

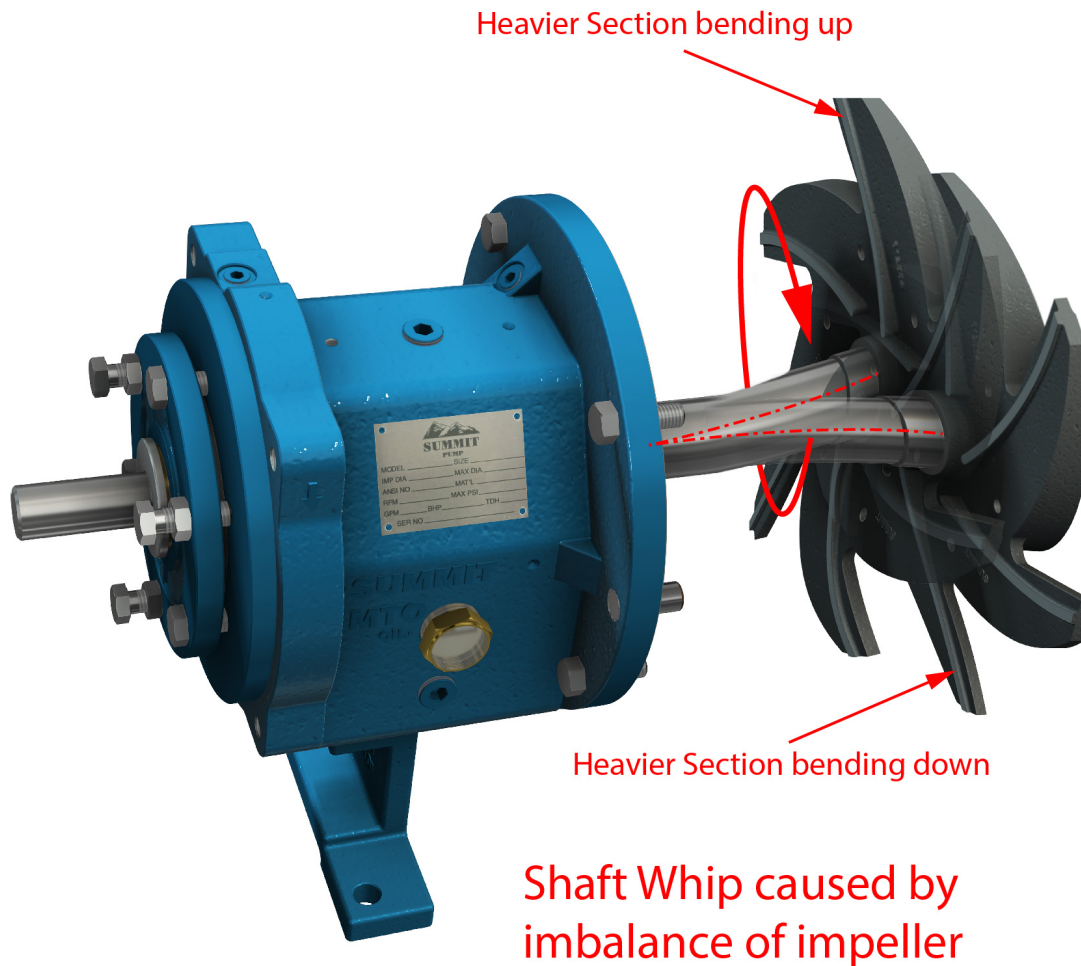


Is Your Impeller Balanced?

The purpose of balancing an impeller (rotor) is to ensure a safe and reliable machine. Unbalance refers to the impeller's (rotor) center-of-gravity (mass) being out of alignment with its center-of-rotation (eccentricity). If left unbalanced, the "centrifugal forces" will generate heat, vibration and noise during rotation. All of these losses also show up as inefficiency.

Why do we care?

When there is imbalance in the impeller (rotor) during operation, stresses are created in the shaft, bearings and seals. The mechanical seal is where the issue will normally manifest first. During pump operation an unbalanced impeller will create a shaft phenomenon known as "whip". The imbalance creates a dynamic bending force on the shaft similar to deflection (Deflection is a dynamic bending of the shaft due to unbalanced radial hydraulic forces like operating back on a curve). In both cases of whip and deflection, the shaft is not actually permanently bent, and would test as straight if the pump was stopped and the shaft runout was checked with a dial indicator.



