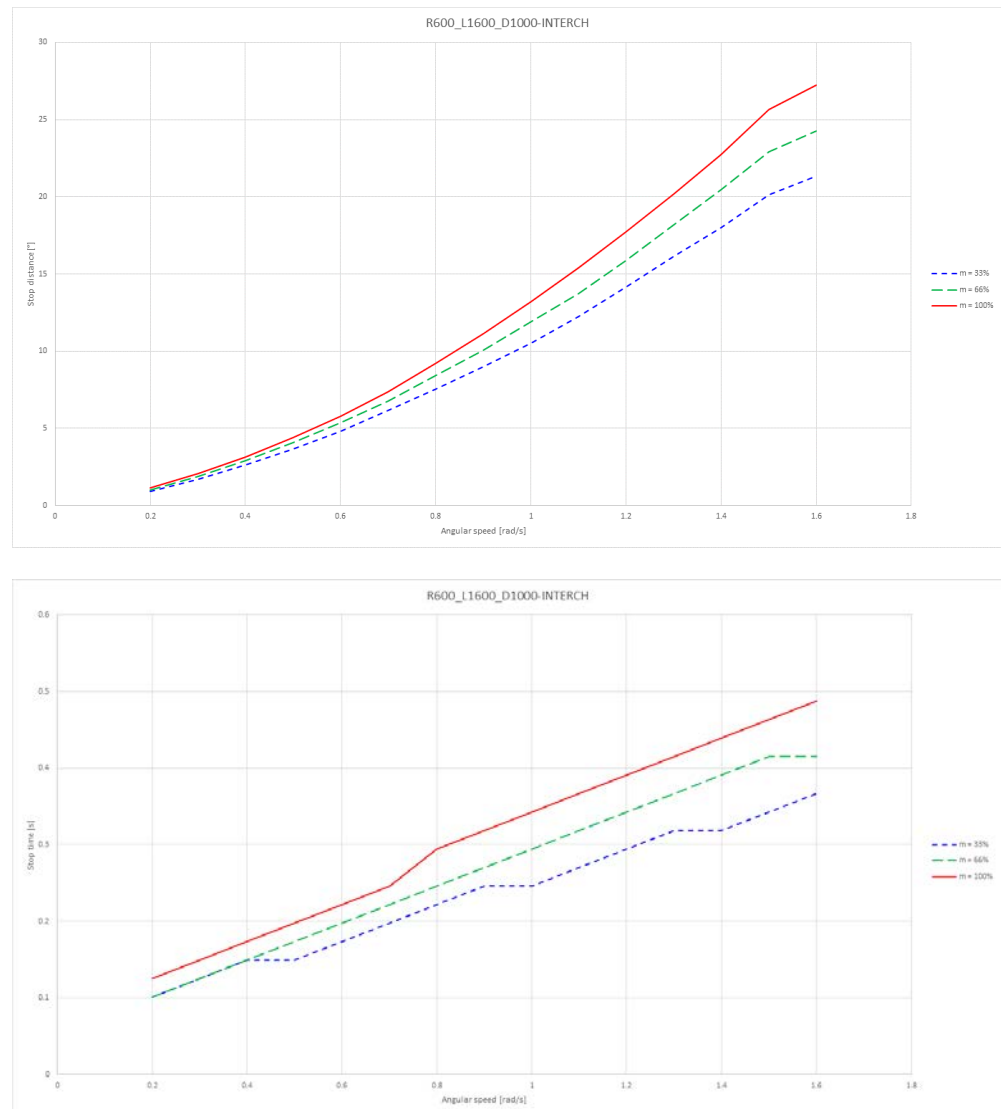
Stopping distance and stopping time



26.7 R600_L1600_D1000

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Stopping distance and stopping time



