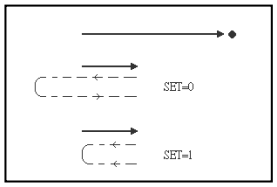
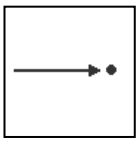
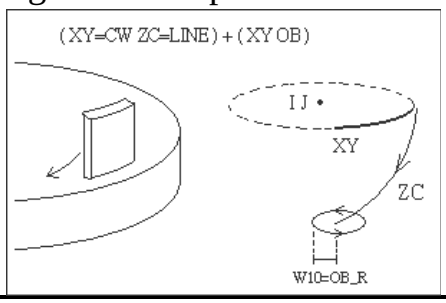
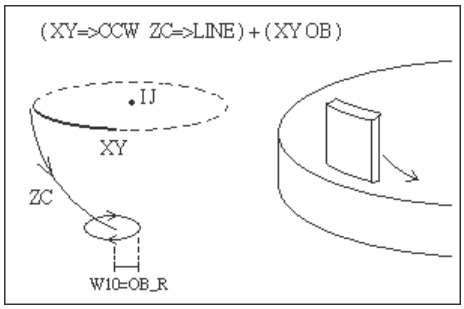
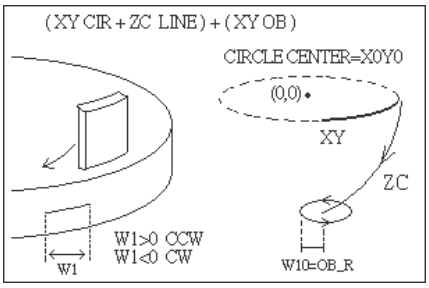
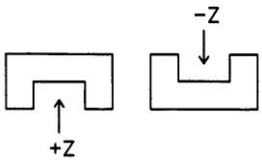
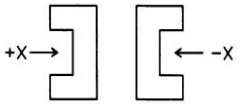
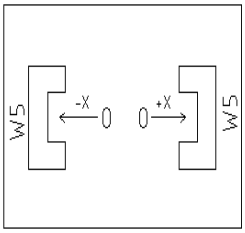
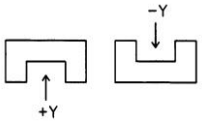
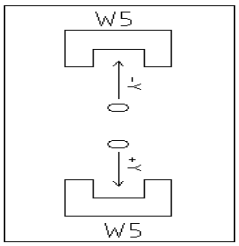
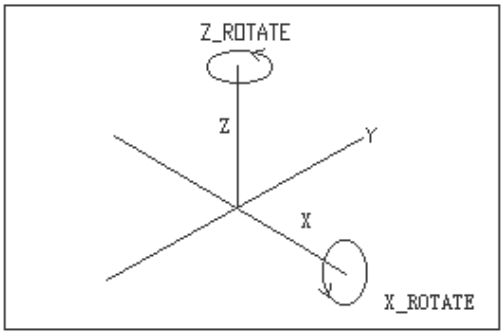
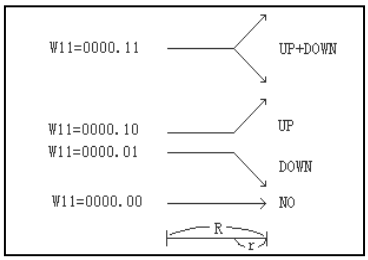
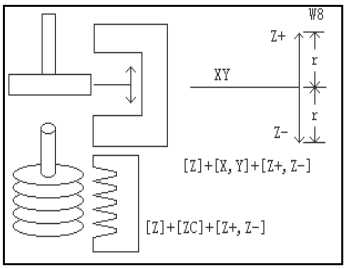
3.6 E CODE Work Conditions

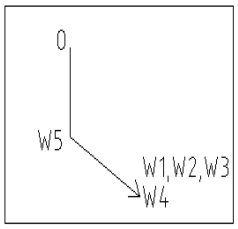
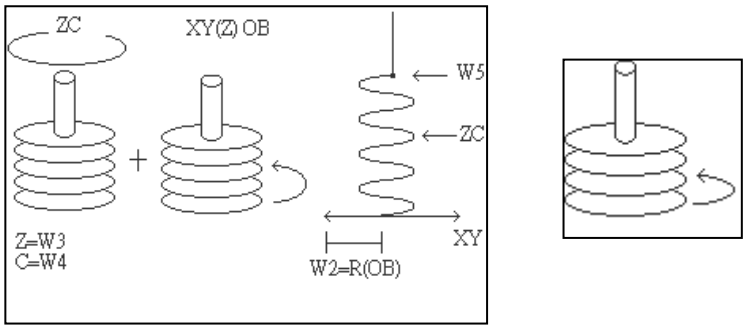
No.	E CODE	Descriptions
E01	LINE (Similar G01 code)  	W1~W4 to set the vector direction at each axis, incremental, discharge at start point and finish at end point, not resume to start point. If SET=0, any flushing action e.g. jumping, it will infinity to retreat & backward until user to stop it manually. If SET =1, any flushing action e.g. jumping, it will retreat & backward until start point is limited, and error message 062 come out. W1：X –axis discharge direction. W2：Y–axis discharge direction. W3：Z–axis discharge direction. W4：C–axis discharge direction. W6：X-axis rotate angle （X_ROTATE）：Discharge with X-axis rotary at start point. W7：Z-axis rotate angle（Z_ROTATE）：Discharge with Z-axis rotary at start point.
E02	CIR_CW	XY-axis do circle clockwise, ZC-axis do the line 4-axes doing synchronize interpolation, until reach the goal then start orbit action in XY plane. W1：X_END P(X_ENDPOS)：Circle X end point. W2：Y_END P (Y_ENDPOS)：Circle Y end point. W3：I_CIRCLE(I_CX_INC)： Circle X Center(Inc.) W4：J_CIRCLE(J_CX_INC)：Circle Y Center(Inc.) W5：Z_INC.： Z-axis incremental. W8：UP&DN SIDE(UP_DOWN)： Up & Down side spark distance, when Z-axis enter this range then do side sparking by 45 degree in XY-axis. W9：C_INC (C_INC)：C-Axis spark. W10：OB_半徑(OB_RAD)：Do circle orbit in XY Plane. W11：SIDE SPARK AREA (ARAE_SET)：Set the work Range for side spark. 

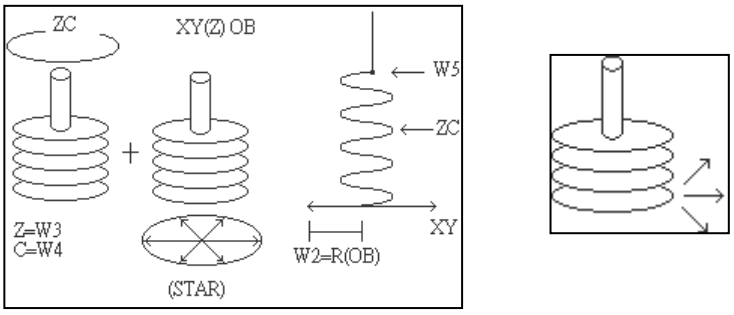
E03	CIR_CCW	XY-axis do circle Counter-Clockwise, ZC-axis do the line 4-axes doing synchronize interpolation, until reach the goal then start orbit action in XY plane. W1：X_END P(X_ENDPOS)：Circle X end point. W2：Y_END P (Y_ENDPOS)：Circle Y end point. W3：I_CIRCLE(I_CX_INC)： Circle X Center(Inc.) W4：J_CIRCLE(J_CX_INC)：Circle Y Center(Inc.) W5：Z_INC.： Z-axis incremental. W8：UP&DN SIDE(UP_DOWN)： Up & Down side spark distance, when Z-axis enter this range then do side sparking by 45 degree in XY-axis. W9：C_INC (C_INC)：C-Axis vector spark. W10：OB_Radius (OB_RAD)：Do circle orbit in XY Plane. W11：SIDE SPARK AREA (ARAE_SET)：Set the work Range for side spark. 

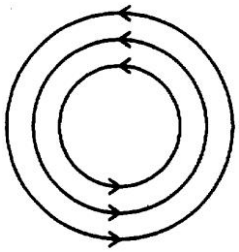
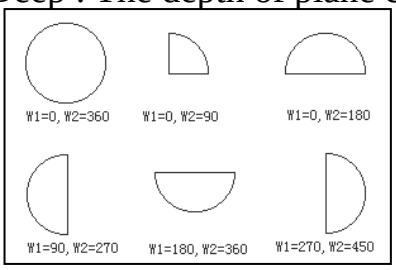
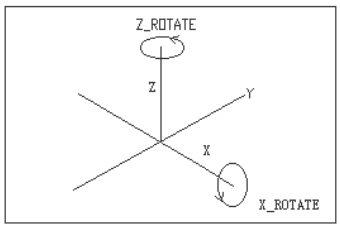
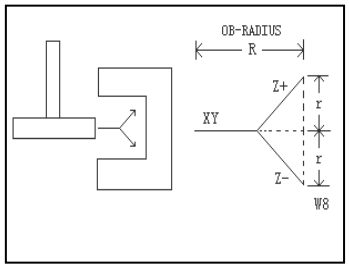
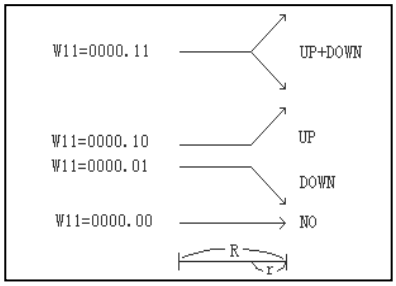
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td>E04</td><td>CIR_ANG</td><td>XY-axis do Arc-circle, ZC-axis do the line 4-axes doing synchronize interpolation, until reach the goal then start orbit action in XY plane. The center of circle at coord.X0, Y0
W1：ANG_INC：Arc length (By angle) and direction ,W1>0 Counter-Clockwise,W1<0 Clockwise.
W5：Z-axis vector by incremental.
W8：UP&DN SIDE(UP_DOWN)： Up & Down side spark distance, when Z-axis enter this range then do side sparking by 45 degree in XY-axis.
W9：C_INC (C_INC)：C-Axis vector spark by incremental.
W10：OB_Radius (OB_RAD)：Do circle orbit in XY Plane.W1：SIDE SPARK AREA (ARAE_SET)：Set the work Range for side spark.
 
