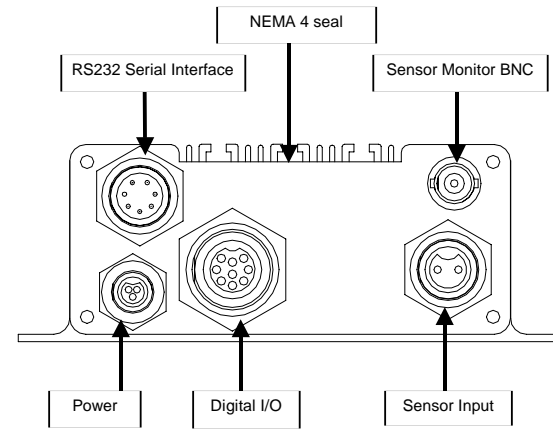
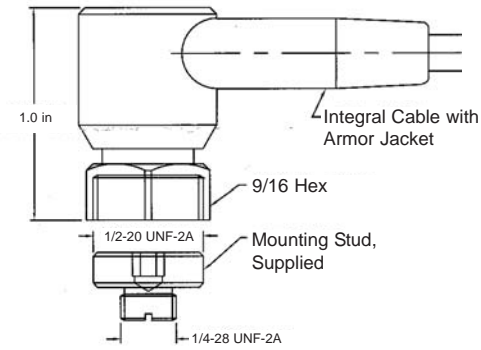


LanSharc Smart Digital Controller



Spindle Accelerometer



**LanSharc™ Machining Application:
energy Process Integrity Gauge (ePIG™)**



Ideal for single spindle transfer line applications, ePIG catches process and machining irregularities due to:

- Spindle degradation
- Tool setup problems
- Broken / dull inserts
- Loose clamps
- Belt slap
- Thermal problems
- Bearing faults
- Balance
- Alignment
- Gear wear
- Upstream process problems
- Material hardness/softness
- Missing operations
- Motor faults
- Coolant issues

RED LIGHT - GREEN LIGHT
is all you need to focus on

ePIG..

- provides *both* in-process quality control monitoring *and* machinery health monitoring.
- uses a unique, proprietary process integrity indication system through statistical normalization.
- automatically detects machining cycles and adapts to minor machine cycle variations.
- self-learns, using thousands of machine cycles for a baseline and automatically sets limits and alarms.
- employs reliable alarming technique based upon machining variances to virtually eliminate false alarms.
- cost-effectively ensures quality machining with a rapid return on investment

TYPICAL APPLICATIONS:

- Single Spindle Operations
 - Turning
 - Milling
 - Drilling
 - Boring
 - Grinding
- Dynamic part gauging
- Tool life extension
- Machine utilization
- Process Optimization

BENEFITS:

- Increases return on investment
- Improves part quality and consistency, directly related to customer satisfaction and machine reliability
- Extends tool life and reduces tooling cost
- Reduces the amount of scrapped and reworked parts
- Maintenance can be scheduled specifically for machines that are indicating a decrease in performance, avoiding catastrophic failures during production runs
- No specialized setup required, since the performance metric is not machine dependent
- Allows for better specification and design of machines for new line installations

SYSTEM SPECIFICATIONS:

Sensor

Model	SDC003-SA020C010A
Type	ICP
Sensitivity	50 mV/g
Cabling	Integral 20 ft, includes 10 ft armored
Mounting thread	1/4 - 28
Installed height	0.97 inch (24.5 mm)
Signal connection	2-pin ConXall

LanSharc Smart Digital Controller

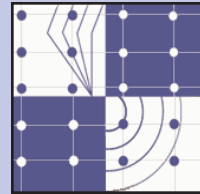
Model	SDC003-ePIG
Dynamic Input	1 (2-pin ConXall), AC coupled 20 Hz
Digital Inputs	2 (9-pin ConXall)
Monitor Output	1, buffered analog (BNC jack)
Digital Outputs	4, solid state relay (9-pin ConXall)
ADC Resolution	24 bit
Power Requirements	24 VDC (3-pin ConXall)
Power Usage	150 mA
Communication	RS-232 or optional Ethernet
Status LED #1	GREEN , indicates system/sensor power OK
Status LED #2	GREEN , indicates cycle pull OK
Status LED #3	GREEN , indicates system on-line
Status LED #4	RED , indicates alarm condition
Mechanical Enclosure	NEMA4, 2x4x7 inches

ePIG Application Firmware/Software

Measured Parameters	Integrity Indicator, I ² Vibration Levels (Min, Max, Overall, RMS) Octave Bands (7 total, to 2500 Hz)
Alarm Options	Short, Intermediate and Long Term Machining and Idle

System Accessories

Power Cable	SDC003-PC06 (included)
Digital Output Cable	SDC003-DPC20 (included)
Utility Software	ePIG-UTIL (included)
RS-232 Cable	SDC003-RS23210 (included with SW)
On-board Ethernet	SDC003-LAN2 (optional)
Ethernet Cable	SDC003-LC06 (optional)
Sensor Installation Kit	SDC003-IMI080M296 (optional)

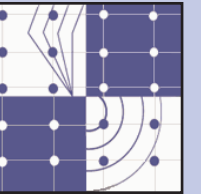


THE
MODAL
SHOP
INC.
A PCB GROUP CO.