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Category 0, PLATE

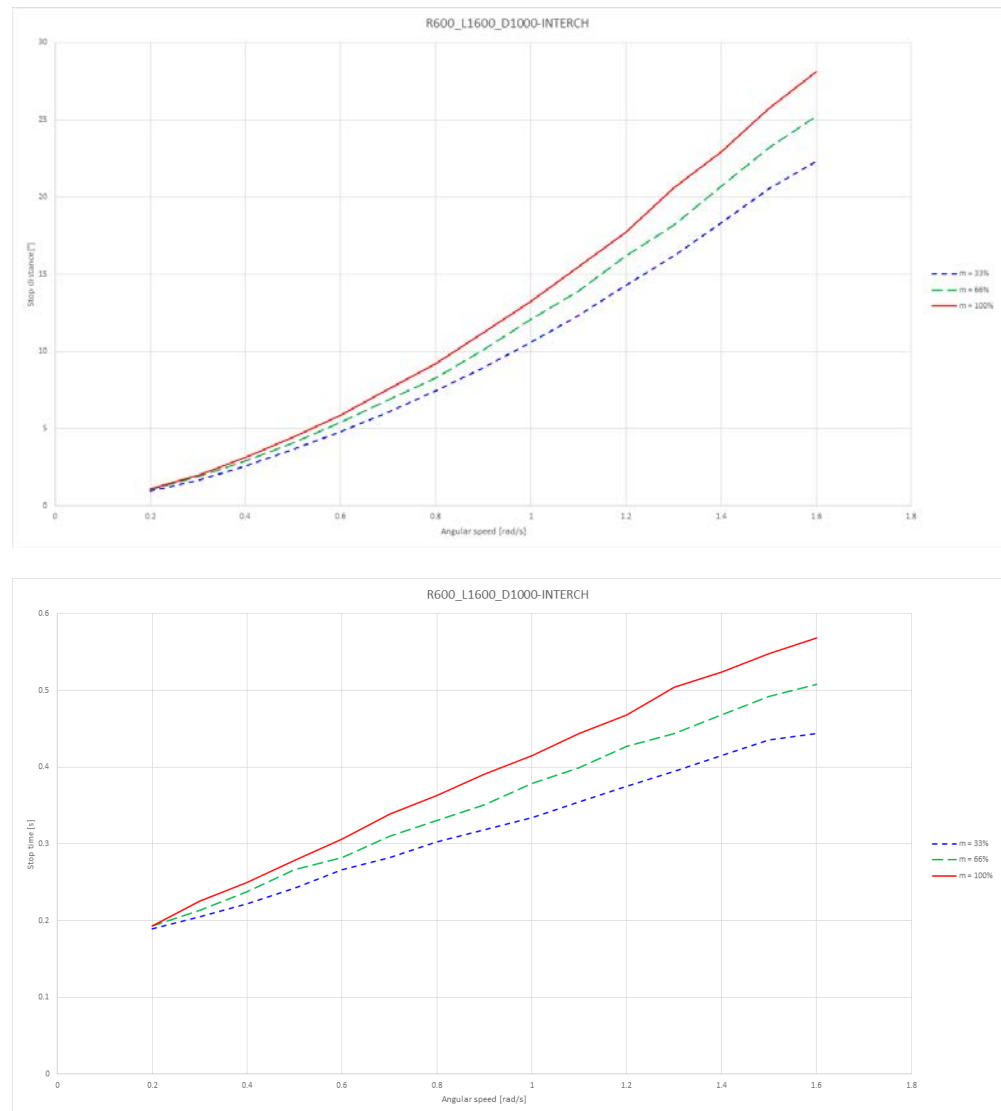
Stopping distance and stopping time



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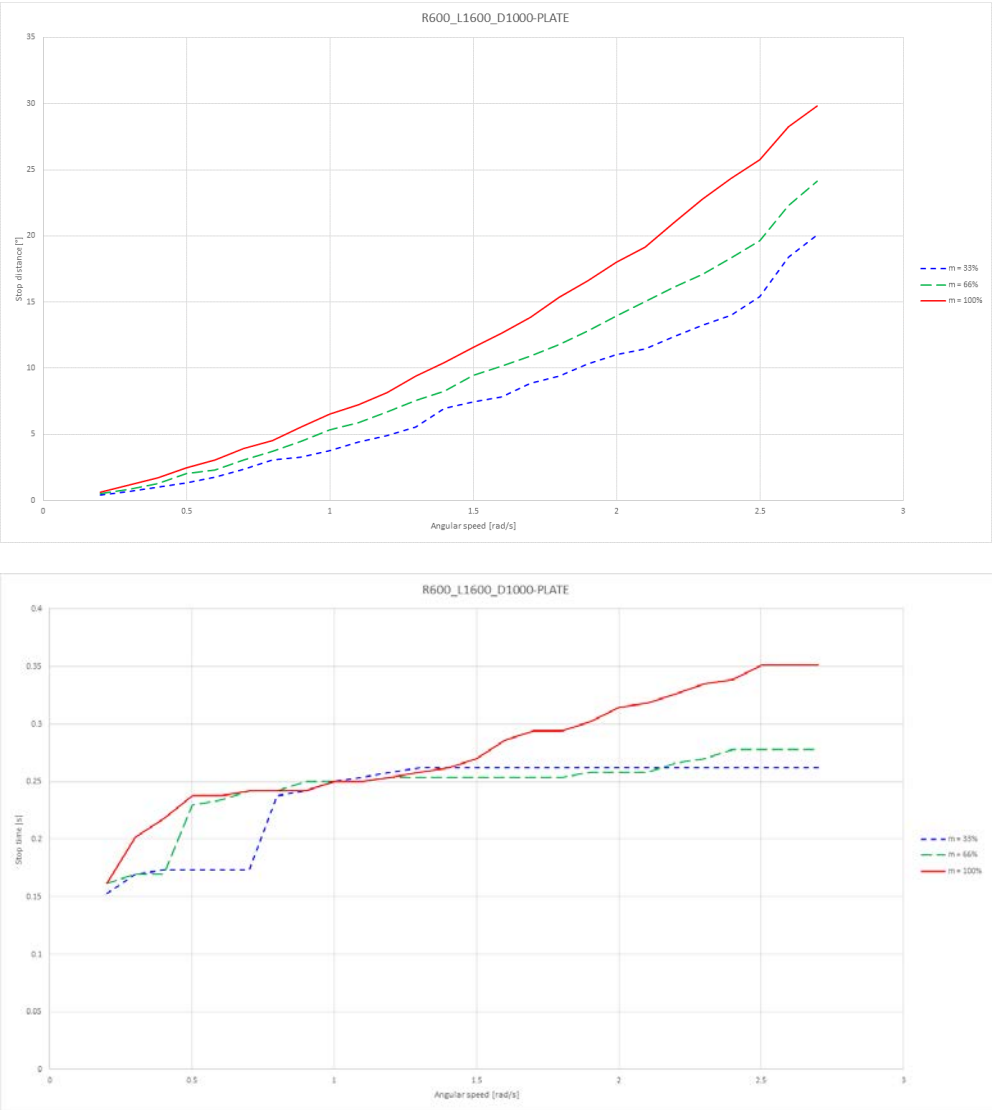
Stopping distance and stopping time



