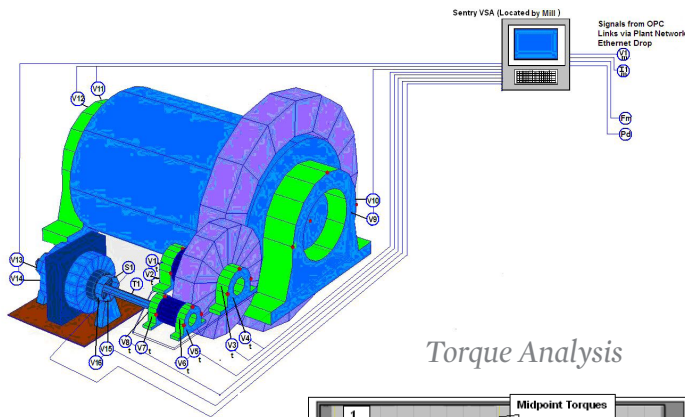




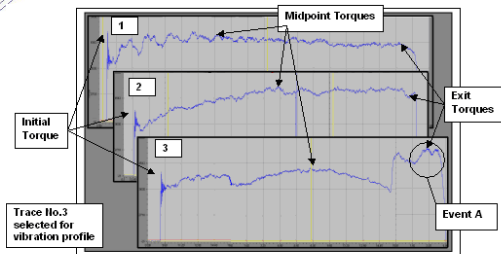
HORSBURGH & SCOTT

CONDITION ASSESSMENT & DYNAMIC MODELING

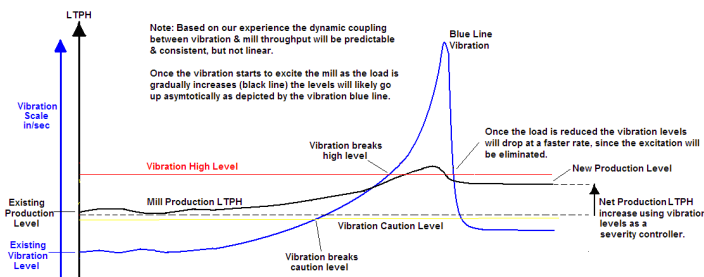
Use latest technology in remote condition monitoring to assess the condition and dynamically model the performance of critical equipment. Our services and solutions can help optimize your operations.



Torque Analysis



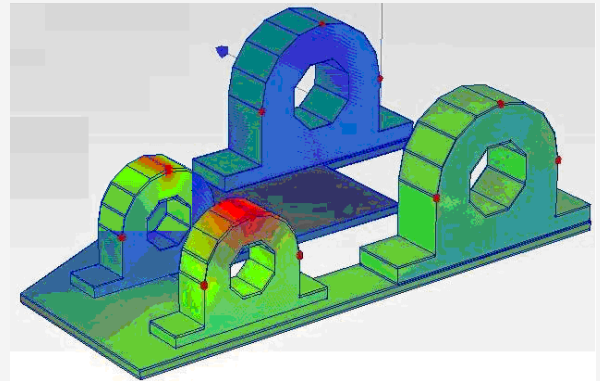
Equipment Optimizer



Comprehensive Analysis and Cost-Effective Solutions:

- Vibration analysis in time & frequency
- Operational deflection shapes (ODS) & modal analysis
- Transient event capture via auto-triggering
- Torque amplification & phase studies
- Integrate plant data with dynamic sensors (remotely monitored)
- Root cause analysis
- Mill optimization and de-bottlenecking
- Establish drive specifications
- Process model and FEA validation
- Peak load and critical frequency identification

Operational Deflection Shapes (ODS)



Sentry® Hardware/Software Package is Fully Customizable:

- Vibration signature analyses integrated with temperature, flow, level, pressure, speed, load, torque, and other variables; alarm notification and long-term trend analyses
- Shop-floor, Nema rated systems, portable laptop units, desktop units, wireless & remote monitors

For More Information Please Contact:

Bill Stan, 440.346.5452
wss@horsburgh-scott.com

COMPANY OVERVIEW

Manufacturing Capabilities:

- Gear cutting, including hobbing, shaping, Sykes herringbone, flycutting, Maag shaping (conventional and hardcutting), up to 7.3m
- Form grinders to 6m; AGMA class 14 with internal grinding to 3.5m OD
- Vertical turning to 15.2m with live spindle, shaft turning to 2m diameter, OD grinding to 1.8m diameter. Keyseating to 1.5m stroke with indexable table
- Large welded gear blanks to 6m diameter with furnace stress relieving
- Horizontal Boring Mills to 229mm spindles, 7 axis CNC floor mill with 6.1m index table



Heat Treat:

- New Aichelin carburizing and hardening line:
 - 2.0m diameter x 2.5m depth
 - 2.5m diameter x 2.0m depth
- New Saet CNC induction hardening machine up to 5.3m diameter
- Effective case depths for carburizing and induction hardening to 6.4mm
- Stress relieving of component weights to 100,000 lbs
- Process components to 50,000 lbs

Main Plant
5114 Hamilton Avenue
Cleveland, OH 44114
216.431.3900

Heat Treat Facility
4629 Hamilton Avenue
Cleveland, OH 44114
216.432.5804

Repair Center
1441 Chardon Road
Euclid, OH 44117
216.865.0550

Engineering and Quality Assurance:

- Engineering analysis and upgrades
- Reverse engineering
- Sophisticated tools and practices to follow rigorous standards, including AGMA, ISO 9001:2008, AASHTO and API
- Zeiss Coordinate Measuring Machine (4 x 4 x 2m)



Comprehensive Industrial Gearing Repair and Service:

- Engineering analysis, gearbox evaluations, reverse engineering
- Disassembly and reassembly
- Gear inspection
- Gearbox no-load spin testing
- Global field service
- Installation supervision
- Predictive and preventative maintenance
- Detailed borescope inspections
- Non-destructive testing
- Condition monitoring (vibration, torque, load, temperature, pressure, etc.)
- Real time, remote and networked
- Alarm notification
- Root cause analysis
- Condition assessment & dynamic modeling

Solutions for Many End Markets and Applications:

- Metals
- Mining
- Pumps
- Sugar
- Oil & Gas
- Wind Energy
- Tire & Rubber
- Power Generation
- Transportation
- Infrastructure
- General Industrial



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