**Operating Parameters**
- Dyna-Drill publishes a rotor RPM and pressure differential recommendation for each model to extend stator life.
- Operating above recommendations deforms stator lobes, produces higher slip, causes elastoformer stress.
- Rotor speed is proportioned to drilling fluid flow rate and differential pressure.
- As rotor speed increases, Dyna-Drill recommends lower differential pressure.

**Power Section Elastomers**
- Dyna-Drill nylon elastomers give excellent performance, balancing oil and solvent resistance.
- Nitrile is copolymer of butadiene and acrylonitrile.
- Acrylonitrile content of nitrile rubber ranges from 15% to 50%; higher content improves oil and solvent resistance but sacrifices dynamic and processing properties.
- Hydrogenated nitriles (highly saturated nitriles - HSA) offer higher mechanical properties and improved temperature resistance.
- HSA rubber with high acrylonitrile provides high temperature and oil resistance.

**DRILLING FLUIDS**
- *Water based* - fresh or salt water most used
- *Oil based* - diesel, mineral, servo
- *Synthetic based* - vegetable oils, poly alpha olefins, isohene alpha olefins, polyethylene, polyethylene, polyethylene, polyethylene
- *Air & Foam* - used less frequently than fluid

**AGGRESSIVE CUTTING STRUCTURE**
- Down-the-hole temperature
- High weight on bit
- High compression fit

**EXCESSIVE PRESSURE DIFF.**
- Excessive stator heat buildup

**EXCESSIVE RPM**
- Stator failure

**Effect of Repeated Stalls**
- A power section stall when it cannot keep up with rotor torque demand.
- As torque increases, so does pressure differential across the power section.
- Higher pressure differential means more slip and lower rotor speed.
- This action continues until rotor speed drops to zero or stalls.
- In a stall, stator elastomer is strained, allowing drilling fluid to blow by seals.
- High stresses accumulate and repeated stalls reduce stator life.

**Hysteresis Heat Buildup**
- Elastomer's viscous properties generate internal heat, known as hysteresis heat.
- Hysteresis heat accumulates in the thick lobes of stator, accelerating failure.
- Hysteresis heat increases with rotor speed, compression fit and pressure differential.

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1. Hysteresis heat begins the degradation of the rubber in the middle of the stator lobe.
2. Hysteresis heat buildup results in rubber component volatilization and voids are created within the stator lobe.
3. Stator rubber “chunks” due to hysteresis heat buildup.
4. Range of maximum torque for popular power sections.