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Category 1, PLATE

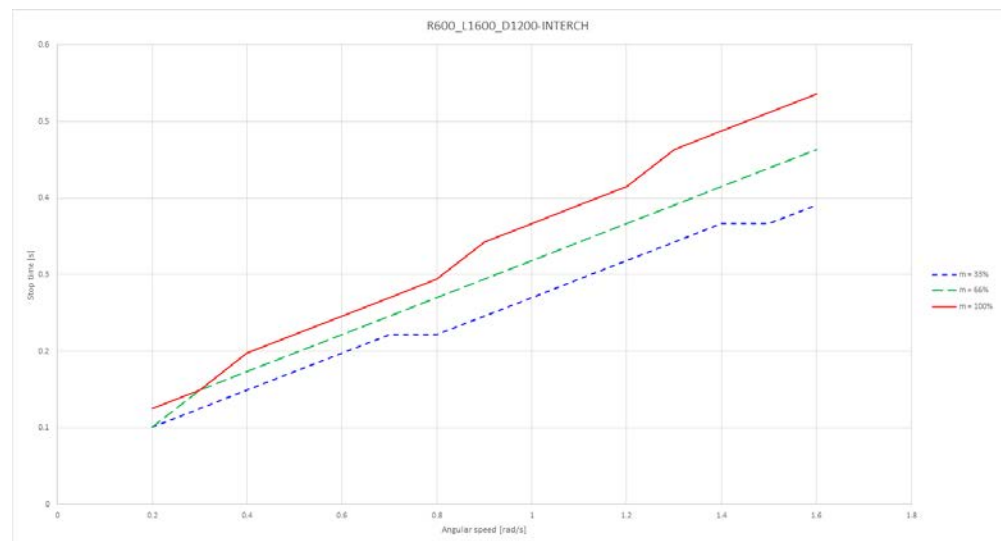
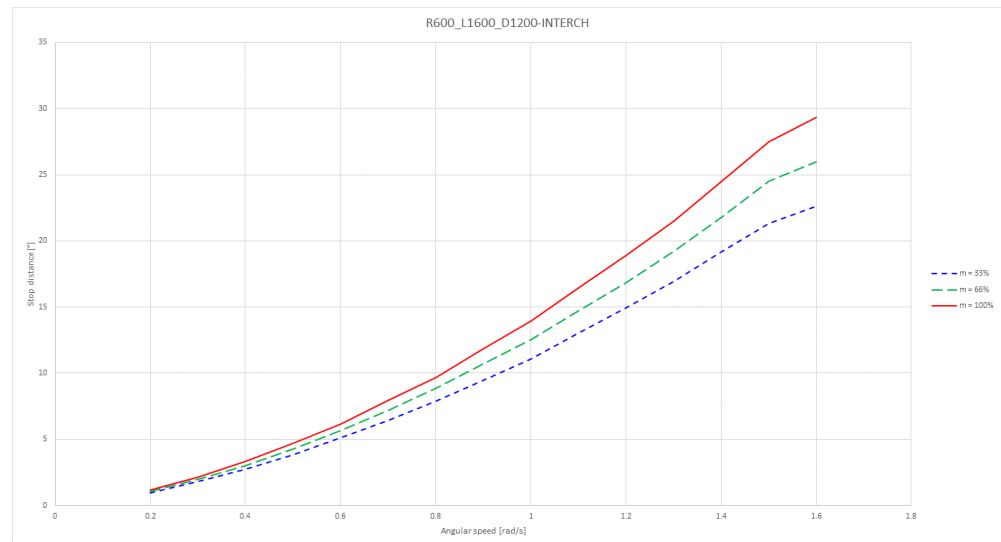
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26.8 R600_L1600_D1200