Helping you test, model, and modify the behavior of structures and processes.

3149 E. Kemper Road
Cincinnati, Ohio
45241-1516
U.S.A.

Ph. 513-351-9919
FAX 513-458-2172
1-800-860-4867
www.modalshop.com
www.processvibration.com



THE
MODAL
SHOP
INC.
A PCB GROUP CO.

Helping you test, model, and modify the behavior of structures and processes.

3149 E. Kemper Road
Cincinnati, Ohio
45241-1516
U.S.A.

Ph. 513-351-9919
FAX 513-458-2172
1-800-860-4867
www.modalshop.com
www.processvibration.com

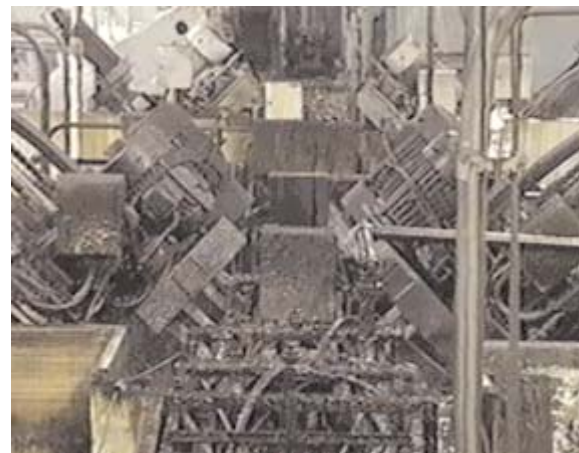
Gauging is a critical step in ensuring manufacturing quality and consistency. Typically, gauging is time consuming, slows production and, as a result, performed only at critical steps of the manufacturing process. Dozens, hundreds or even thousands of unacceptable parts can be produced before the next "spot check" along a line catches a problem condition. Flaws are often a result of a process problem (broken/dull tool, loss of coolant, etc), part problem (hardened material), or simple operator error (tool mount, etc). This change of condition from "good" manufacturing to "bad" can often be captured and validated with a simple dynamic process Integrity Indicator (I^2) based on a "cutting energy" signature. The ePIG system, based on the SDC003 LanShar[™] hardware platform, uses statistical analysis to alert the machine operator or process engineer that an alarm condition exists where the cutting energy has changed from the expected. By using variances from the expected results, ePIG can also accommodate processes with evolving cutting energy levels (such as those with tool wear and tool change) without false alarming.



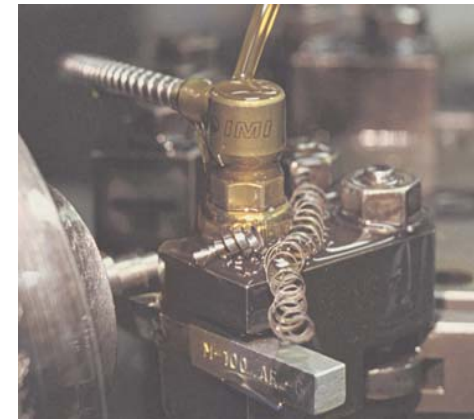
ePIG results in an effective and easy-to-use process monitor, which continuously obtains data without shutting down the line.

Opening broad access to dynamic cutting process monitoring, ePIG combines highly innovative algorithmic processing with low cost hardware. The algorithms are based on adaptive processing techniques, wherein the box automatically learns the base signature during the machining process. The ePIG approach monitors only the statistical data on a normalized basis. This eliminates the need for any specialized setup based on machine type or speed, making ePIG a universal tool. Faults are detected on the basis of variances of the expected results, rather than via commonly utilized frequency/amplitude templates, which are highly subject to false alarm and require expert intervention to setup and evaluate. Since the process throughput is so high due to the on-board digital signal processing, every machining hit can be monitored for analysis on quality trends, machine/tool performance and downtime.