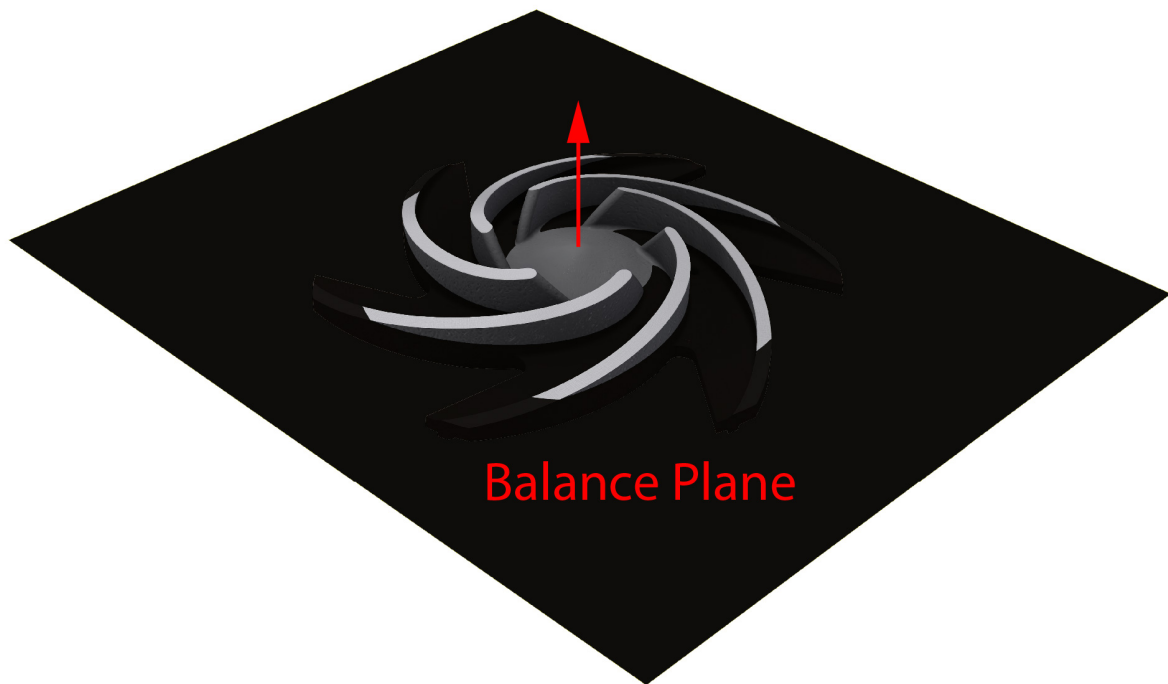
In summary: Imbalance creates Whip; the shaft is not actually bent, but will act as if it is while running.

Notes:

- Both whip and deflection can occur at the same time.
- At Summit Pump we dynamically balance 100% of our Impellers to ISO standards 1940/1941.
- **Summit Pump dynamically balances all impellers including maximum diameter impellers**, which some OEMs do not. They assume the impeller will be trimmed prior to assembly and consequently balanced, which is not always the case in real life.
- You should always rebalance an impeller if **any** work or trim was completed on the piece.
- We recommend **all** impellers be dynamically balanced regardless of size, speed or service.
- Please note we are only balancing the impeller and not the assembled

rotor.

- For pumps of low to medium energy and speeds below 3600 RPM; normal industry standards for impeller balancing are typically single-plane balanced if the ratio of diameter to width D/b is 6.0 or greater. The width b is measured between the outside of the shrouds at the impeller OD. For an open impeller it is in essence the vane height at the OD. Two-plane (or dynamic) balancing is typically performed otherwise.



- The lower the number for the quality grade the higher the balance tolerance... (The higher the tolerance the better the balance. Also thought as there is less unbalance).
- **Industry best practices and Summit Pump standard default balance quality grade for centrifugal pumps is ISO G 6.3.**
- For impellers balanced to a higher tolerance than ISO G 6.3, industry studies show that there is little to zero gain in reliability or reduction in vibration levels to be achieved.
- Summit Pump will balance to quality grade ISO G1.0 or ISO G 2.5 for a small fee, determined by size and shop schedule. Please see the inside sales group for the actual costs. Note that slight delays are possible, and your requirements must be outlined as a separate line item on the purchase order.
- Specifications such as Mil Spec 167-1, API 610 // 617, ANSI //HI 9.6.4 //

B73.1 and ANSI S2.19 will have more information and different acceptance tolerances.

- The International Standards Organization, ISO, published Standard 1940/1 "Balance Quality Requirements of Rigid Rotors,"... it was adopted by the American National Standards Institute (ANSI) in 1975 , and is also known as S2.19-1975, and is titled "Balance Quality Requirements of Rotating Rigid Bodies."



-The Summit Pump Team

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at a fair market price."*



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