Category 0, INTERCH

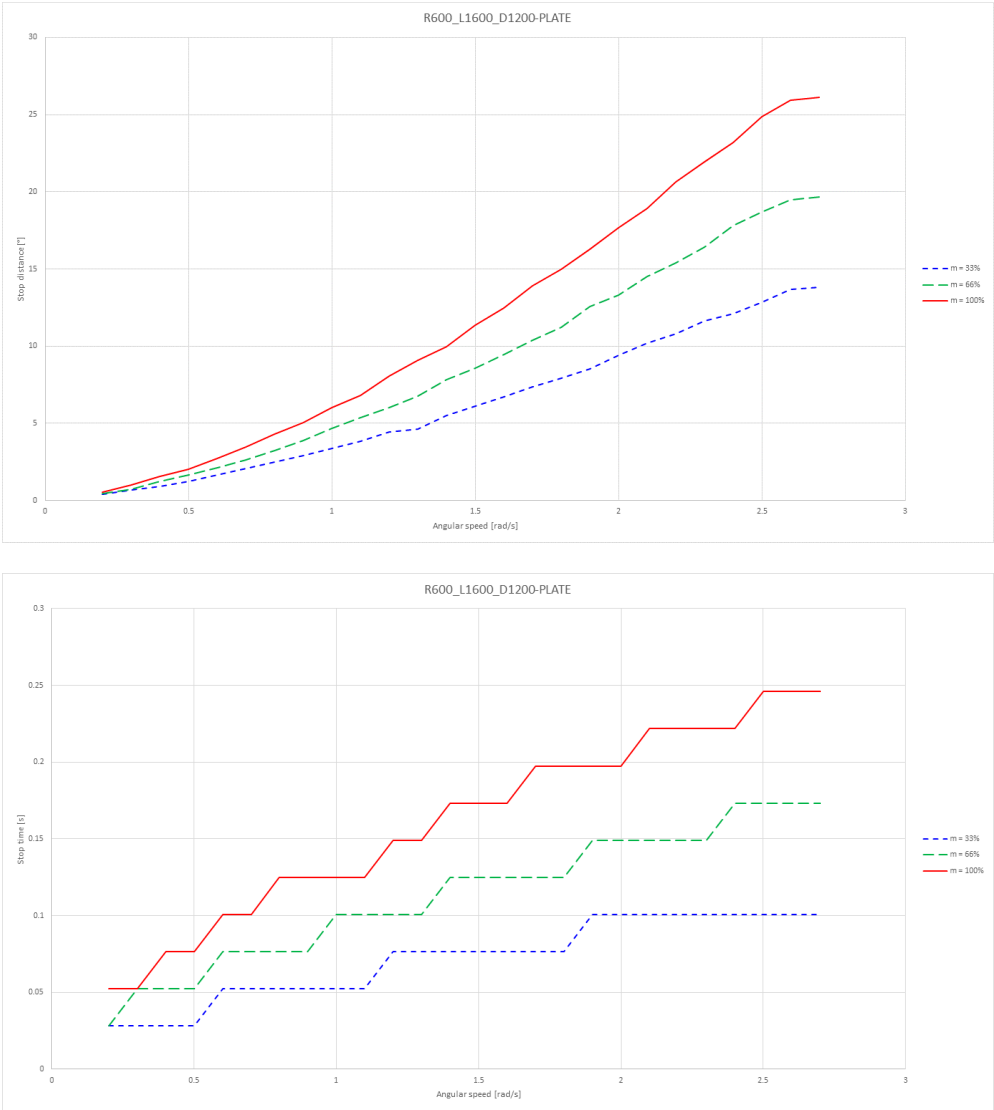
Stopping distance and stopping time



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Category 0, PLATE

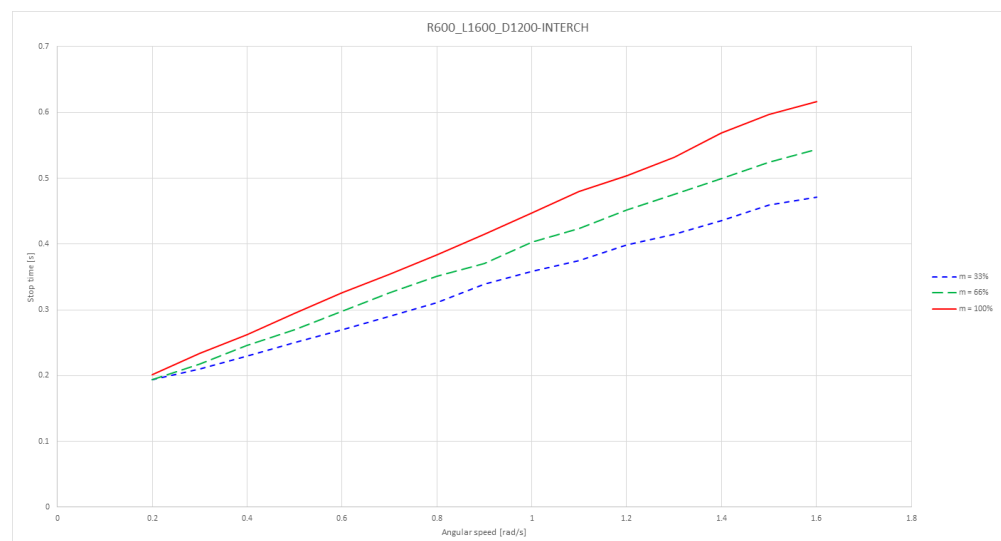
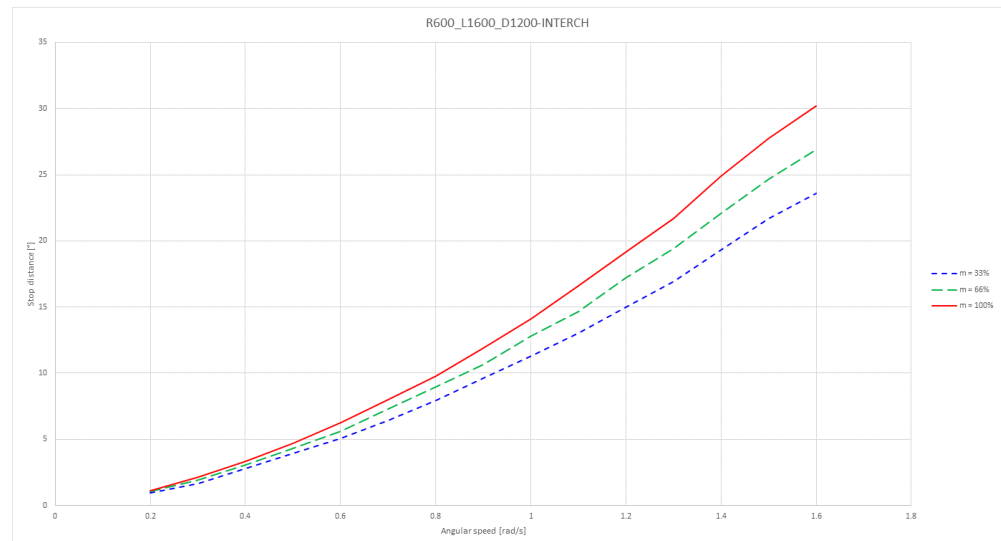