</td></tr>
<tr><td rowspan="2">E11</td><td>Z-AXIS ↓
 
</td><td>Work along the Z axis upwards or downwards until the coordination (work coordination) is reached. If the depth (W5) is larger than the current work coordination, the direction of work will go upwards, and if the depth is smaller than the current work coordination, the direction of work will go downwards.
W5 : The depth of work along the Z axis.</td></tr>
<tr><td></td><td>Example :
W1 W2 W3 W4 W5
E11 Work Depth
0.000 0.000 0.000 0.000 -1.000
S016
When executing the program, the coordination of Z axis starts from +1.0, and the system works downwards until it reaches –1.0 (W5) and stop the work</td></tr>
</table>

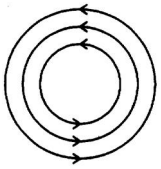
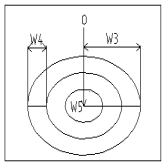
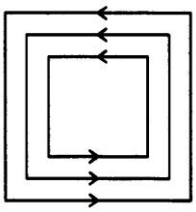
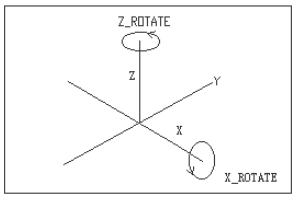
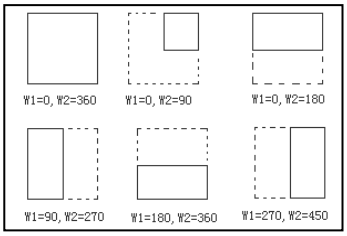
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td rowspan="2"></td><td>Z-AXIS ←
 
</td><td>Work along the X axis (X+ or X-) until the preset coordination (W5) is reached. If the depth setting is larger than the current work coordination, the Z axis works toward the X+ axis, if the depth setting is smaller than the current work coordination, the Z axis works toward the X- axis.。</td></tr>
<tr><td>E12</td><td> 
</td><td>Example :
W1 W2 W3 W4 W5
E11 Work Depth
0.000 0.000 0.000 0.000 -1.000
When executing the program, the coordination of X axis starts from +1.0, and the system works until it reaches –1.0 (W5) and stop the work.</td></tr>
<tr><td rowspan="2"></td><td>Y-AXIS→
 
</td><td>Work along the Y axis (Y+ or Y-) until the preset coordination (W5) is reached. If the depth setting is larger than the current work coordination, the Z axis work toward the Y+ axis, if the depth setting is smaller than the current work coordination, the Z axis works toward the Y- axis.</td></tr>
<tr><td>E13</td><td> 
</td><td>Example :
W1 W2 W3 W4 W5
E11 Work Depth
0.000 0.000 0.000 0.000 -1.000
When executing the program, the coordination of Y axis starts from +1.0, and the system works until it reaches –1.0 (W5) and stop the work.</td></tr>
</table>

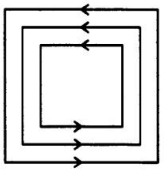
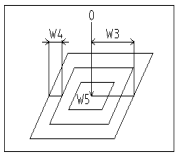
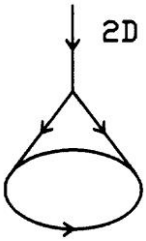
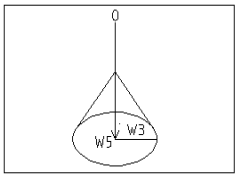
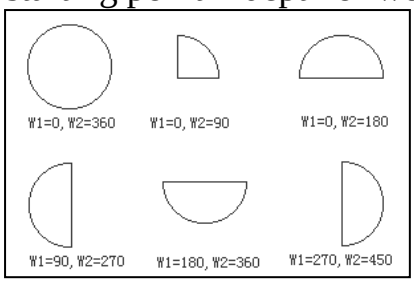
No.	E CODE	Descriptions
E14 (Origi-nal E46)	3 AXES LINE 3D	The system works along the Z- axis until the work depth (W5) is reached, then work along the direction of the vector (increment) W1+W2+W3+W4 (capable to set 1 to 4 axes). W1 : X_INC : X axis component of the work direction vector after the starting point is reached. W2 : Y_INC : Y axis component of the work direction vector after the starting point is reached. W3 : Z_INC : Z axis component of the work direction vector after the starting point is reached. W4 : C_INC, in degree : C axis component of the work direction vector after the starting point is reached. W5 : Z_ST : The turning point of the work. W6 : X_POTATE : Rotate from the starting point by X axis W7 : Z_POTATE : Rotate from the starting point by Z axis    W8 : Up_Down : r is the distance of the up and down work. When Z axis enters the range of up and down work, it will work on the direction 45 degrees between the X axis and Y axis. W11 : Area of the up and down work : Set the area of up and down work. The system is capable for doing only up work or down work.

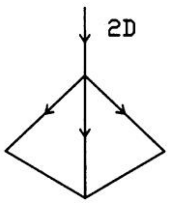
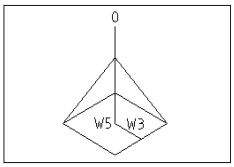
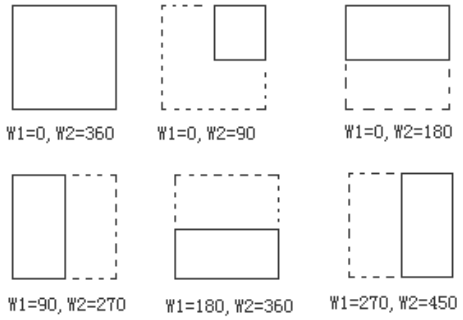
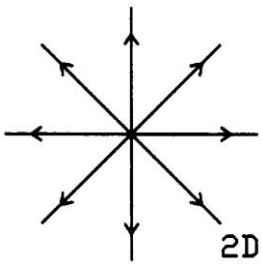
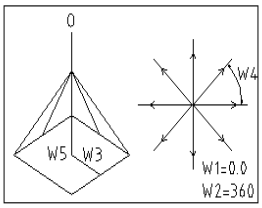
No.	E CODE	Descriptions
E14 (Original E46)		Example : W1 W2 W3 W4 W5 E14 Increment Y_INC. Z_INC. C_INC. Work depth 0.500 0.500 -0.500 0.000 -1.000 S016 Upon execution, the system works downwards on the Z axis until –1.0 (W5) is reached. Then the system works simultaneously on X,Y,Z distance 0.5 on Z axis. When the distance is reached, the system ends the work.
E15	Add a command "E15" ZC Circle Enlargement ZC-CIR	ZC to do screw thread firstly, XY will standby until ZC discharge complete then start to do XY circle enlargement or XYZ circle enlargement. (Up & Bottom) W2: XY Circle enlargement radius. W3: Z-axis work depth W4: C-axis work depth W5: Z-axis starting coordinate W6: X-axis rotate angle (X_ROTATE): Start to rotate at the start point by X-axis. W7: Z-axis rotate angle (Z_ROTATE): Start to rotate at the start point by Z-axis. W8:Up & Bottom shape finishing(Up_Down): The distance (r)of shape finishing ,Upon Z-axis enter into the range of shape finishing, then start to 45 degree discharge with XY axes. W11: Set the area of up and down shape finishing. The system is capable for doing only up work or down work. 

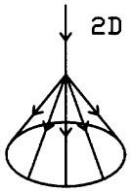
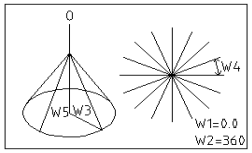
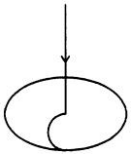
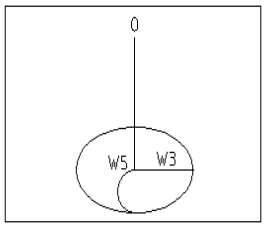
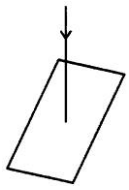
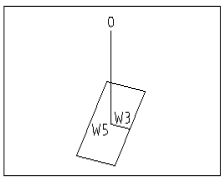
No.	E CODE	Descriptions
E16	Add a command "E16" ZC Circle Enlargement ZC-STAR	ZC to do screw thread firstly, XY will standby until ZC discharge complete then start to do XY star enlargement or XYZ star enlargement. (Up & Bottom) W1: Star step angle of star enlargement: Set angle interval. W2: XY Star enlargement radius. W3: Z-axis work depth W4: C-axis work depth W5: Z-axis starting coordinate W6: X-axis rotate angle (X_ROTATE): Start to rotate at the start point in X-axis. W7: Z-axis rotate angle (Z_ROTATE): Start to rotate at the start point in Z-axis. W8:Up & Bottom shape finishing(Up_Down): The distance (r)of shape finishing ,Upon Z-axis enter into the range of shape finishing, then start to 45 degree discharge with XY axes. W9: Start Angle (ST_ANG): Set the start angle of star enlargement. W10: End Angle (END_ANG): Set the end angle of star enlargement. W11: Set the area of up and down shape finishing. The system is capable for doing only up work or down work. When work is finished or interrupted, all axis will return to start point. 

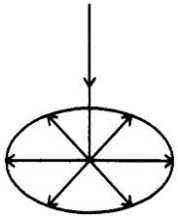
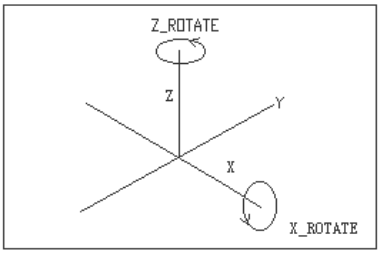
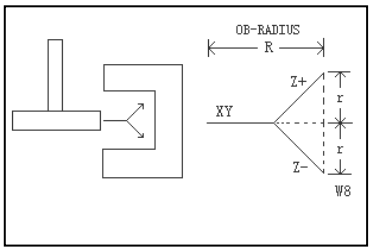
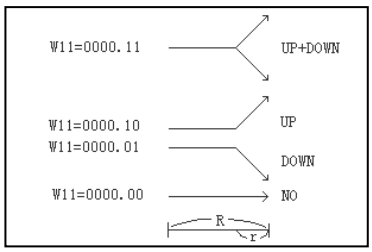
No.	E CODE	Descriptions
E20 (Original E47	Plane Circle 3D 	When Z axis reaches the preset depth, the system works along the X and Y axes and enlarge the hole, and finally creates a circle. The circle will change according to the work item. (When ejection, the system will goes back to the center of X,Y axes, then pull up along the Z axis). W1 : ST_ANG : Set the start angle of circle enlargement W2 : END_ANG:Set the end angle of circle enlargement W3 : RADIRS : Set the radius (R) of the circle. W4 : DST(1) : Limitation of the distance between circle enlargements. If the valve is 0, then the distance is not limited. W5 : Deep : The depth of plane circle enlargement.   W6 : X_ROTATE : Rotate by the X axis from the starting point of the work. W7 : Z_ROTATE : Rotate by the Z axis from the starting point of the work.   W8 : Up_Down : r is the distance of the up and down work. When Z axis enters the range of up and down work, it will work on the direction 45 degrees between the X axis and Y axis. W11 : Area of the up and down work : Set the area of up and down work.. The system is capable for doing only up work or down work. Condition of E-Code (SET) : if the value is 0, the system does not lock the Z axis, and work in L shape between X and Y axes. If the value is 1, the system locks the Z axis and remains fixed when depth is reached.

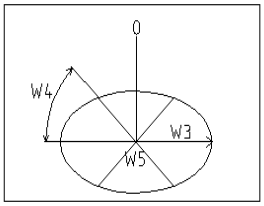
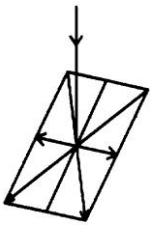
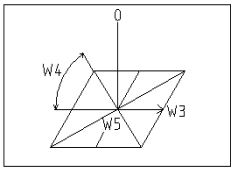
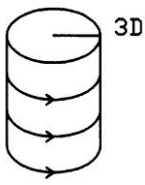
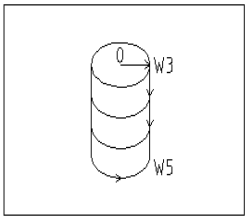
No.	E CODE	Descriptions
E20 (Original E47	Plane Circle 3D  	Example : W1 W2 W3 W4 W5 E20 Start End Work Increment Work angle angle Radius depth 0.000 360.000 0.500 0.000 -1.000 S016 Upon execution, the system works along the Z axis until –1 (W5) is reached. Then the system works on X,Y plane in circular path, the radius is increased using the increment value. (If W4 is set to 0, the increment value for radius is set to the step value.)
E21 (Original E48)	Plane Square 3D 	When Z axis reaches the preset depth, the system work along the X and Y axes and enlarges the hole, and finally creates a square. The square will change according to the work item. (When ejection, the system will goes back to the center of X,Y axes, then pull up along the Z axis). W1 : ST_ANG : Set the start angle of square enlargement. W2 : END_ANG : Set the end angle of square enlargement. W1 and W2 must be multiple of 45 degrees. W3 : RADIUS : Set the radius R of square enlargement. W4 : DST(I) : Limitation of the distance between square enlargements. If the value is 0, then the distance is not limited. W5 : DEEP : The depth of plane square enlargement.   W6 : X_ROTATE : Rotate by the X axis from the starting point of the work. W7 : Z_ROTATE : Rotate by the Z axis from the starting point of the work. Condition of E-Code (SET) : if the value is 0, the system does not lock the Z axis, and work in L shape between X and Y axes. If the value is 1, the system will lock the Z axis when the depth is reached, the system will not move along the Z axis. The (plane) setting in E-code can be used to change the direction of work axis.

