Bently Nevada
a Baker Hughes business

Decision Support Analytics

Over 60 years of proven Bently Nevada machine and process problem-solving is now embedded in powerful new software plug-ins which continuously perform analytics and diagnostics covering an extensive range of equipment.

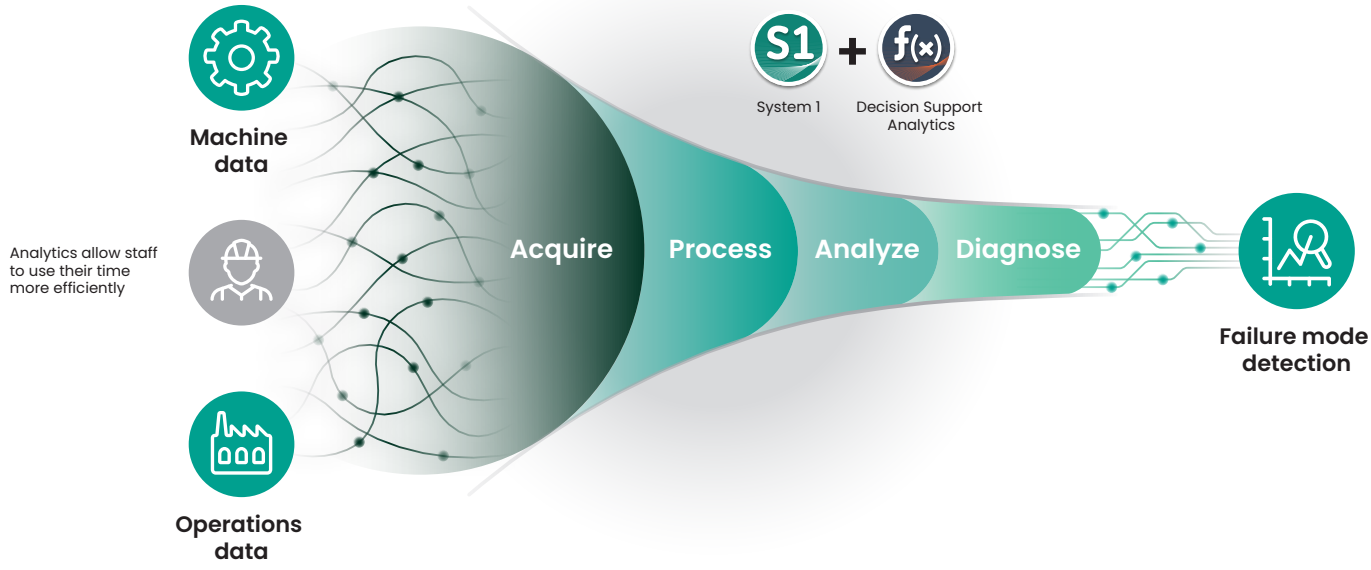
Modern industrial operations have an overwhelming quantity of data, and it's impossible for staff to continuously monitor and analyze machinery conditions. Unfortunately, generic analytics tools often provide insufficient diagnostics for specialized machines, and many analytic offerings do not allow experts to access and alter the algorithms to meet specific requirements. In addition, it is difficult to correlate diagnostic results with data in disparate historian platforms lacking high-resolution, time-synchronized data.

Decision Support Analytics changes all that.

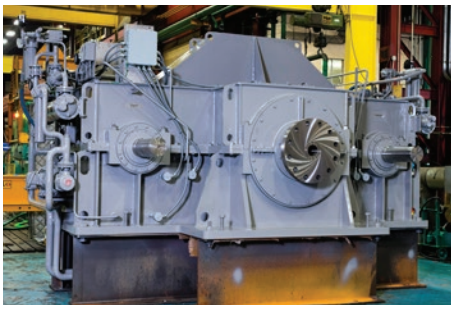
Each analytic can be applied to specific machines within the System 1 platform to perform continuous real-time data analysis to detect early changes in machine behavior and identify targeted failure modes. It doesn't just raise red flags. Decision Support analytics diagnose malfunctions by using machine configuration information, real-time data, and asset operating states.

Results can be visualized, trended, and annunciated within System 1. Alarm notifications are available via email and may be shared via open protocols such as OPC UA. Decision Support Analytics can aid root-cause diagnostics by correlating its results with high-resolution data within the System 1 database.

Decision Support Analytics cover a wide range of assets including rotating machines with fluid-film bearings, reciprocating machines, auxiliary systems, and common processes.