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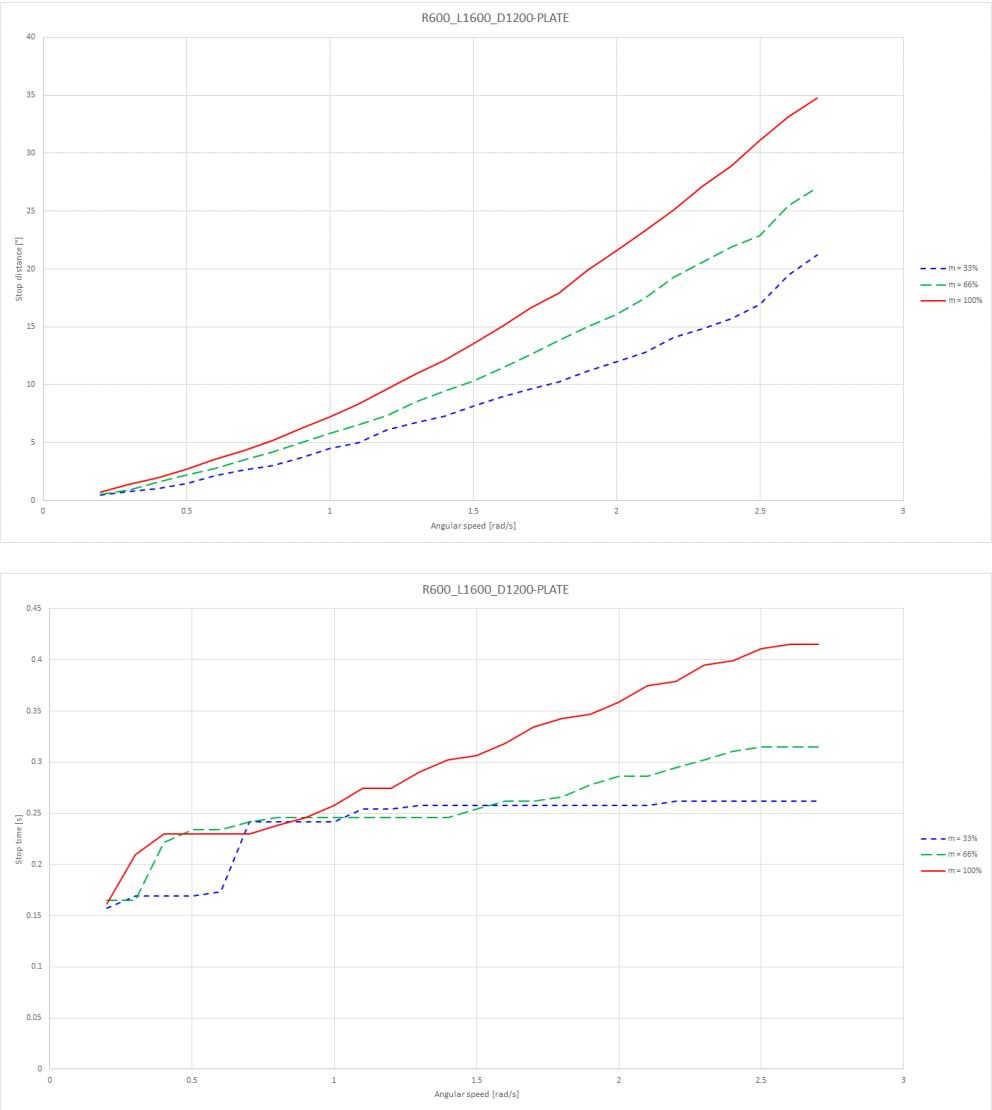
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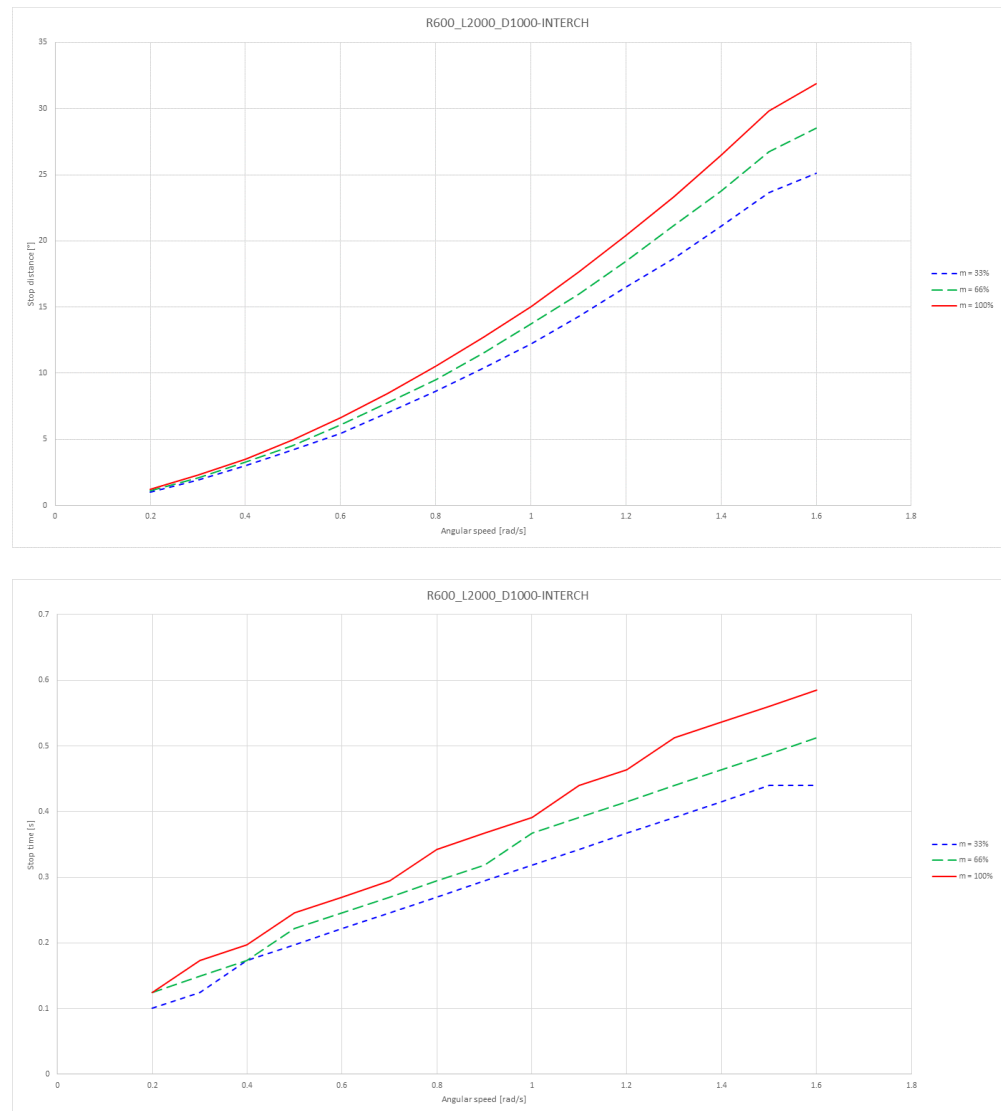
Stopping distance and stopping time