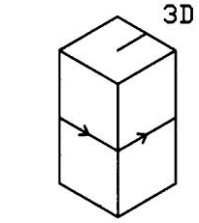
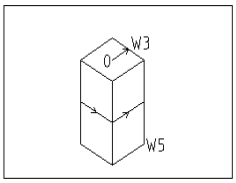
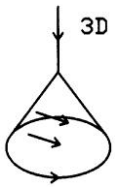
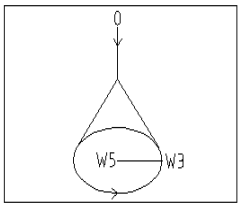
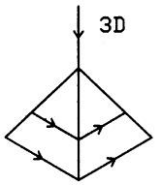
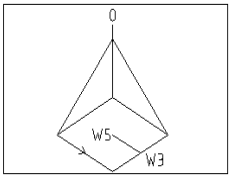
No.	E CODE	Descriptions
E21 (Original E48)	Plane Square 3D  	Example : W1 W2 W3 W4 W5 E21 Start End Work Increment Work angle angle Radius depth 0.000 360.000 0.500 0.000 -1.000 S016 Upon execution, the system will work along the Z axis to –1.0 (W5), then enlarge the square along the square path on the X, Y plane. The system will stop working when the radius reaches 0.5 (W3). (If W4 is set to 0,the radius of working path is set to the step value.)
E22 (Original E40)	Circle Work 2D45°  	The system works along the Z axis using SUD, and is not controlled by PC. But the PC is controlling the work on the XY plane. Along the Z axis, when the work goes deeper on Z axis, the shaking radius will be larger. Passing the starting point on Z axis, the ratio between the radius of circle of X, Y axes and the depth along the Z axis is 1:5. Combine the X,Y,Z components of vector, it creates an 45°degree angle. The Orbit starting point = depth of work – (radius * ratio)  W1: ST_ANG : Set the start angle of circle enlargement. W2: END_ANG:Set the end angle of circle enlargement. W3: RADIUS : Set the radius R of the circle. W5: DEEP : Set the end depth of circle enlargement. The PLANT of E-CODE (PLANT) can be used to change the direction of working axis. Example : W1 W2 W3 W4 W5 E22 Start END Work Work Angle Angle Radius Depth S016 Upon execution, the system works along the Z-axis downwards until the ratio of W5 abd W3 is 1:5. Then the system combines component vector of X,Y,Z axes to work in 450 until the radius of circle on X,Y axes reach 0.5 (W3) and the distance on Z-axis reaches -1 (W5)

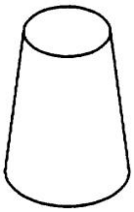
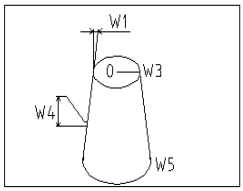
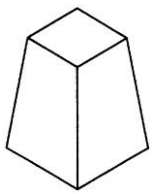
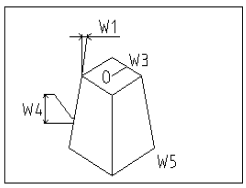
No.	E CODE	Descriptions
E23 (Original E41	Square Work 2D45°  	The function works like E22, the differences is that on the X.Y plane, the system works in square pattern. The PLANT of E-code can be used to change the direction of working axis. 
E24 (Original E42)	Radial Square 2D45°  	The system works like E22. After working passing the starting point on Z axis, the system works on the X,Y plane in a square radial pattern. It is possible to use the function J1 ～ J30, D1 ～ D30 in the gap. If the system does not reach the preset depth on Z axis, the work will jump to next angle while the timer is reached. W1 : Start angle. W2 : End angle. W3 : Radius, the radius of the radial square on X,Y plane. W4 : Step angle. The difference between one line and the next line (must be multiple of 45 degrees). W5 : Work depth. The desired working depth on Z axis. Example : W1 W2 W3 W4 W5 E24 Start angle End angle Radius Step angle Work depth 0.000 360.000 0.500 45.000 -1.000 S016 The gap jump is set to +1×j1. Upon execution, the system works downwards along the Z axis until touching the work. Then when each time the timer activates, the system changes the angle 45° (W4) twice, and work until the radius 0.5 (W3) and the work depth –1.0 (W5) is reached.

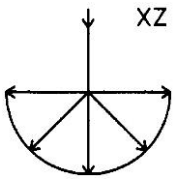
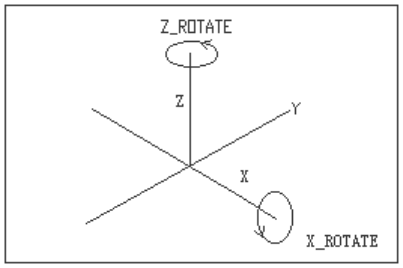
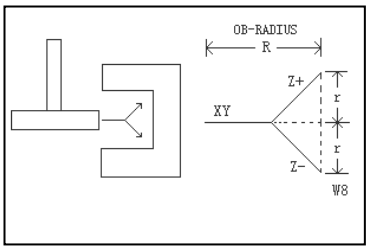
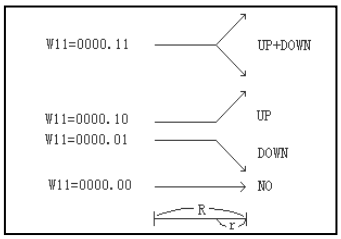
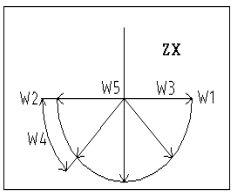
No.	E CODE	Descriptions
E25 (Original E43)	Radial Circle 2D45°  	This Function works like E22, and operation is similar with E24. The difference is the angle can be set to 00 ～180°.
E26 (Original E51)	Plane Circle 3D  	Until the work reaches the preset depth on the Z axis, the system works in a circle pattern on the X,Y plane. When each time the timer activates, the system moves back to the center on X,Y plane and pulls up the distance of radius along the Z axis then redo the plane circle work. W3 : Radius, the radius of circle on the XY plane. W5 : Work depth. The depth on the Z axis. Example : W1 W2 W3 W4 W5 E26 Work Work radius depth 0.000 0.000 0.500 0.000 -1.000 S016 Upon execution , the system works along the Z axis until the coordination reaches –1 (W5). Then the system moves back to the center on the XY plane, then works using the circle pattern, until the radius reaches 0.5 (W3) and Z axis coordination reaches –1 (W5).
E27 (Original E52)	Plane Square 3D  	The work and operation are similar with E26, and the path of work is square.

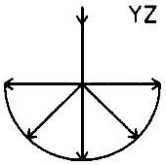
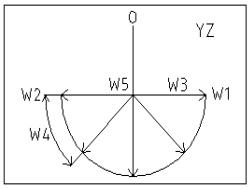
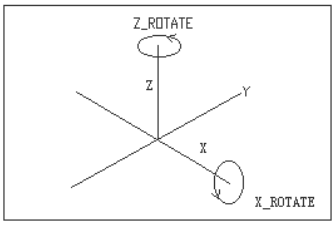
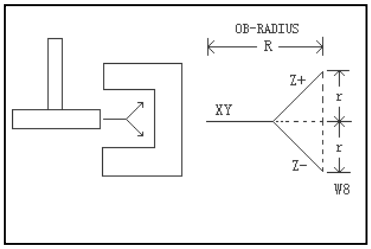
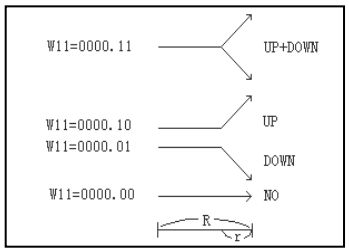
No.	E CODE	Descriptions
E28 (Original E53)	Plane Radial Circle 3D 	After the work reaches the preset depth on Z axis, the system works using line vector on XY plane until the radius (W3) is reached. J1 ～ J30 can be executed in gap, D1 ～ D30 can be used to change angle when jump operation is occurred. W1 : START_ANG : Set the start angle for hole enlargement. W2 : END_ANG : Set the end angle for hole enlargement. W3 : RADIUS : Set the radius R for hole enlargement. W4 : Step Angle : Set the angle .    W5 : DEEP : Set the depth of plane circle enlargement. W6 : X_ROTATE : Rotate using the X axis from the starting point of the work. W7 : Z_ROTATE : Rotate using the Z axis from the starting point of the work. W8 : Up_Down : r is the distance of the up and down work. W11 : Area of the up and down work : Set the area of up and down work. The system is capable for doing only up work or down work. Condition of E-Cod (SET) : if the value is 0, the system does not lock the Z axis, and work in L shape between X and Y axes. If the value is 1, the system will lock the Z axis and remain fixed when preset depth is reached.

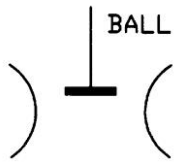
No.	E CODE	Descriptions
E28 (Original E53)		Example : W1 W2 W3 W4 W5 E28 Start angle End angle Work radius Step angle Work depth 0.000 360.000 0.500 45.000 -1.000 S016 Upon execution, the system works along the Z axis until the coordination –1 (W5) is reached. On the XY plane, the system works towards 0 degree direction to radius 0.5 (gap jump sets of OFF). When the working to radius 0.5 is completed, change the direction to 45 degrees (W4). Using this pattern, the system works until the radius 0.5 (W3), depth –1 (W5) is reached. (W2/W4= angle between radial lines on plane circle.)
E29 (Original E54)	Plane radial square 3D  	The function is similar with E28. The difference is that the step angle (W4) must be set using the regular triangle priciple (45°/90°)
E30 (Original E49)	Cylinder 3D  	The system will move to the radius on the XY plane, then descend along the Z axis. The system move in a circular pattern at fixed speed, and work downwards along the Z axis. (When ejection, the system stops on the XY plane, and pull up along the Z axis). W3 : Work radius. The radius of circle on XY plane. W5 : Work depth, the work depth along the Z axis. Example : W1 W2 W3 W4 W5 E30 Work radius Work depth 0.000 0.000 0.500 0.000 -1.000 S016 Upon execution, the system works along the direction of 0 degree until the radius 0.5 (W3) is reached. Then the system works downwards in a circular pattern, until the depth reaches –1, and the radius reaches 0.5.

