SP Engineering Services

2129 SW 39th Terrace
Cape Coral, Florida 33914

Equipment Specifications

Rebuilt" DD Series 4000 Refiner, Coupled Motor Design

- Rebuilt "DD Series 4000 Duo-Flo, Refiner with Standard Rotor.

Rebuild Scope of Work

- Main Base will be cleaned, sand blasted, and inspected for cracks and critical dimensions. It will be machined to manufacturing specifications and all drilled and tapped holes will be repaired.

- Base Liner will be repaired or replaced based on damage and thickness.

- Stainless Steel cladding will be repaired or replaced.

- Adjusting Mechanism Assembly will be machined to specifications to match critical fits in the housing and include the following repairs.
  1. Cross bores will be repaired and machined to specifications.
  2. New adjusting gear set consisting of: worm gear, worm shaft and adjusting screw will be installed.
  3. Sliding guide pads and keyways will be repaired.
  4. Sliding head will be machined to specifications with new threaded inserts.
  5. Gear motor will be reconditioned to "like new" condition.
  6. New gaskets, shims, packing, had wheel, updated grease blocks will be installed.

- Rotating Assembly shaft and bearing housing will be cleaned, inspected and repaired as needed to specifications. It will be assembled with new bearings, seals, gaskets, O-rings and hardware.

- Rotating Head will be machined to true all surfaces and disk mounting holes.

- Final Assembly will include reassembly of repaired and new parts along with new paint of customer's choice.

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Equipment Description

The bearings are designed for splash oil lubrication, with internal re-circulating oil. An oil cup located at the top of the bearing housing provides easy access for oil fills and serves as an air vent. A Direct-reading oil sight gauge is attached to the side of the bearing housing.

The design unitizes an adjusting mechanism housing that permits the thrust load to be transmitted directly to the door. The basic screw and worm gear along with the adjusting screw is immersed in oil at all times. The adjusting screw housing is sealed by the use of "O" rings and lip-type seals are used on the worm shaft. An oil fill pipe plug is located above the adjusting screw and a drainpipe plug is located beneath the worm.

The ductile iron-sliding head has a type 1/2" 316 stainless steel liner at the outside diameter, and a replaceable 1/8" cladding of type 316L stainless steel. This provides a plate-mounting surface and a non-corrosive surface for the lip seal and plates. Four pads, two with grease lubricated keyways, guide the sliding head in place, with the keys serving as anti-rotation stops.

The sliding head is jointed to the adjusting screw by means of a heavy shrink fit design.

The adjusting mechanism housing is hinged to the main refiner casting to facilitate disk inspection and replacement.

Plate Positioning System

The plates are positioned within the refiner cavity by means of a motor/gear-box assembly. This design allows for proper plate Gap (0.003 – 0.005") during refiner loading. The initial and full open gap is set up by adjusting a 3/16" overall plate gap and setting the limit switch to provide repeatability. A standard two speed gear-motor can be controlled by a signal from the mills DCS system.

Optional Floating Rotor (Spline Rotor technology)

The floating shaft in the refiner has always been a maintenance concern. When the shaft does not float, plate-to-plate contact occurs causing poor refining and could eventually result in broken plates and damage to the refiner. It could also add thrust to the motor bearings and cause them to fail prematurely. With the new splined hub design, the shaft is fixed in the refiner and the "float" occurs by the rotor moving on the splined hub at the end of the drive shaft within the refiner cavity. This design eliminates the need for other parts of the refiner to work in conjunction to float or slide properly. Both the Splined Rotor and Splines Hub are reversible thus allowing two wear surfaces and long life.

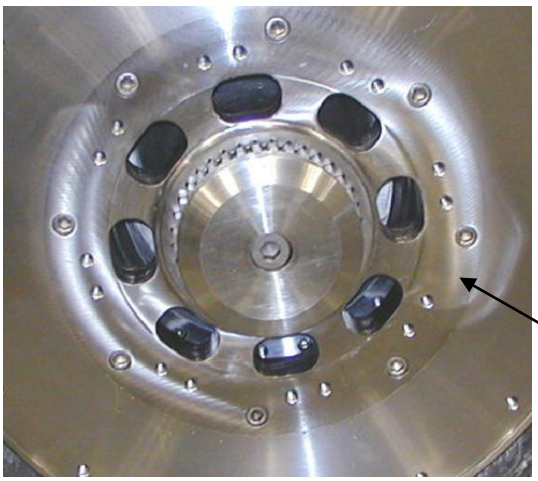

Figure 1 shows a picture of a rotor mounted on the splined shaft. This concept was originally developed many years ago for the Beloit MultiDisc Refiner.

Reversible / replaceable spline insert eliminates the need to replace the entire rotating head when fits are worn.

Figure 1

Materials of construction are stainless steel for the body of the rotating head, 17-4 PH for the splined head insert and 13-8 MO for the drive shaft splined hub. Both will be heat treated and then with Nano-Fusion SLIP_TEK surface treatment to assist with smooth sliding and reduced wear.

Optional Rotor Removal Arm – Quicker and Safer Plate Changes

- Eliminates the need for a over-head crane or chain fall.
- Lowers downtime for plate changes by up to 30%

Technical Service

Pricing in this proposal does not include supervision of installation or start-up assistance If these services are required. They are available upon request and by separate agreement as defined in the *Service Supervisors Rate Sheet.* Purchaser should schedule the Service Representative at least twenty-one days prior to the occurrence of the service trip.

Mechanical Warranty

Material and workmanship for a period of one year after installation, not to exceed eighteen months from shipment. Misuse of the equipment invalidates all warranty claims, including but not limited to, equipment breakdown and possible injures. This warranty also is contingent on the proper installation, operation and maintenance of the equipment as per **SP Engineering** recommendations.