26.9 R600_L2000_D1000

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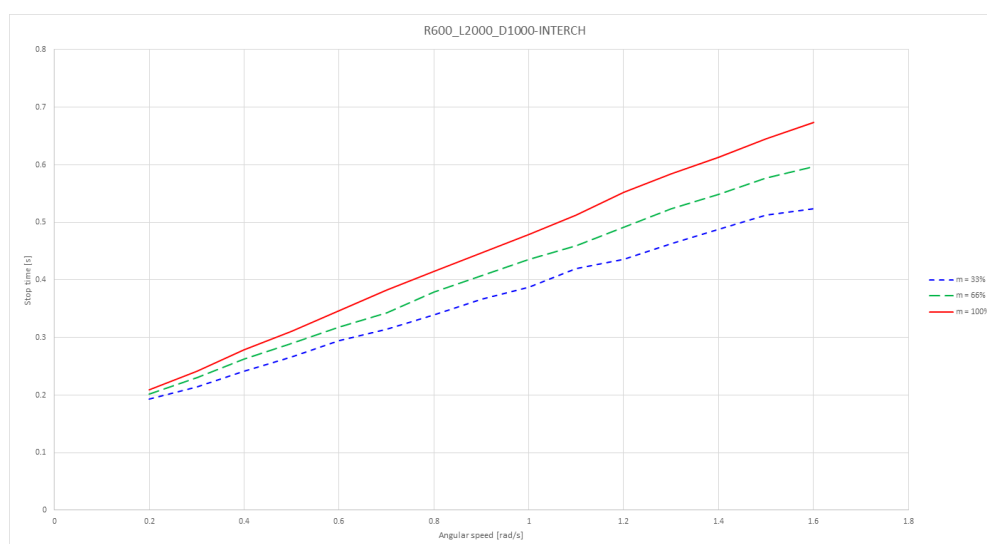
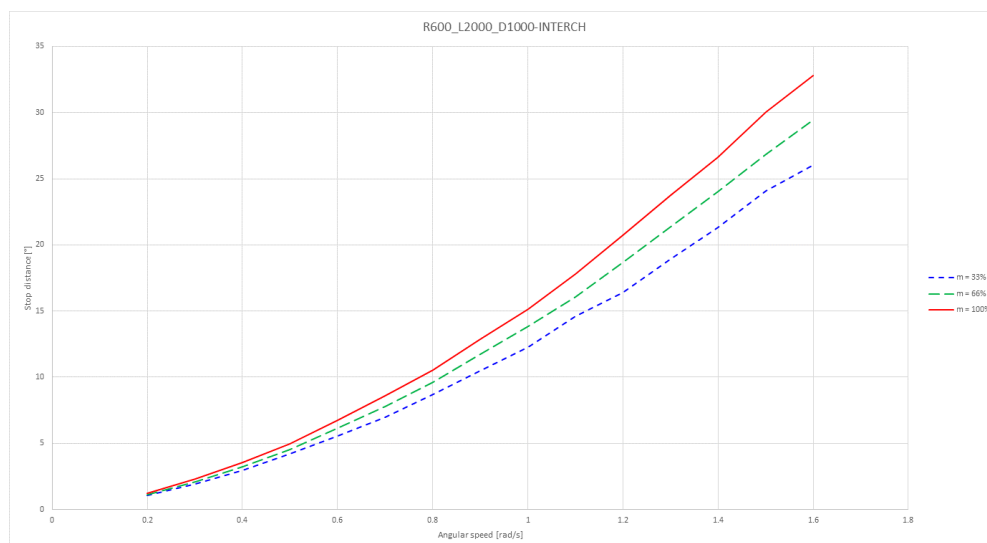
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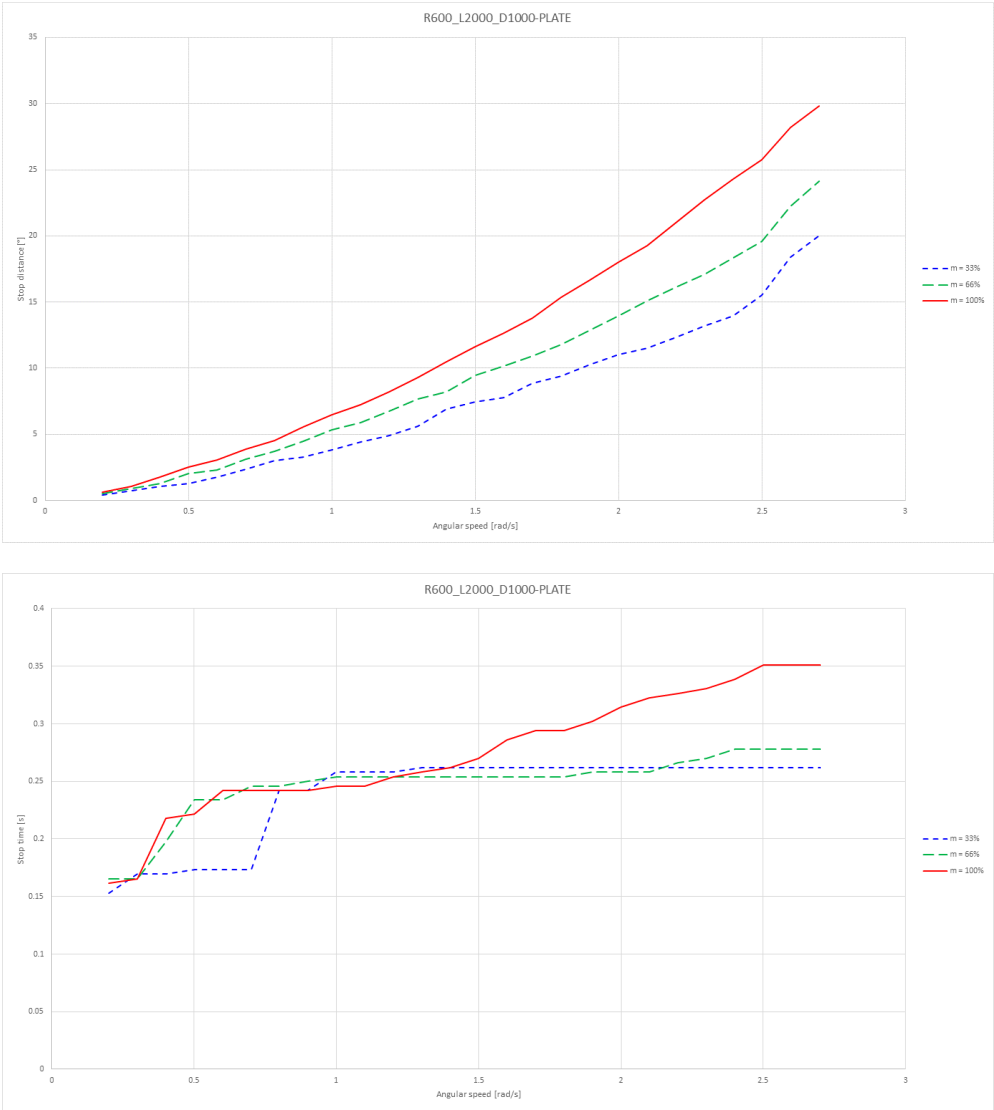
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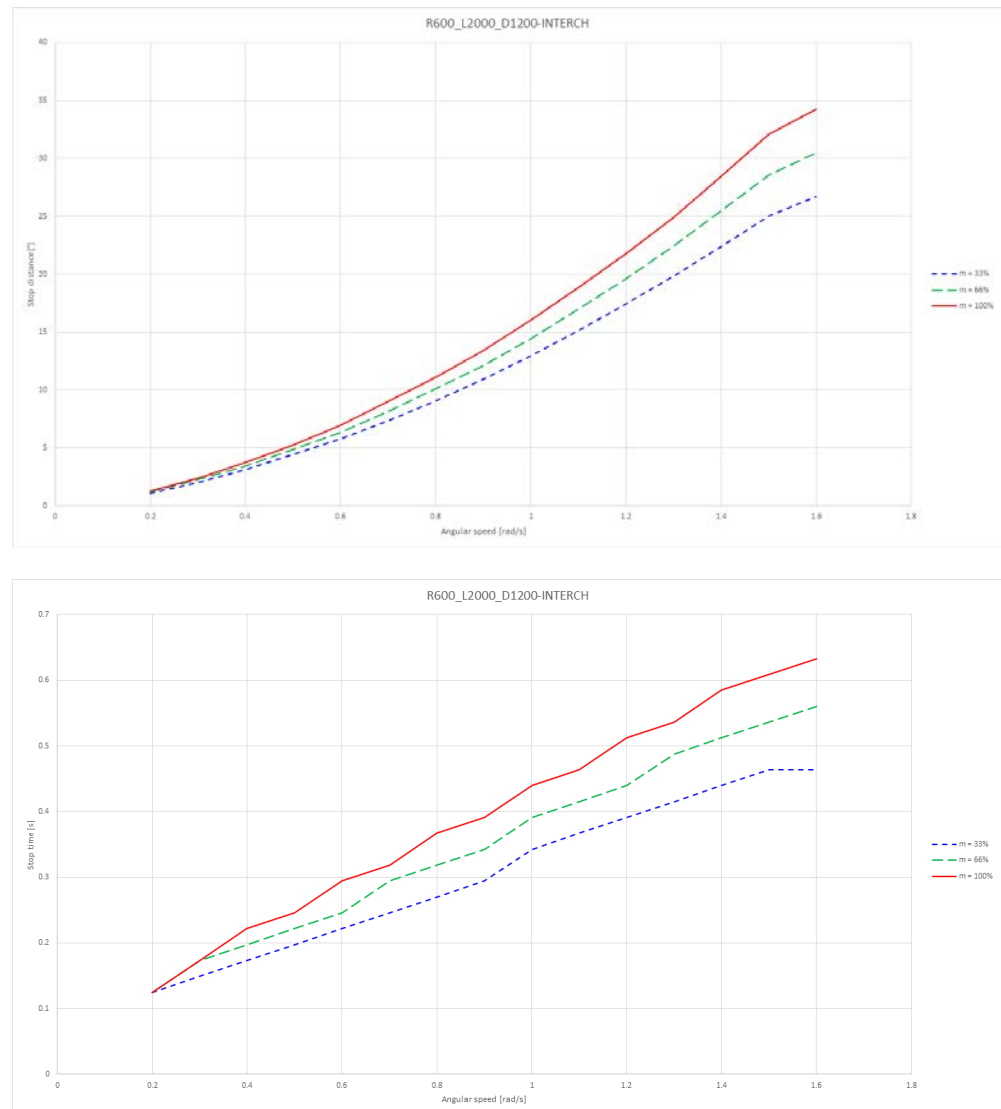
Stopping distance and stopping time