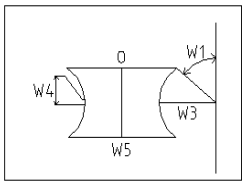
No.	E CODE	Descriptions
E31 (Original E50)	Pillar 3D  	The function is similar with E30, the difference is that the work path is square
E32 (Original E44)	Circular Hole Enlargement 3D  	The work starts when the Z axis reaches the starting point. The system works on XY plane using spiral pattern, and the radius of circle on the XY plane is proportional to the depth on the Z axis. Combine the vector components on X,Y,Z axes, it creates a 45° angle on the work. When PC controls and advances the 3 axes at the same time, it creates a cone shape. (When the depth on Z axis reaches radius (W3), the system begin shaking work). Example : W1 W2 W3 W4 W5 E32 Work radius Work depth 0.000 0.000 0.500 0.000 -1.000 S016 Upon execution, the system works along the Z axis until the depth and the radius (W3) from a 45° angle, the system starts spiral work on X,Y,Z axes in a circular path until the radius reaches 0.5 and the depth reaches –1.
E33 (Original E45)	Square hole Enlargement 3D  	The function is similar with E32, it creates a pyramid, and PC controls X,Y,Z axes. The working path is in square path.

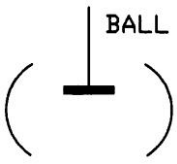
No.	E CODE	Descriptions
E34 (Original E57)	TAPER  	Extend E26 to create a taper. Set the taper angle to crate a positive or negative taper. W1 : Taper (If the value is negative, the radius of circle will change from small to large. If the value is positive, the radius of circle will change from large to small). W3 : Work radius W4 : Step distance W5 : Work depth Example : W1 W2 W3 W4 W5 E34 Taper Work radius Step distance Work depth -5.000 0.000 1.000 1.000 -5.000 S016 Upon execution, the system will work in a circular path to radius 1.0 (W3), then work downwards to –1.0 (W4 step distance). Then the system works on the XY plane in a circular path to the radius, and works back to center point (the radius is calculated by the formula W4/W5 = -1.0/-5 = 5). After 5 step cycle and the system works to taper 5° (W1), and the depth on Z axis reaches –5 to end the program.
E35 (Original E58)	Square Taper  	Extend the function of E27 to create a square taper. The work path is square.

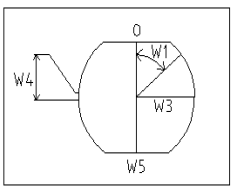
No.	E CODE	Descriptions
E36 (Original E55)	XZ Vector 3D 	Radial circle on the XZ plane. W1 : ST_ANG : Set the start angle of hole enlargement. W2 : END_ANG : Set the end angle of hole enlargement. W3 : RADIUS : Set the radius R of hole enlargement. W4 : STEP_A : Set the step angle between lines. W5 : Z_ST : Set the depth for the system to change from working on Z axis to ZX plane.    W6 : X_ROTATE : Rotate using the X axis from the starting point of work. W7 : Z_ROTATE : Rotate using the Z axis from the starting point of work. W8 : Up_Down : r is the distance of the up and down work. When Z axis enters the range of up and down work, it will work on the direction 45 degrees between the X axis and Y axis. W11 :Area of the up and down work : Set the area of up and down work. The system is capable for doing only up work or down work. Example : W1 W2 W3 W4 W5 E34 Taper Work radius Step distance Work depth -5.000 0.000 1.000 1.000 -5.000 S016 Upon execution, the system works downwards on Z axis until the coordination –1 (W5) is reached, and then using 45° angle as step angle, and work along the X axis until the radius 0.5 (W3) is reached.
		

No.	E CODE	Descriptions
E37 (Original E56)	YZ Vector 3d  	Radial circle on the YZ plane. W1 : ST_ANG : Set the start angle of hole enlargement. W2 : END_ANG : Set the end angle of hole enlargement. W3 : RADIUS : Set the radius R of hole enlargement. W4 : STEP_A : Set the step angle between lines. W5 : Z_ST : Set the depth for the system to change from working on Z axis to YZ plane.    W6 : X_ROTATE : Rotate using the X axis from the starting point of work. W7 : Z_ROTATE : Rotate using the Z axis from the starting point of work. W8 : Up_Down : r is the distance of the up and down work. When X axis enters the range of up and down work, it will work on the direction 45degrees between the Y axis and Z axis. W11 : Area of the up and down work : Set the area of up and down work. The system is capable for doing only up work or down work. Example : W1 W2 W3 W4 W5 E37 Start End Work Step Z start angle angle radius angle point 0.000 360.000 0.500 45.000 -1.000 S016 Upon execution, the system works downwards on Z axis until the coordination –1 (W5) is reached, and then using 45° angle as step angle, and work on the YZ plane along the X axis until the radius 0.5 (W3) is reached.

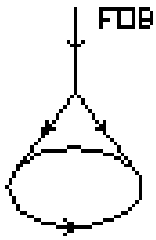
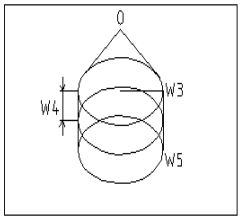
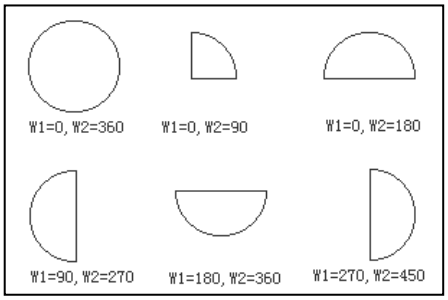
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td>E38
(Original
E59)</td><td>Ball out of object
3D
 

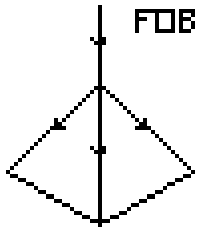
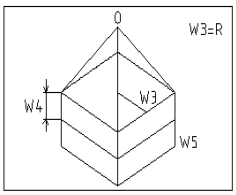
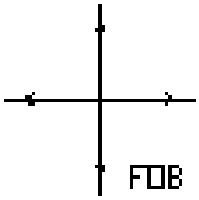
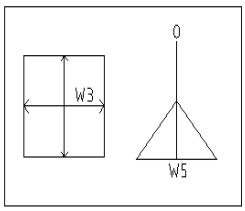

</td><td>The work radius must match to the work depth to create a perfect circle. The stop coordination is on Z axis.
W1 : Start angle (The start point is 0 degree.)
W3 : Work radius
W4 : Step distance
W5 : Work depth

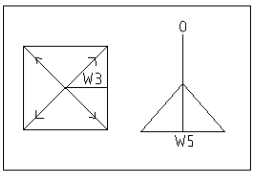
Example :
<table>
<tr><th></th><th>W1</th><th>W2</th><th>W3</th><th>W4</th><th>W5</th><th></th></tr>
<tr><td>E38</td><td>Start angle</td><td></td><td>Work radius</td><td>Step distance</td><td>Work depth</td><td></td></tr>
<tr><td></td><td>0.000</td><td>0.000</td><td>0.500</td><td>0.200</td><td>-1.000</td><td>S016</td></tr>
</table>
Upon execution, the system works on the XY plane from 0° (W1) in a circular path to radius 0.5 (W3), and works downwards along the Z axis to 0.2 (W4). Using the repetitive circular path, the radius changes from large, medium, small, medium and back to large to radius 0.5 (W3) depth –1 (W5), circle (W1+W5).</td></tr>
<tr><td>E39
(Original
E60)</td><td>Ball in the object
3D
 


</td><td>W1 : Start angle
W3 : Work Radius
W4 : Step distance
W5 : Work depth

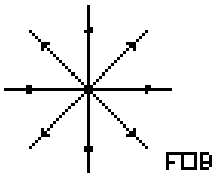
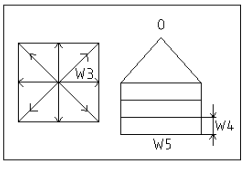
Example :
<table>
<tr><th></th><th>W1</th><th>W2</th><th>W3</th><th>W4</th><th>W5</th></tr>
<tr><td>E39</td><td>Start angle</td><td></td><td>Work radius</td><td>Step distance</td><td>Work depth</td></tr>
<tr><td></td><td>0.000</td><td>0.000</td><td>0.500</td><td>0.200</td><td>-1.000</td></tr>
</table>
Upon execution, the system works on the XY plane from 0° (W1) in a circular path, and works downwards along the Z axis to 0.2 (W4). Using the repetitive circular path, the radius changes
from small, medium, large (radius = 0.5 (W3), medium and back to small, depth –1 (W5), circle (W1+W5).</td></tr>
</table>

No.	E CODE	Descriptions
E40	Circle Cycle  	The system works in 45° vector all the time. The function is similar with E22, the difference is that if the distance descended on the Z axis is larger than the work radius, the system works using the radius equal to the depth until the work radius is reached, then use the work radius and step setting to work downwards until the work depth is reached. Step distance function is added. If the value is 0, no step function will be performed. If the value is not 0, the value is used as step distance to perform work segmentations.  W1 : ST_ANG : Set the start angle of hole enlargement. W2 : END_ANG : Set the end angle of hole enlargement. W3 : RADIUS : Set the radius R of hole enlargement. W4 : STEP : If the value is 0, no step function will be performed. If the value is not 0, the value is used as step distance to perform work steps on depth. W5 : DEEP : The end depth when the hole enlargement is completed. Example : W1 W2 W3 W4 W5 E40 Start End Work Step Work angle angle radius distance depth 0.000 360.000 0.100 0.100 -1.000 S016 The start coordination on Z axis is +1.0. Upon execution, the system works downwards in a circular circle path from 0 degree. When the coordination of Z axis reaches +0.5, the radius on XY plane will be 0.1 (W3). Use the alue as radius, the system works in circular path. Each time a circle is complete, the system move downwards on Z axis for 0.1 (W4).Using the same pattern, the system works until the radius 0.1 (W3) and coordination on Z axis 1.0 is reached.

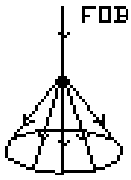
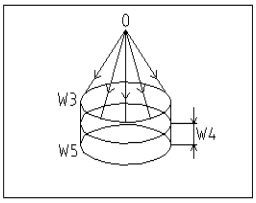
No.	E CODE	Descriptions
E41	Square Cycle   	The function is similar with E40, which is all time 45° work on a square cycle path. W3 : Work radius. W5 : Work depth
E42	Edge Cycle   	The function is similar with E40, which is all time 45° work on a square edge path. The function can match the gap for J1 ～ J30, and D1 ～ D30. Each time the timer activates, the working angle can be changed as well. W3 : Work radius W5 : Work depth Example : W1 W2 W3 W4 W5 E42 Work radius Work depth 0.000 0.000 0.100 0.000 -1.000 Upon execution (the gap jump is set to J1), the system works downwards on the Z axis , and towards 0° direction to radius 0.1 (W3) on the XY plane. For each jump, the working angle increases 90°, and repeats the work on XY plane. Using the pattern, the system works until radius 0.1 (W3), coordination –1 (W5) on Z axis is reached.

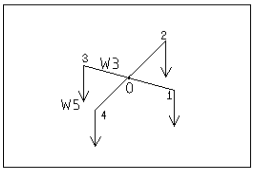
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td>E43</td><td>Diagonal Cycle
 
  </td><td>The function is similar with E40, which is all time 45° work on a square diagonal path. The function can match the gap for J1 ～ J30, and D1 ～ D30. Each time the timer activates, the working angle can be changed as well.

