Splitting The Flow

Gear (Rotary) vs. Spool-Type Flow Dividers in Grinding Mill Lube Systems

Flow dividers are common devices found in grinding mill lubrication systems, they are typically used to split flows between bearings, bearing pads (shoes) or lubrication pockets. Below we review these two designs, along with their pros and cons.

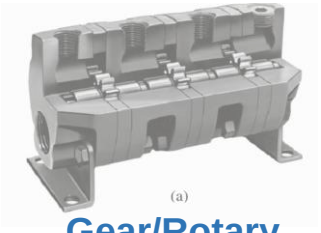
Spool-type

Pros:

- **Few moving parts:** The spool type divider has few moving parts. It is unlikely to fail and send debris further upstream that can cause damage to other components.
- **Cost-effective:** Typically, cheaper than gear flow dividers due to its simple design.
- **Compact:** Physically smaller than gear flow dividers.
- **High accuracy:** Accuracy increases with flow and can reach +/- 2%, which is comparable to gear flow dividers.
- **Several ratios available:** 50/50, 60/40 and 70/30 are common. Other custom ratios are possible.
- **Pressure and load compensation:** Designed to maintain equal flow division regardless of the pressure and load changes at the outlets.

Cons:

- **Pressure drop:** The device operates by variable restriction; therefore, a pressure drop occurs.
- **Lower efficiency** than gear flow dividers: any restrictive device will cause a loss of efficiency and will generate heat.
- **Only two outlets possible** per divider block.
- **Slightly less tolerant to contamination** than gear flow dividers.



Gear/Rotary

Pros:

- **High efficiency** (98-99%): since the device does not rely on restriction to control flow. Minimal energy loss and heat generation.
- **High accuracy:** typically around +/-2%.
- **Modular design**: two or more outlets and a wide range of division ratios available.
- **Output pressure independent**: The same volume of oil will be moved per rotation regardless of output pressure variations (positive displacement design).
- **Better tolerance to contamination** in oil than spool-type.
- Integrated pressure relief valves in each port.

Cons:

- **Several moving parts:** in case of a failure, debris can travel upstream and cause damage to other components, such as the mill main bearings and trunnion journal.
- **Higher cost** than spool type flow dividers.
- **Larger in size** than spool-type flow dividers.

The Bottom Line

- **Both types of flow dividers are suitable for grinding mill lube system applications. High quality gear flow dividers are considered very reliable, but when a failure occurs, debris from the flow divider such as needle bearings and metal fragments can travel upstream, damaging very critical components, such as main bearing inserts, trunnion journals or pinion roller bearings. This can lead to extensive downtime.**

- **It is for these reasons that we typically lean towards spool type flow dividers, not only for their simplicity and few moving parts, but to also to prevent costly downtime when a failure occurs. However, the expected pressure drop across the device must be carefully considered in each application prior to installation or retrofitting.**