26.10 R600_L2000_D1200

Category 0, INTERCH

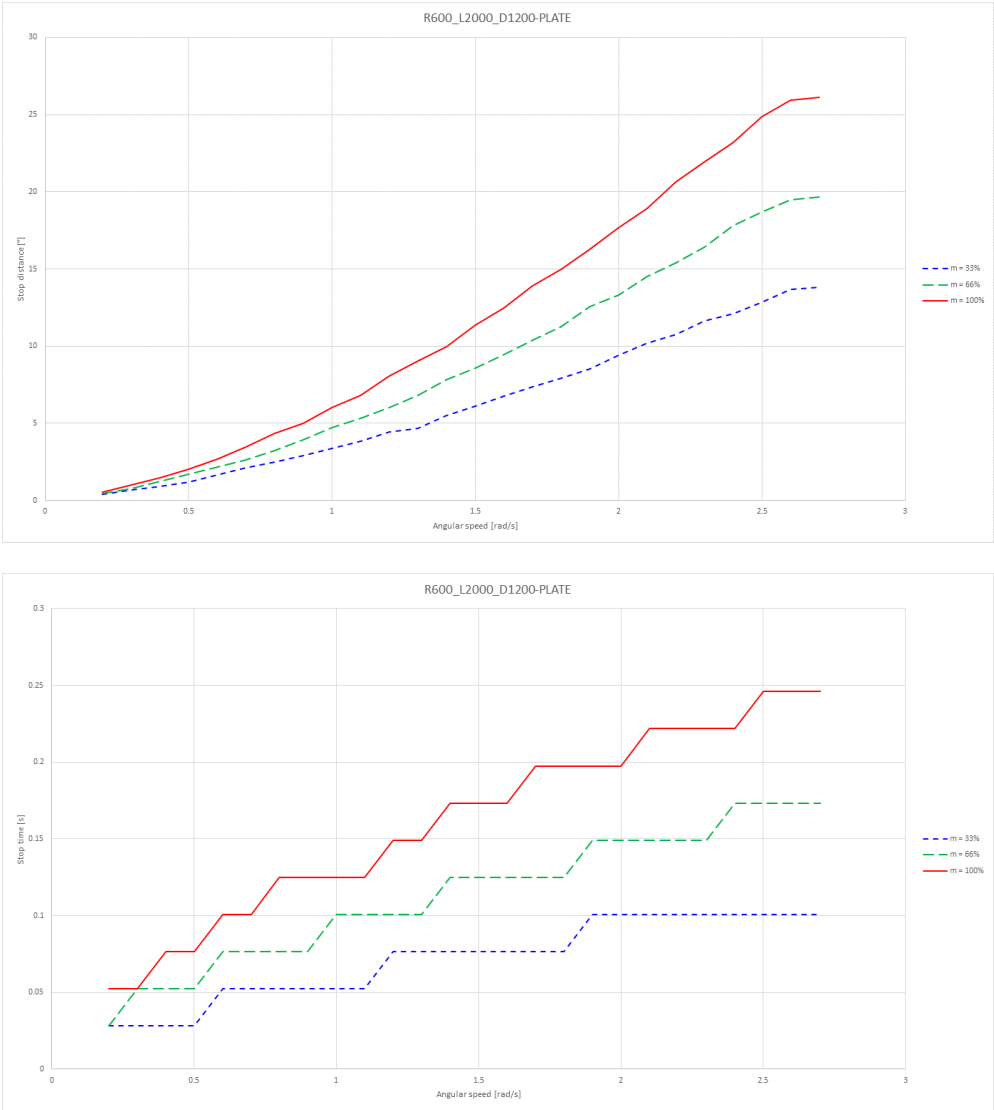
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Category 0, PLATE