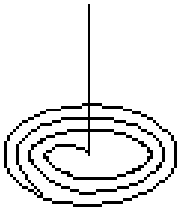
W3 : Work radius
W5 : work depth

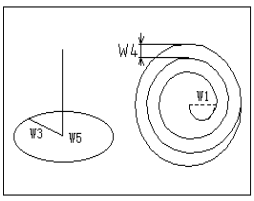
Example :
W1 W2 W3 W4 W5
E43 Work Work
radius depth
0.000 0.000 0.100 0.000 -1.000
Upon execution (the gap jump is set to J1), the system works downwards on the Z axis, and towards 45° direction to radius 0.1 (W3) on the XY plane. For each jump, the working angle increases 90°, and repeats the work on XY plane. Using the pattern, the system works until radius 0.1 (W3), coordination –1 (W5) on Z axis is reached.</td></tr>
<tr><td>E44</td><td>Square line cycle
 
  </td><td>The function is similar with E40, which is all time 45° work on a square edge and diagonal path. The function can match the gap for J1 ～ J30, and D1 ～ D30. Each time the timer activates, the working angle can be changed as well.
W1 : Start angle W4 : Step angle
W2 : End angle W5 : Work depth
W3 : Work radius

Example :
W1 W2 W3 W4 W5
E44 Start End Work Step Work
angle angle radius angle depth
0.000 360.000 0.100 45.000 -1.000
Upon execution (the gap jump is set to J1), the system works downwards on the Z axis, and towards 0° direction to radius 0.1 (W3) on the XY plane. For each jump, the working angle increases 45°, and repeats the work on XY plane. Using the pattern, the system works until radius 0.1 (W3), coordination –1 (W5) on Z axis is reached.</td></tr>
</table>

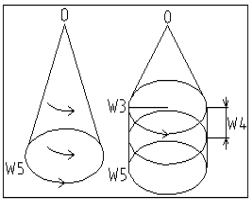
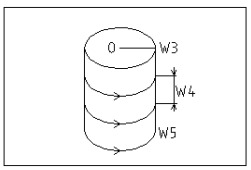
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td rowspan="2">E45</td><td>Circular line cycle
  </td><td>The function is similar with E40, which is all time 45° work on a circular radial line path. The function can match the gap for J1 ～ J30, and D1 ～ D30. Each time the timer activates, the working angle can be changed as well. The range of working angle can be adjusted.
W1 : Start angle W4 : Step angle
W2 : End angle W5 : Work depth
W3 : Work radius</td></tr>
<tr><td>  </td><td>Example :
W1 W2 W3 W4 W5
E45 Start End Work Step Work
angle angle radius angle depth
0.000 360.000 0.100 45.000 -1.000
Upon execution (the gap jump is set to J1), the system works downwards on the Z axis, and towards 0° direction to radius 0.1 (W3) on the XY plane. For each jump, the working angle increases 45°, and repeats the work on XY plane. Using the circular path pattern, the system works until radius 0.1 (W3), coordination –1 (W5) on Z axis is reached.</td></tr>
<tr><td rowspan="2">E46</td><td>4 Edge Work
  </td><td>The function is similar with E40. 4 times of E11 is performed. Before the work starts, the system will move the X,Y axis to the distance of radius, like operations in E71. The system will move on the 4 edges on X axis to work along the Z axis.

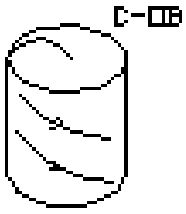
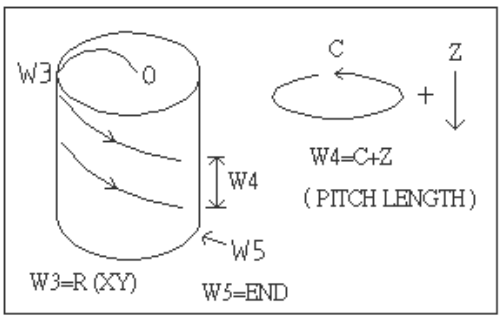
W3 : Work radius
W4 : Work depth</td></tr>
<tr><td>  </td><td>Example :
W1 W2 W3 W4 W5
E46 Work Work
radius depth
0.000 0.000 0.500 0.000 -1.000
Upon execution, the system moves towards 0° along the X axis to the radius 0.5 (W3), then works downwards along the Z axis to –1.0 (W5). After completion, the system moves to the starting point on Z axis, and moves to next 90° angle and radius 0.5 (W3) and then downwards to –1.0 (W5). Using the pattern to complete 4 edges, the system stops when radius 0.5 (W3) and coordination –1 (W5) on Z axis is reached.</td></tr>
</table>

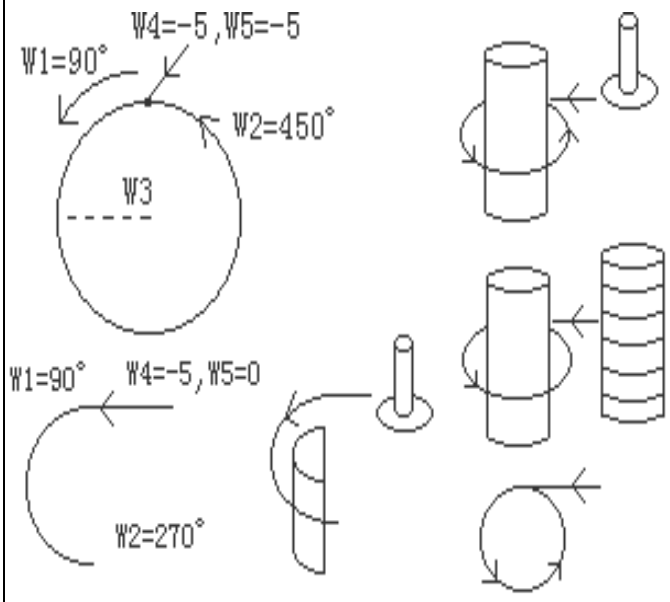
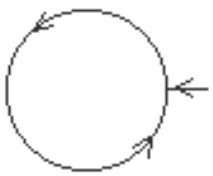
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td rowspan="2">E47</td><td>Spiral Cone
  </td><td>When the work depth is reached, the circle radius is also reached the working radius. This is 3D full-time close loop work. This is also track seeking work. When jumping, the system backs by the original tracks.

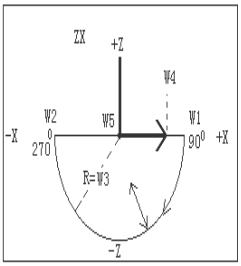
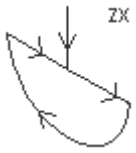
W1 : Start radius. The circle radius when the cutting begins.
W3 : Work radius. The circle radius when the cutting ends.
W4 : Step radius. The radius increments after each loop.
W5 : Work depth. The depth of working axis.
W6 : X-axis rotate.
W7 : Z-axis rotate.</td></tr>
<tr><td> 
</td><td>Example :
W1 W2 W3 W4 W5
E47 Start Work Step Work
angle radius angle depth
+0.5 0 +1.0 +0.1 -1.0
Upon execution, the system works in a circular path to radius 0.5(W1), and then works simultaneously on the XY axes using spiral path. When each loop is completed, the working radius 1.0 (W3) is reached.</td></tr>
</table>

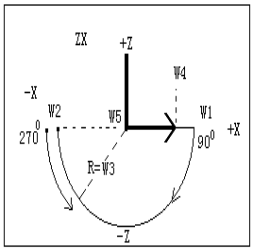
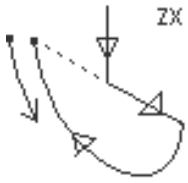
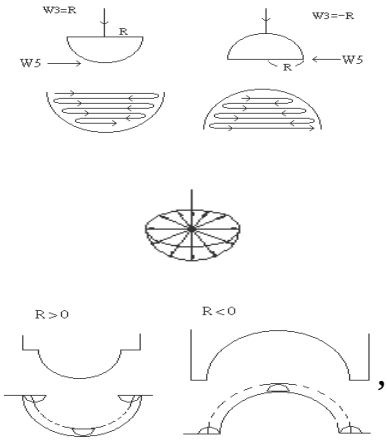
No.	E CODE	Descriptions
E48	Spiral Cylinder 	The difference with E47 is that the radius is fixed. Other settings are identical with E47. This function is 3D, full-time close loop track work, spiral work with fixed radius. The function can be used to perform spiral track work. The work proceeds according to tracks, and when jumps occurred, the work also backs according to tracks. When the condition of E-code 〔SET〕 is set to 0. or 2, the path is clockwise, otherwise when 〔SET〕 is set to 1,3, the path is counter-clockwise. The current position of electrode is the starting point of work. When condition of E-code is set to 0 or 1, when the working depth is reached, the work is completed, and the system performs ejection according to original track and back to the starting point. When the condition of E-code is set to 2 or 3, when the working depth is reached, only plane circle path is remained, and when the full circle path is completed, the system goes back to the starting point. When the starting point (position of electrode) has the same depth with the working depth (W5), the function degenerates to plane work. W3 : Work radius the radius of the circle. W4 : Step distance the distance of working axis moved when the system completes on circle. W5 : Work depth. Example : W1 W2 W3 W4 W5 E48 Work Step Work radius angle depth 0 0 +0.5 +0.2 -1.0 Upon execution, the system works in circle path on the X, Y plane until the radius 0.5 reached. After that, the system works downwards simultaneously on the X,Y,Z axes. When each circle is completed, the depth on Z axis increases –0.2 (W4). Using the pattern, the system stops working when the radius 0.5 (W3), coordination on Z axis –1.0 (W5) is reached.

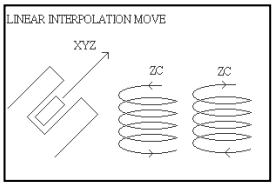
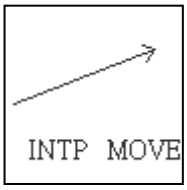
No.	E CODE	Descriptions
E49	Spiral circle 2  	This function is 2D. When the depth is reached, the working radius is also reached. The work is not totally 45° working, and suitable for deeper depth. When the depth goes deeper, the shaking is also bigger, for advantages of residues removal. W3 : Work Radius W4 : Step distance, the value can be set to 0. When the value is not 0, segmented execution is performed. W5 : Work depth, the work depth on Z axis. Example : W1 W2 W3 W4 W5 E49 Work radius Step distance Work depth 0 0 +0.1 0 -1.0 Upon execution, the system works downwards using spiral path on XYZ axes until radius 0.1 (W3) and coordination on Z axis –1.0 (W5) is reached.
E50	Cylinder 2  	The function is 2D, and is different with E30. E30 is a full-time close loop function, and E50 is 2D function, and can perform segmented execution (step distance). W3 : Work radius. The radius of circular moving path. W4 : Step distance, the value can be set to 0. When the value is not 0, segmented execution is performed. W5 : Work depth, the work depth on Z axis. Example : W1 W2 W3 W4 W5 E50 Work radius Step distance Work depth 0 0 +0.100 +0.2 -1.00 Upon execution, the system works on the XY plane to radius 0.1 (W3), and then works towards using the circular path to depth –0.2 (W4). When the work of the step depth is completed, the system works along the Z axis in circular path to the next step depth –0.2 (W4). Using the pattern, the system works until radius 0.1 (W3), coordination of Z axis –1.0 (W5) is reached.

