

BULK HANDLING - John Frater

John S. Frater's internationally renowned pump designs have made an extraordinary contribution to the mining industry worldwide. He is recognised globally for his extensive knowledge of pump design and pumping systems. He continues to travel worldwide to engineering, procurement and construction companies, as well as to end-users, to assist with piping and sump design issues. He began his illustrious career in the slurry pump industry in 1957 as a student engineering apprentice with Mather and Platt in the United Kingdom. After graduating from Bolton Technical College, he was awarded with a Higher National Certificate by the Institute of Mechanical Engineers, with distinction for Mathematics and Mechanical Engineering. In 1961, Warman Pump licensee Simonacco, a coal prep engineering company, employed Frater as a manufacturing engineer, where he later became head of the technical sales, service, and marketing departments. He left Warman and invented the Orion Pump and started the Orion Pump Company in 1981. The patented pump pioneered the design to allow adjustment of running clearances at both the front and back of the impeller. The company was subsequently purchased by Denver Equipment. This acquisition would lead to his position as Pump Product Manager at Denver Equipment, which soon after would be purchased by Metso. In 1996 Frater invented what to this day remains a revolutionary pump, the millMAX™ pump. The patented suction side sealing has changed the way the industry looks at wear on the suction side liner and pump adjustment overall. The design uses a wear ring to seal between the suction liner and impeller. Further it allows the adjustment of the wear ring to maintain the sealing while the pump is operating. This was a first for any slurry pump. Frater sold his company to FLSmidth Krebs in 1999 and since that time has served as Pump Technical Director. As already noted, the millMAX pump features a patented on-line wear clearance adjustment. This pump minimises cost per tonne pumped compared to conventional hard metal and rubber lined pumps through:

- Increased wear life
- Lower power consumption
- On-line wear clearance adjustment
- Increased mill throughput
- More consistent hydrocyclone separation

• Less downtime millMAX severe-duty slurry pumps have a unique patented design developed exclusively for grinding mill discharge duties and other abrasive slurries. FLSmidth Krebs offers wet end conversions or complete pump assemblies to meet customer desires and demands.

“The key advantage of the Krebs metal slurry pump,” FLSmidth reports, “is the 10% to 30% lower power, long even wear life and less pump downtime, which results in lower cost-per-tonne pumped, along with better cyclone separation.” Applications are in mill discharge, crusher slurry, sand and aggregate or any coarse solids or other severe, abrasive slurries especially in copper, gold, lead-zinc, coal, or phosphate plants. “The most dramatic savings will be in these applications, though savings will also be realised on fine solids, like iron ore or kaolin.”

Design Casing- designed for minimum slurry turbulence and even wear. Includes (14×12 and smaller) integral wear ring, carrier, and adjustment screws for on-line adjustment and elimination of suction side recirculation.

Wear Ring - adjustable wear ring assembly to permit closing of suction side impeller clearance during operation. This reduces slurry recirculation and lowers pressure at the suction area, thereby maintaining flow and reducing wear.

Impeller - designed for high slurry efficiency and hydraulic performance. Machined surface at the eye for wear ring adjustment and high expelling vanes.

Backliner - designed for close clearance at the back (14×12 and smaller), or suction liner with integral wear ring (16×14 and larger). Matching full impeller diameter and profile for close operating clearance.

Wear Parts - designed hydraulically to wear evenly. Constructed of high chrome at 680/720 Brinell hardness.

Power Frame - heavy-duty cast iron pedestal with external bearing assembly adjustment mechanism. Drilled for overhead motor mounting assembly.

Flanges - loose intake and discharge flanges drilled to suit various pipe requirements.

Bearing Assembly - heavy duty shaft and indirect fitted taper roller bearings rated at 100,000 hours B-10 life minimum. Bearing arrangement designed to prevent over greasing and ingress of slurry.

High Radial Vanes

- Clears large solids
- Prevents solids from being crushed
- Reduces casing slurry pressure at the eye of the impeller
- External wear adjustment screw.

Four screws for on-line wear clearance adjustment

- Adjusted while the pump is operating
- Adjusted six to eight times during the life of the pump
- Adjustable wear ring. Wear ring takes up clearance at the impeller
- Adjusted during operation
- Reduces suction side recirculation
- Maintains hydraulic performance.