Decision Support analytics perform real-time analysis and diagnostics to detect failure modes



Analytics for rotating assets with fluid-film bearings

- Centrifugal compressors
- Speed increasing/ decreasing gearboxes
- Integral gear compressors
- Industrial gas turbines
- Aeroderivative gas turbines
- Power turbines
- Axial compressors
- Electric motors
- Pumps
- Blowers
- Fans
- Generators
- Steam turbines

With appropriate instrumentation, diagnostics include:

- Radial preload
- Fluid-induced instability
- High synchronous vibration
- Rotor runout
- Sub and Super synchronous rubs
- Misalignment
- Rotor bow
- Surge
- Stall
- Gear mesh
- Blade pass
- Combustor rumble
- High exhaust/high differential exhaust temperatures
- Electric motor non-uniform airgap
- Pump cavitation

Analytics for reciprocating assets

This Decision Support Analytic covers API type compressors in the services of hydrogen, flare gas, LDPE, or natural gas. With appropriate instrumentation, diagnostics include:

- Crosshead pin loading
- Frame loading
- Pressure packing leaks
- Suction/discharge valve leaks
- Leak—cylinder to low pressure
- Leak—high pressure to cylinder

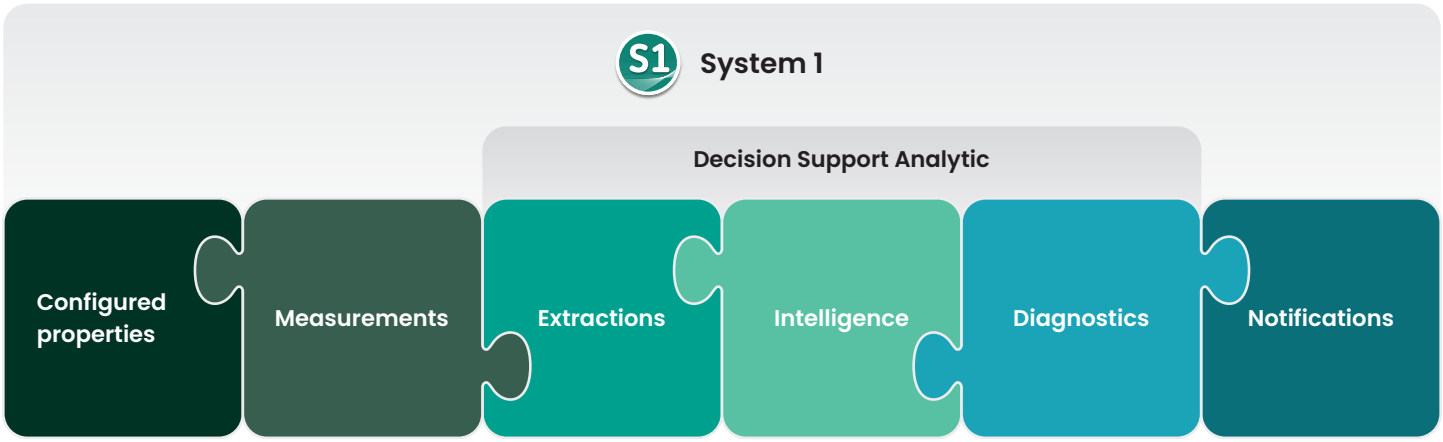
Rules for auxiliary systems

Decision Support Analytics include diagnostics for two types of dry gas seals used in centrifugal compressors: tandem, and tandem with intermediate labyrinth. Diagnostics include:

- Bearing oil migration
- Low seal gas DP
- Low seal gas temperature
- Low secondary seal gas temperature
- Low separation seal gas DP
- Primary seal failure
- Seal gas flow problem
- Secondary or separation seal failure
- Secondary seal failure
- Secondary seal gas flow problem
- Separation seal gas flow problem
- Seal gas booster fouled filter
- Seal gas fouled filter
- Secondary seal gas fouled filter
- Separation seal gas fouled filter

Stay tuned for more diagnostics

Methodology



Configured properties examples:

- Design speed/ lower and upper speed limits
- First balance resonance
- Rotor rotation direction
- Bearing clearance
- Maximum and nominal bearing temperature

Measurement examples:

- Speed
- Temperature
- Vibration: direct values, 1x and 2x amplitude and phase, gap, nx bands
- Pressure

Extracted asset values for model-based analytics examples:

Bearing level

- Bearing temperature ratio
- Maximum direct amplitude ratio

Rotor level

- Slow-roll threshold ratio
- Slow-roll amp ratio
- Relative phase

Asset level

- Inlet volume ratio
- Design pressure ratio
- Measured pressure ratio

Embedded subject matter expertise:

- Decision trees
- Logic
- Physical and operational limits
- Etc.

Diagnostic results examples:

- Radial preload
- Fluid induced instability
- High synchronous vibration
- Rotor runout
- Sub and super synchronous rubs
- Misalignment
- Rotor bow
- Primary seal failure

Notifications

Diagnostic results are identified via System 1 Event Manager, email notifications, or OPC UA alarm events

Benefits

- Automatically detect failure modes
- Maximize your plant availability
- Support existing maintenance strategies
- Mitigate your operational risks
- Extend the life of your assets
- Reduce time spent for root-cause analysis
- Utilize existing sensor data
- Gain new insight into equipment and process behavior
- Leverage System 1's core capabilities such as notifications and plotting

Support

In addition to installation, we provide a full range of support services to ensure you get the most value from your Decision Support Analytics:

- Installation and configuration
- Training
- Optimization
- Customization to meet corporate best practices
- Supporting service agreements

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