No.	E CODE	Descriptions
E51	TC Hole Enlargement 	The system moves on the XY plane in a circle, and the ZC plane in line. The function can be used for spiral hole enlargement. W3 : Work depth W4 : Step distance W5 : Work depth Example : W1 W2 W3 W4 W5 E51 Work Step Work Radius distance depth 0 0 0.1 +0.5 -1.0 Upon execution , the system works on the XY plane to radius 0.1 (W3), and downwards on the Z axis using this radius in circular path. For each –0.5 (W4) is deepened, the system moves 360 degrees (a full circle). Using this pattern , the system works until the coordination –1.0 is reached. When ejection, the system backs using the original path. 

No.	E CODE	Descriptions
E52	Outer Circle OUT_CIR	W1 : Start angle W2 : End angle W3 : RADIUS : radius of circle path W4 : X_INC, the X component of cut-in vector for current position of electrode to the circle path. W5 : Y_INC, the Y component of cut-in vector for current position of electrode to the circle path. The electrode advances linearly using the preset cut-in vector (W4,W5) and then works using the preset circle path (W1,W2,W3). After completion, the system backs using the original path to the starting point. When jumps occurred, the system also backs using the original path. The function can be used to perform spiral marks or sinks on cylinder works. In order to remain the track intact, the jump speed should be lowered, or turn off the jump function.  Example : W1 W2 W3 W4 W5 E52 Start End Work X Y angle angl radius Increment Increment +0.0 +360.0 +1.0 +0.5 +0.5  Upon execution, the working axis moves linearly using the XY increments to 0.5 (W4/W5), and then begin from start angle 0 degree (W1) radius 1.0 and start work counter-clockwise in a circular path to end at 360.0 degrees. After completion, the system backs using original path to starting point.

No.	E CODE	Descriptions
E53	ZX Arc ZX_CIR   	W1 : Start angle (ST_ANG) -----ZX arc W2 : End angle (END_ANG) ----ZX arc W3 : Working radius (RADIUS) W4 : Step distance (STEP), used in quick movement to approach the distance of arc. The value must be smaller than W3. W5 : Work depth (DEEP), the coordination on Z axis of the center of ZX arc. When jump and residual removal occur, the electrode will be moving toward the circle center, not using the original path. If the work is performed on YZ plane, W6 (Z-ROTATE) can be used to rotate the Z axis. Example W1 W2 W3 W4 W5 E53 Start End Work Step Work angle angle radius distance depth +90.0 +270.0 +0.5 +0.1 -1.0 Upon execution, the system works on the Z axis to depth –1.0 (W5), and then towards the start angle 90.0 degrees, work towards +X direction to the radius 0.5 (W3), and work in a arc path on ZX plane to end angle 270.0 degrees. After completion, the system goes back to starting point.

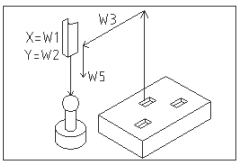
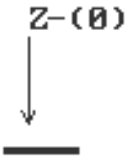
No.	E CODE	Descriptions
E54	ZX Arc Track ZX_CIR (T)   	W1 : Start angle (ST_ANG) --------ZX Arc W2 : End angle (END_ANG) --------ZX Arc W3 : Work radius (RADIUS) W4 : Step distance (STEP), used in quick movement to approach the distance of arc. The value must be smaller than W3. W5 : Work depth (DEEP), the coordination on Z axis of the center of ZX arc. The system performs work according to defined path. When jump and residual removal occur, the electrode will be moving using the original path. If the work is performed on YZ plane W6 (Z-ROTATE) can be used to rotate the Z axis. Example : W1 W2 W3 W4 W5 E54 Start angle End angle Work radius Step distance Work depth +90.0 +270.0 +0.5 +0.1 -1.0 Upon execution, the system works on the Z axis to depth –1.0 (W5), and then towards the start angle 90.0 degrees, work towards +X direction to the radius 0.5 (W3), and work in a arc path on ZX plane to end angle 270.0 degrees. After completion, the system goes back to starting point.
E55	Equal Interval Gap Enlargement	 This function applied in 3D direction interval gap enlargement. Thread discharge to Bottom of hemispherical (W5), radius R, W3>0, this is called convex discharge (Core mold), this is called concave discharge (Cavity) W4 = Step Dist.

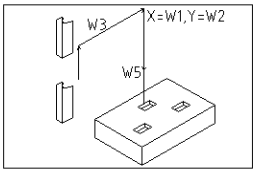
No.	E CODE	Descriptions
E70	E70 MOVE LN  	With interpolation,all axes move at same time and arrive at target place synchronization. W1~W4 are the axes movement, incremental jogging,for entry and retreat moving, ZC axis movuing for tapping stay or quit. Work Condition (SET)=0,Without short protection during the moving; if (SET)=1,With short protection during the moving. User also have to consider the dregs whether influence the short protection result. S-Code [JP_SPD] can control jogging speed, as well as the jogging speed is slower and interpolation is more accurate. (JP_SPD is about 25% lower) C axis radus needs preset inadvance for interpolating motion.
E71	Relative Movement	Move the coordination of X,Y,Z axes to preset relative coordination (REL). Before movement on XY plane, the system will pull up Z axis first, then descend when movement on XY plane is completed. W1 : X axis target relative coordination (REL) W2 : Y axis target relative coordination (REL) W3 : Before movement on XY plane, the distance to pull up on the Z axis. W4 : C axis target relative coordination (REL) W5 : Before movement on XY plane, the distance to descend on the Z axis. Example : W1 W2 W3 W4 W5 E71 Work Work Upper C Lower Coordination Coord. Coord Coord. Coord. +50.000 +50.000 +10.000 +0.000 +2.000 Upon execution, the system pulls up along the Z axis to +10.0 (W3), then moves on the XY plane to +50 (W1/W2). When the target coordination is reached, quickly position to +2.0 (W5) on Z axis and stop working.

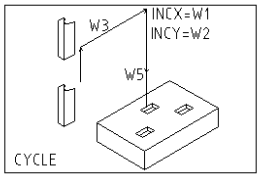
<table>
<tr><th>No.</th><th>E CODE</th><th>Descriptions</th></tr>
<tr><td>E72</td><td>Absolute
Movement</td><td>Move the coordination of X,Y,Z axes to preset absolute coordination (ABS). Before movement on XY plane, the system will pull up Z axis first, then descend when movement on XY plane is completed.
W1 : X axis target absolute coordination (ABS)
W2 : Y axis target absolute coordination (ABS)
W3 : Before movement on XY plane, the distance to pull up on the Z axis. (ABS)
W5 : Before movement on XY plane, the distance to descend on the Z axis. (ABS)

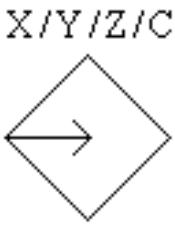
Example :
W1 W2 W3 W4 W5
E72 Machine Coordination Machine Coord. Upper Coord Coord. Lower Coord.
+50.000 +50.000 +10.000 0.000 +2.000
Upon execution, the system pulls up along the Z axis to machine coordination +10.0 (W3), then moves on the XY plane to machine coordination +50 (W1/W2). When the target coordination is reached, quickly position to +2.0 (W5) on Z axis and stop working.</td></tr>
<tr><td>E73</td><td>Set original point</td><td>The function can take one of the coordination from A1 ～ A15 as the original point of the current work. Input A1 ～ A15 coordination in S CODE to set the original point, for example, set the S CODE to A005 to set the 5th coordination as the original point.

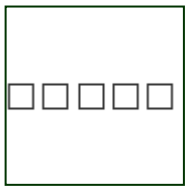
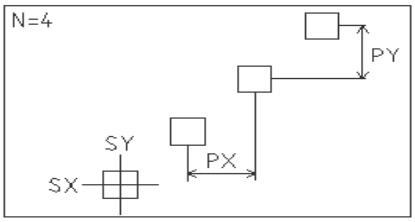
Example :
W1 W2 W3 W4 W5
E73
0.000 0.000 0.000 0.000 A005
Upon execution, the work coordination set on screen is changed to 5. The work coordination X,Y,Z is changed according to the relative coordination of original points before and after execution.</td></tr>
</table>

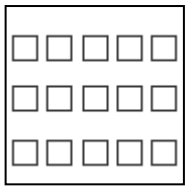
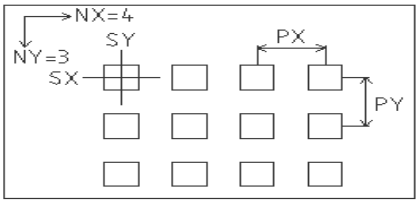
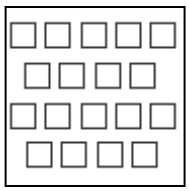
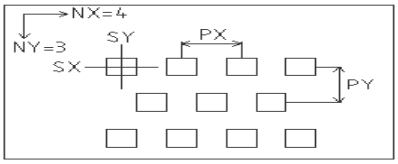
No.	E CODE	Descriptions
E74	Edge Offset -Z   	The system uses Z axis and test the position by downwards movement, and automatically set the offset for the original point. The function can be used with E71 to compensate the offset on Z axis when performing multi-hole work. W1 : X axis Work coordination (WORK COOR) (W1 axis). W2 : Y axis Work coordination (WORK COOR) (W2 axis). W3 : Z axis The pulled-up work coordination on Z axis before movement on XY plane (WORK COOR) (W3 axis). W4 : C axis Work coordination (WORK COOR) (W4 axis). W5 : Z axis The descended work coordination on Z axis before movement on XY plane (WORK COOR) (W3 axis). Operation : The electrode was pulled up to W3 on Z axis, then move the XYC coordination to W1,W2,W4, then move to W5 on Z axis. Then the electrode try to touch the edge on specified axis. When edge touching is completed, the electrode move to W5 on Z axis, XYC coordination move to original point. (Offsets on all axes are all effective, and will be added into the final offset value). Condition of the E-CODE〔SET〕: Set the axis and direction for edge searching. (0: -Z, 1: +Z, 2: -X, 3: +X, 4: -Y, 5: +Y). PLANE setting of E-CODE : Movement operation on W1 ～ W3 axes. ◆ If S Code is 0, the coordination of the edge touching pint is set into the working coordination Axx. The setting can be used for setting the original point on work surface. ◆ If the value of S Code is between 1 to 100, the coordination of the edge touching point is set to the work coordination specified in the S Code (A01 ～ A100). ◆ If the value of S Code is between 101 to 140, the coordination of the edge touching point is compared with the electrode base position to calculate the offset. Then the offset is set to the electrode offset specified by S Code.

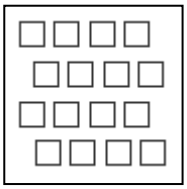
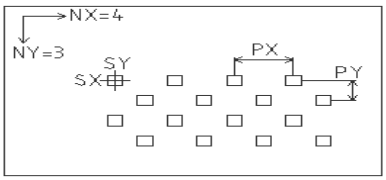
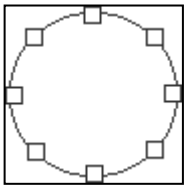
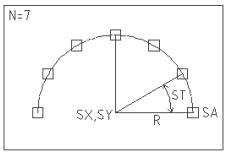
No.	E CODE	Descriptions
E74		Electrode Offset can be used to compensate the length of electrode or center of electrode. When the operation is completed, the offset calculated will be used as the offset for current program. W11 0000.00 W1,W2,W4 TYPE 0=CURRENT COOR 1=INC_DST 2=POSITION A99 W11 : The second digit after the decimal point can be used to set the positioning operation of W1,W2,W4. 0 : Move to the coordination specified by W1,W2,W4. 1 : W1,W2,W4 is the distance for increment movement. 2 : W1,W2,W4 does not affect the operation. Move directly to the position specified by A99 X,Y,C. Example : W1 W2 W3 W4 W5 E72 Machine Coordination Machine Coord. Upper Coord Lower Coord. +50.000 +50.000 +10.000 +2.000 Upon execution, the system moves along the Z axis to work coordination +10.0 (W3), and then move on the XY plane to work coordination +50 (W1/W2), then move along the Z axis to work coordination +2.0 (W5). Then the system start to perform edge searching on Z axis. After completion, perform offset operation on Z axis automatically.