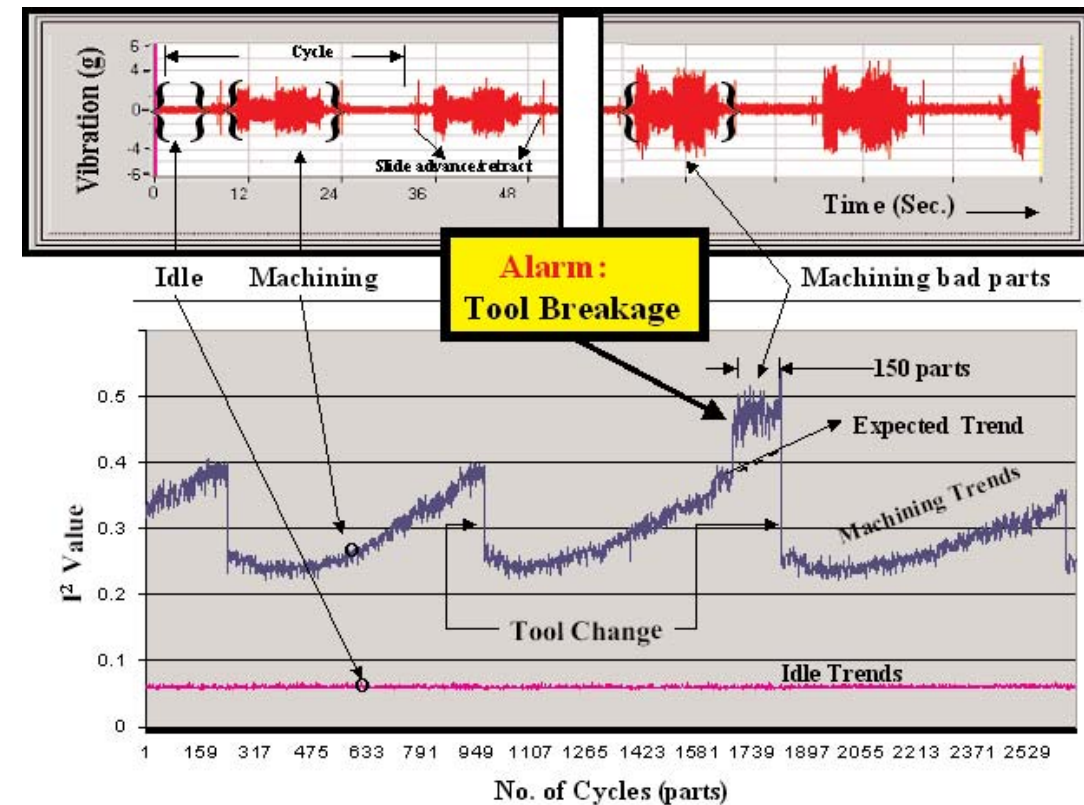
With ePIG, machinery health monitoring is simple, non-intrusive and cost-effective.



As an extra benefit, the vibration sensor used for the dynamic process gauging can also supply indications of the machinery health. Machinery health monitoring is a common practice providing useful machine condition information (often spindle or bearing related); however its usefulness is often overshadowed by requiring production to be stopped in order to take proper vibration measurement. Due to the costs and inconvenience associated with "route-based" or "walk-around" vibration measurement, it may take place on a given machine only a few times a year. It also is often performed on machines that are in perfect health, which is certainly not cost effective. Online systems have emerged to provide continuous health monitoring, but generally have failed to reach broad acceptance, due to the machine complexity, high measurement system cost and inconvenience from repeated false alarms.



Using a non-intrusive vibration sensor (shown at the left), ePIG measures and analyzes both the cutting energy during a machining cycle as well as the ambient rotating energy while the machine idles during part transfer. During machining, the I^2 trend provides a clear signal for monitoring a "significant change in the manufacturing process", shown in blue below. Note the unexpected jump highlighting the tool breakage event. Similarly, the pink data shows the machine idle trend and any significant variances accordingly. Alarm output conditions are communicated via a simple status LED or with solid state relays connected to a PLC. To determine what caused the change in the process, the I^2 trend can be analyzed either at the machine by downloading data to a PC, or by remotely addressing the ePIG system over Ethernet.



A single installation of 16 ePIG's in an automotive manufacturer's single spindle transfer line operation has provided millions of dollars of savings in part quality, avoided down time, minimized scrap, and reduced maintenance costs in just the first year of operation.

Call one of our application engineers toll-free at 800-860-4TMS for additional information on evaluating the ePIG system as a quality or health monitor within your manufacturing operations, or visit our industrial products website at www.processvibration.com.

ePIG provides a trustworthy process alert that has earned the respect of both machine operators and process engineers alike.