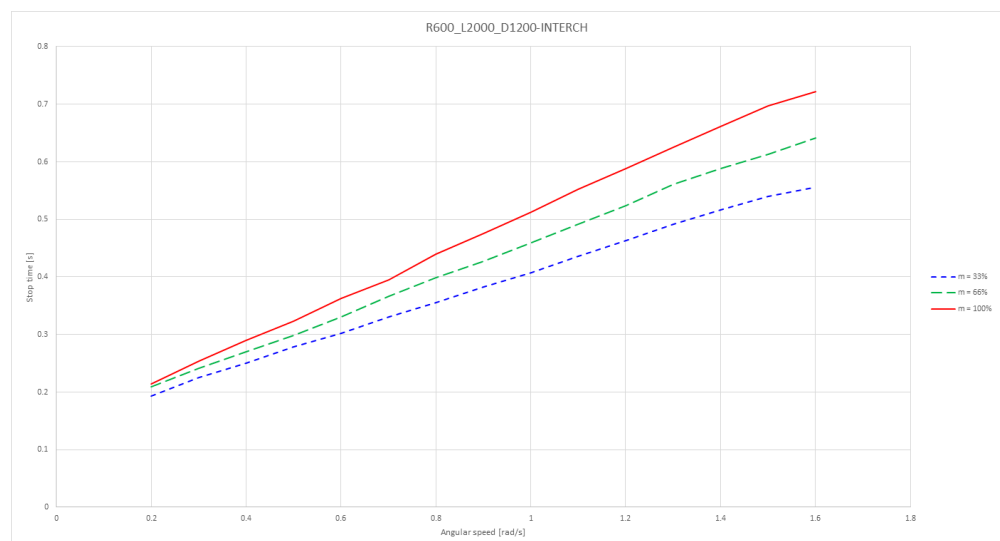
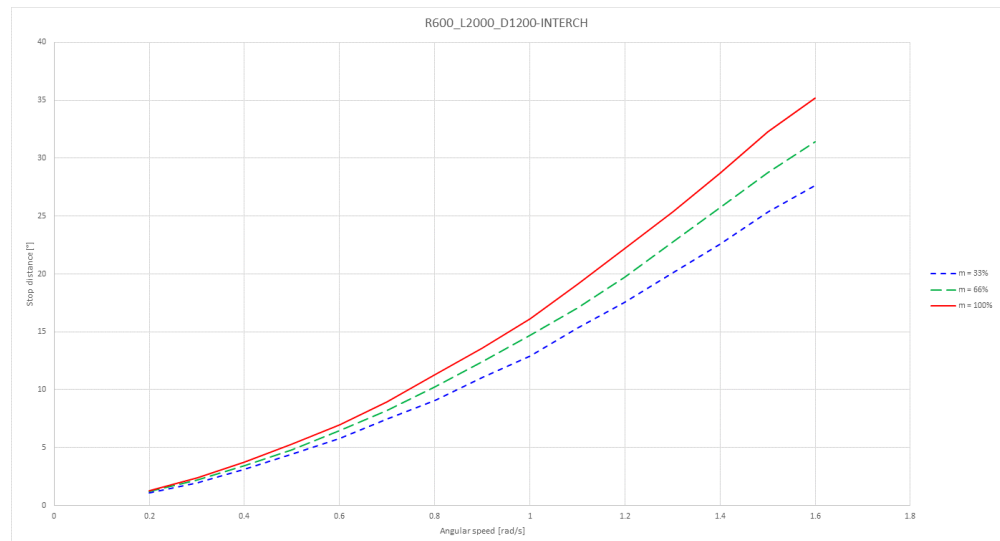
Stopping distance and stopping time



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Category 1, INTERCH

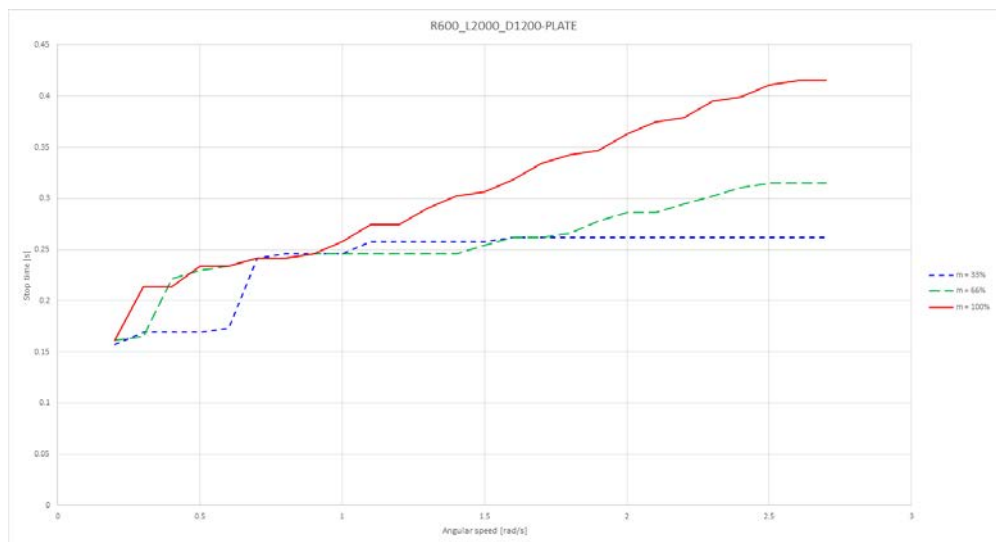
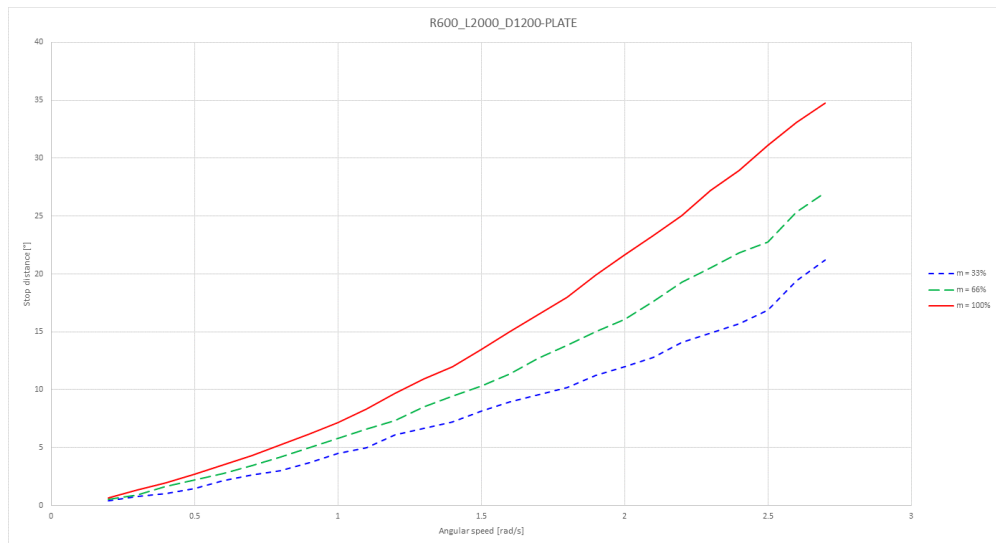
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