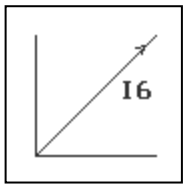
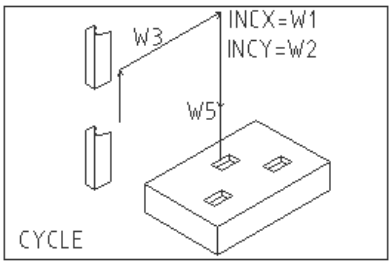
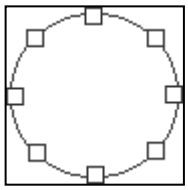
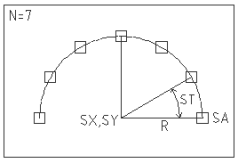
No.	E CODE	Descriptions
E75	Offset Movement 	Take one of the coordination among A01 ～ A15 as offset point related to current relative coordination by input A1 ～ A15 coordination set in S CODE. For example, setting the S CODE to A005 means use the 5th coordination as offset coordination. W1 : Increment on X axis. W2 : Increment on Y axis. W3 : The pulled-up relative coordination on Z axis (REL.) W4 : Coordination on C axis. W5 : The descended relative coordination on Z axis (REL). Example : W1 W2 W3 W4 W5 E75 Increment Upper C Lower coordination Increment coordination +50.000 +50.000 +10.000 0.000 +2.000 The system can execute E75 with E71. After E71 is executed, the system execute E75 and change the work coordination set to A06, and move the E75 coordination. In the example, the system moves to +10.0 (W3) on Z axis, then moves to +50.0 (W1/W2) on both XY axes, and then move to +2.0 on Z axis to end the program.
E76	Set Offset SET OFT	Set the offset of each axis by W1(X), W2(Y), W3(Z). If the S CODE is 0～99, this function is not executed. If the S CODE is 100, cancel offsets of all axes. If the S CODE is 101～140, the electrode offset specified by S CODE is used as program offset. When the offset is set for the program, the program will ad the offset into each axis when execution. If the E CODE is smaller than 70, the E CODE is E work code (workable). For example, if the offset for axes: X=-1.0mm, Y=3.0mm, Z=-2.0mm. When execution E22 circle work with radius 0.5mm, depth –5.0mm, the actual depth on Z axis will be –5.0+(-2.0)=-7.0. The offset will not be added into the X, Y axes, only the Z axis. The center of circle will not automatically affected by offsets, movement commands must be issued before E22 to move the center of circle according to offsets.

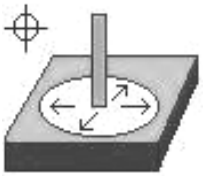
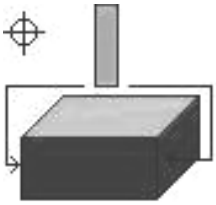
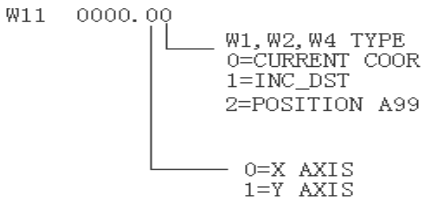
No.	E CODE	Descriptions
E76	Set Offset SET OFT	When the work axis is X axis (YZ plane) or Y axis (ZX plane), the offset of X axis or Y axis will b automatically adopted. For example, in E71 work movement, the coordination is set to W1=50.0 W2=70.0 W3=15.0 W5=5.0, if no offsets were set, the electrode will be moved to X=50.0, Y=73.0, Z=3.0. If the working program uses incremental depth mode, the offset on the work axis of E work code will not be considered. An movement command must be performed first. After that, correct offsets will be set for incremental work. If the work program uses rotation, the correct offset will not necessarily applied. Because (1) the offset is parallel with all axes (2) rotation of the basic plane is XYZ-, the work axis is Z axis. Special care must be taken here. When the execution of program ends, the offset will be reset. Example: E76 0,010,01 -1,01 Then the depth of Z axis will be added with (-1,0) E11 -2.0 The depth of E11 will become (-2,0)+(-1,0)= -(-3,0)
E77	Set Coordinate 	Set coordination in program directly. If SET POS A005 means set coordination at #5. Function : SET=0 Set X,Y,Z,C coordinate, SET =1 set X-axis coordinate ,SET =2 set Y-axis coordinate, SET=3 set Z-axis coordinate, SET =4 set -axis coordinate, SET=5 set XY axes coordinate.
E78	Change Tool	Set the tool number using S CODE table.

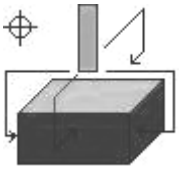
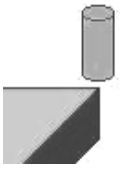
No.	E CODE	Descriptions
E79	Call M CODE	Set currently using M CODE M03、M04、M05 using S CODE. (Then M CODE can only be used under E CODE mode) M01：STOP； M03：C-Axis Rotate CW； M04：C-axis rotate CCW M05：C-axis stop rotate； M08：Pump ON； M09：Pump OFF； M25：Chuck ON； M26：Chuck OFF； M54 : All flushing valves ON; M55: Quick Fill Pump ON； M56: Quick Fill Pump OFF； M57: Disable Drain Valve; M58: Enable Drain Valve
E81	Line Multi-HOLE HOLE (LINE) 	W1 : POS_1 SX : The position on the X axis of the first hole, starting hole (work coordination). W2 : POS_1 SY : The position on the Y axis of the first hole, starting hole (work position). W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. W4 : C axis coordination. W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. W6 : PITCH PX : Pitch on X axis between holes. W7 : PITCH PY : Pitch on Y axis between holes. W8 : HOLE_NX : Number of holes on X axis. W9 : HOLE_NY : Number of holes on Y axis. Axxx : The coordination set used. The coordination is relative to the original point. 

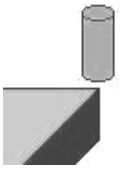
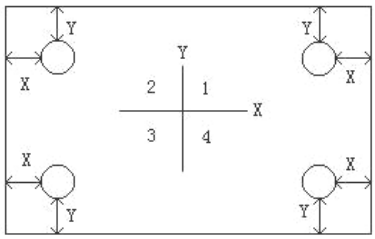
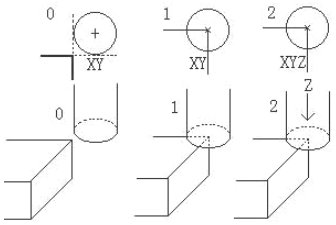
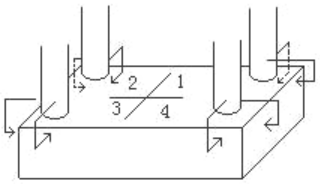
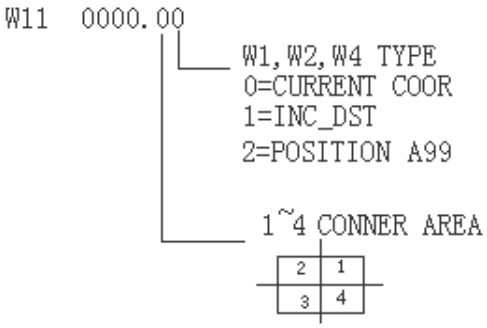
No.	E CODE	Descriptions
E82	Grid multi-hole 1 	W1 : POS_1 SX : The position on the X axis of the first hole, starting hole (work coordination). W2 : POS_1 SY : The position on the Y axis of the first hole, starting hole (work position). W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. W4 : C axis coordination. W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. W6 : PITCH PX : Pitch on X axis between holes. W7 : PITCH PY : Pitch on Y axis between holes. W8 : HOLE_NX : Number of holes on X axis. W9 : HOLE_NY : Number of holes on Y axis. Axxx : The coordination set used. The coordination is relative to the original point. 
E83	Grid multi-hole 2 (MULT 2) 	W1 : POS_1 SX : The position on the X axis of the first hole, starting hole (work coordination). W2 : POS_1 SY : The position on the Y axis of the first hole, starting hole (work position). W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. W4 : C axis coordination. W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. W6 : PITCH PX : Pitch on X axis between holes. W7 : PITCH PY : Pitch on Y axis between holes. W8 : HOLE_NX : Number of holes on X axis. W9 : HOLE_NY : Number of holes on Y axis. Axxx : The coordination set used. The coordination is relative to the original point. 

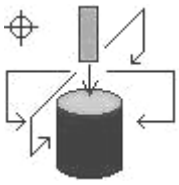
No.	E CODE	Descriptions
E84	Grid multi-hole 3 (MULT 3) 	W1 : POS_1 SX : The position on the X axis of the first hole, starting hole (work coordination). W2 : POS_1 SY : The position on the Y axis of the first hole, starting hole (work position). W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. W4 : C axis coordination. W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. W6 : PITCH PX : Pitch on X axis between holes. W7 : PITCH PY : Pitch on Y axis between holes. W8 : HOLE_NX : Number of holes on X axis. W9 : HOLE_NY : Number of holes on Y axis. Axxx : The coordination set used. The coordination is relative to the original point. 
E85	Circle multi-hole HOLE(CIR)  	W1 : CENTER_X: The position on X axis (work coordination) of the center of the circle. W2 : CENTER_Y: The position on Y axis (work coordination) of the center of the circle. W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. W6 : ST_ANG : Angle of the first hole. W7 : STEP_A : Angle between holes. W8 : HOLE_NUM : Number of holes. W10 : radius : Radius of the circle. Axxx : The coordination set used. The coordination is relative to the original point. Condition of the E CODE (SET) : C –AXIS **not** automatic perform cutting.

No.	E CODE	Descriptions
E86	Position Increase POS.INC 	Move to the preset coordination on all XYZ axes, and repeat the operation for multiple times. The electrode will be pulled up before movement, and descended again when the movement is completed. The value of S CODE is the number of movements. If the value is L005, means the movement will be repeated for 5 times W1 : The increased distance on X axis DST(I).(W1 X- axis W2 : The increased distance on Y axis DST(I). (W2 Y- axis W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. (W3 Z-axis) W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. 
E87	Circle multi-hole HOLE(CIR)  	W1 : CENTER_X: The position on X axis (work coordination) of the center of the circle. W2 : CENTER_Y: The position on Y axis (work coordination) of the center of the circle. W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes. W5 : The descended relative coordination on Z axis (REL) before movements on XY axes. W6 : ST_ANG : Angle of the first hole. W7 : STEP_A : Angle between holes. W8 : HOLE_NUM : Number of holes. W10 : radius : Radius of the circle. Axxx : The coordination set used. The coordination is relative to the original point. Condition of the E CODE (SET) : C –AXIS automatic cutting. If the value is 0, then cutting is not performed. If the value is 1, cutting is performed.

No.	E CODE	Descriptions
E93	Hole center seeking HOLE CEN 	Locate the center of the hole. W1 : X axis work coordination (WORK COOR) (W1 axis). W2 : Y axis work coordination (WORK COOR) (W2 axis). W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W4 : C axis work coordination (WORK COOR) (W4 axis). W5 : The descended relative coordination on Z axis (REL) before movements on XY axes (W3 axis).
E94	Axis Center AXIS CEN 	Position and set the center on a single axis. Condition of E CODE〔SET〕: If the value is 0, the outer radius is taken, if the value is 1, inner radius is taken. PLANE of E CODE : Set the direction of axis. W1 : X axis work coordination (WORK COOR) (W1 axis). W2 : Y axis work coordination (WORK COOR) (W2 axis). W3 : The pulled-up relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W4 : C axis work coordination (WORK COOR) (W4 axis). W5 : The descended relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W6 : Distance on Z axis W7 : Width of the electrode (EL.De) Radius of electrode. W9 : Width of the work. W11 : Set the direction on axis for edge search. 0=AXIS1 X,1=AXIS2 Y.  W11 The first digit after decimal point is used to set the axis measured. 0=X, 1-Y. W11 The second digit after decimal point can be used to set the positioning operation for W1,W2,W4. If the value is 0, the operation is to move to the position specified by W1,W2,W4. f the value is 1,= W1,W2,W4 is the distance for incremental movement. If the value is 2 = W1,W2,W4 is meaningless. The system will move to the position specified by A99 X,Y,C

No.	E CODE	Descriptions
E95	Outer Center OUT CEN 	Locate the center of the work. Condition of E CODE〔SET〕: If the value is 0, the outer radius is taken, if the value is 1, inner radius is taken. PLANE of E CODE : Set the direction of axis. W1 : X axis work coordination (WORK COOR) (W1 axis). W2 : Y axis work coordination (WORK COOR) (W2 axis). W3 :The pulled-up relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W4 : C axis work coordination (WORK COOR) (W4 axis). W5 : The descended relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W6 : Distance on Z axis W7 : Width X of the electrode (EL.De(X)) : The diameter of the electrode on the direction of X axis. W8 : Width Y of the electrode (EL.De(Y)) : The diameter of the electrode on the direction of Y axis. W9 : Width X of work (DW_X) : The width of the work on the direction of X axis. W10 : Width Y of work (DW_Y) : The width of the work on the direction of Y axis.
E96	Corner Center CONNER 	Locate the corner of the work. W1 : X axis work coordination (WORK COOR) (W1 axis). W2 : Y axis work coordination (WORK COOR) (W2 axis). W3 :The pulled-up relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W4 : C axis work coordination (WORK COOR) (W4 axis). W5 : The descended relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W6 : Distance on Z axis W7 : Width of the electrode (EL.De) Radius of electrode.

No.	E CODE	Descriptions
E96	Corner Center CONNER 	W9 : Measurement distance on X axis (DST X) W10 : Measurement distance on Y axis (DST Y)    Condition of E CODE is used to set the end mode.  W11 The first digit after decimal point is used to set the work area 1 ～ 4. W11 The second digit after decimal point can be used to set the positioning operation for W1,W2,W4. If the value is 0, the operation is to move to the position specified by W1,W2,W4. If the value is 1, W1,W2,W4 is the distance for incremental movement. If the value is 2, W1,W2,W4 is meaningless. The system will move to the position specified by A99 X,Y,C.

No.	E CODE	Descriptions
E97	Ball Center BALL CEN 	Locate the center of the work. Condition of E CODE〔SET〕: If the value is 0, the outer radius is taken, if the value is 1, inner radius is taken. PLANE of E CODE : Set the direction of axis. W1 : X axis work coordination (WORK COOR) (W1 axis). W2 : Y axis work coordination (WORK COOR) (W2 axis). W3 :The pulled-up relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W4 : C axis work coordination (WORK COOR) (W4 axis). W5 : The descended relative coordination on Z axis (REL) before movements on XY axes (W3 axis). W6 : Distance on Z axis W7 : Width X of the electrode (EL.De(X)) : The diameter of the electrode on the direction of X axis. W8 : Width Y of the electrode (EL.De(Y)) : The diameter of the electrode on the direction of Y axis. W9 : Width X of work (DW_X) : The width of the work on the direction of X axis. W10 : Width Y of work (DW_Y) : The width of the work on the direction of Y axis.
E98	Sub program	S code field. If the field is set to the program number O010, then program 010 will be executed (file name must be one of 001 ～ 299). Only the main program can use this field. W1: call [Number] times, can indicate how many times to execute the program repeatedly.

Note : 1). E73, E74, E51 ～ E60 is used in main program, and will not execute the sub program.

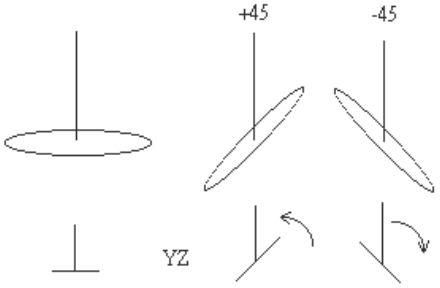
2). E71、E72、E81 ～ E98 is used in main program, and will execute the sub program.

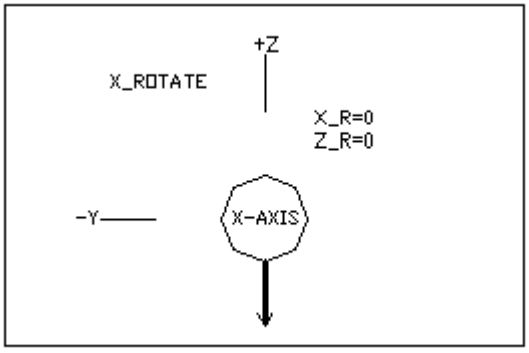
3). If the plane work is expected, the condition can be set to 1. When the depth on Z axis is reached, the system will lock on the Z axis.

4). It can call the sub-program to execute at same if SET=1 on E71、E72、E75 、E81~E89 by W11 [SUB_PGM] parameter.

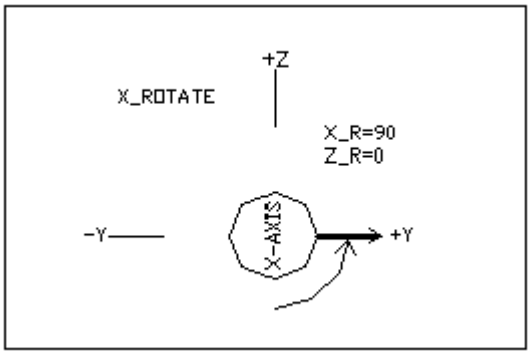
PS: One Sub. Program can be called available.

5).Add W10:[BTM ANG] on E20,E21,E26,E27,E28,E29.

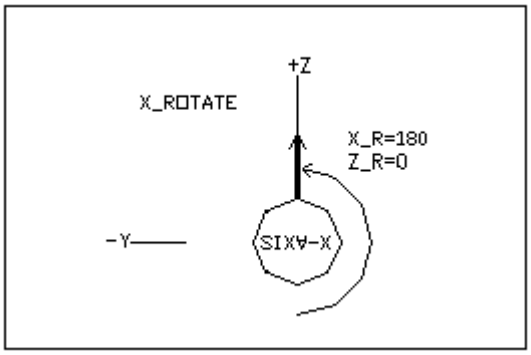




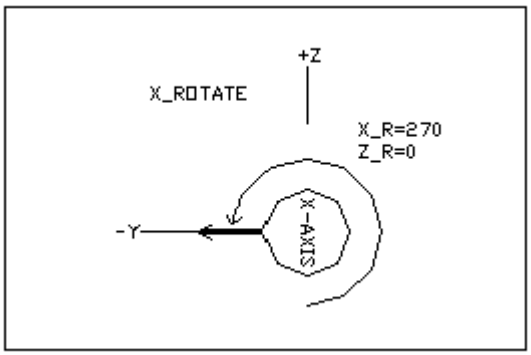
X-axis not rotate



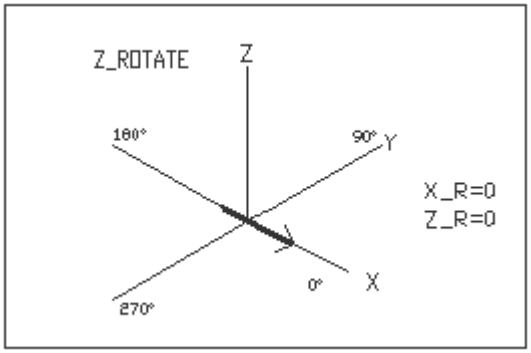
X-axis rotate 90 degree



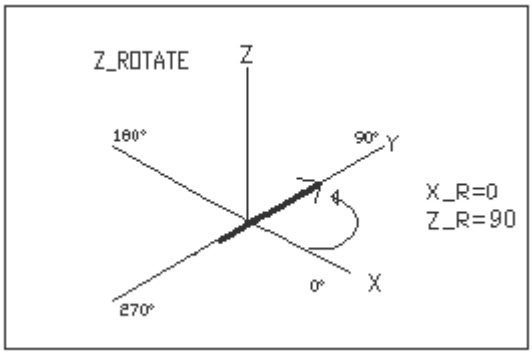
X-axis rotate 180 degree



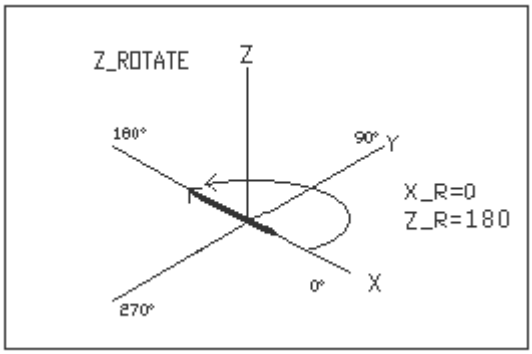
X-axis rotate 270 degree



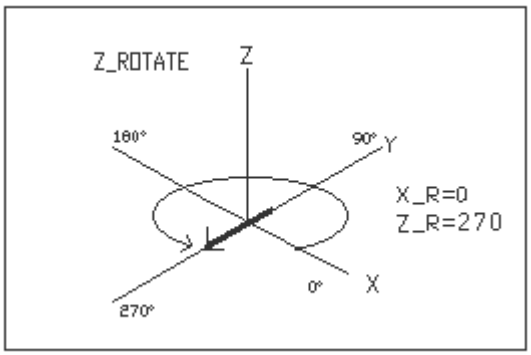
Z-axis not rotate



Z-axis rotate 90 degree



Z-axis rotate 180 degree



Z-axis rotate 180 degree

Rotate regulations：

Rotate and discharge by the working path at present electrode position.
X-axis rotation would be the first (Height, Rake) then Z-axis rotate (By Phase angle),
this way can do any 3D vector angle.
Controller will rotate by programmed vector angle , for example: If set depth -3.0, at present the electrode position = 2.0, then discharge vector angle would be -5.0.
X-axis and Z-axis rotate at free direction, can do single or double axes rotate.
The based plane by XY, Z- axes, while using rotate function, there shows PLANE: XY**R** Z-. Please note the plane switch can not be used with rotate function.
The setting parameter of rotation is W6=X ROTATE, W7=Y ROTATE. In program W6,W7 showed the rotary on display, it must matching E code to act, and W6=0, W7=0 means not rotate.