SmartSAM™
Statistical Process Controller®
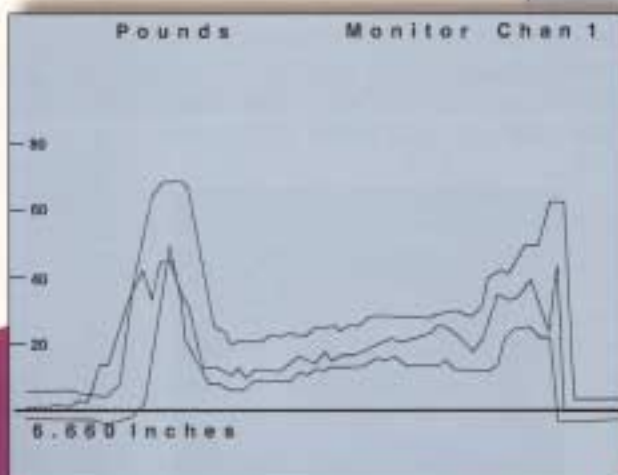
TOOL & DIE WEAR

MATERIAL HARDNESS & THICKNESS
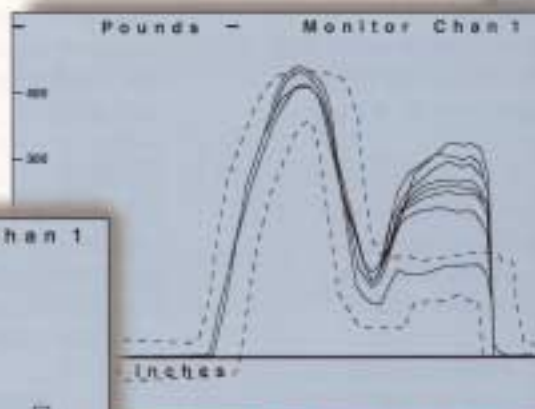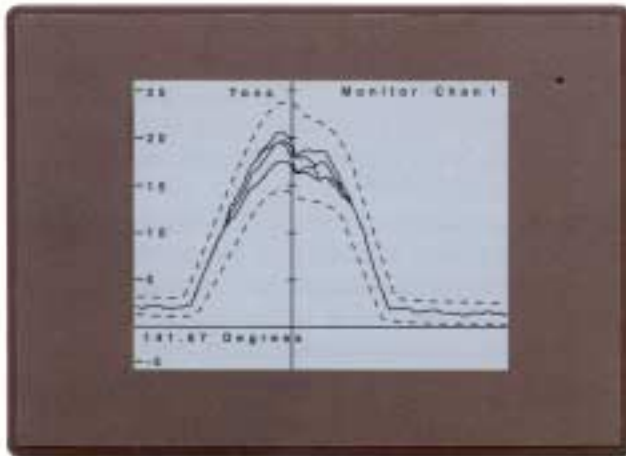
BURRS & SLUGS

SCRAP IN DIE

A decade of enhancements driven by users . . . tools designed to improve productivity

Real-time signature monitoring and control

With SmartSAM you can see the signature immediately. There is no waiting for slow serial networks to eventually update the screen, nor do you sacrifice data resolution or the number of channels displayed for the sake of performance. SmartSAM is fast, smart and easy to use.

Signature load limits computed automatically

Using our patented Statistical Process Controller technology, SmartSAM determines warning and control limits automatically. It also features exclusive variable-width limit arrays to insure that highly compliant portions of the process (stroke) have tight limits and highly variable portions of the process have loose limits. This reduces nuisance faults and assures that the process produces consistent part quality.

Touch-screen controls

Use of touch-screen operator interface is deemed as the most intuitive type of computer interface. All commands are in easy to read type. The backlit LCD display provides excellent readability in bright and dark environments.

Simple setup and calibration

A decade of application engineering expertise in applying signature-based process control have been converted into an expert system which automatically sets limit boundaries based upon press and die operating characteristics. These default limits benefits a new operator with signature-based process control right away. Tools are provided to override the default settings when the operator becomes more knowledgeable with the calibration and tuning.


Setups accelerated and verified

By loading the tool data into SmartSAM you can utilize the master signature or prior signature to validate proper setup and begin repeat production runs in a fraction of the usual setup time.

Assure part quality using advanced functions that monitor process details

Material control and verification for hardness and thickness

SmartSAM has extremely high resolution which provides the benefit of being able to detect slope and shift changes easily. When the slope changes at the beginning of the hit it usually is a result of hardness variation in the material. When the signatures starting position shifts this is indicative of a thickness variation the material. This is because the signature is referenced to the die position by a high-resolution resolver. SAMview software also features special patented software targeted at the forming industry that monitors hardness, thickness, and work hardening coefficient.
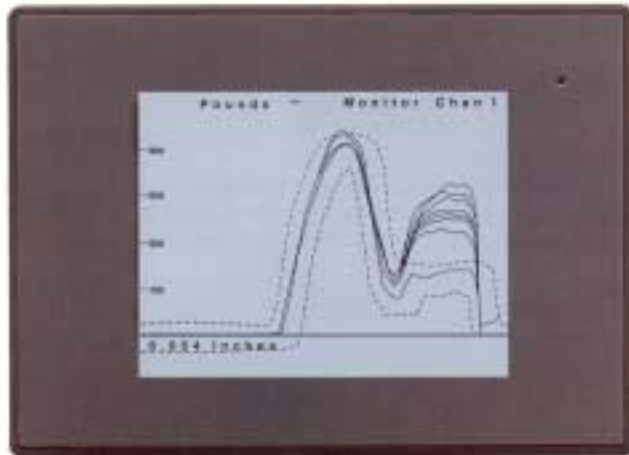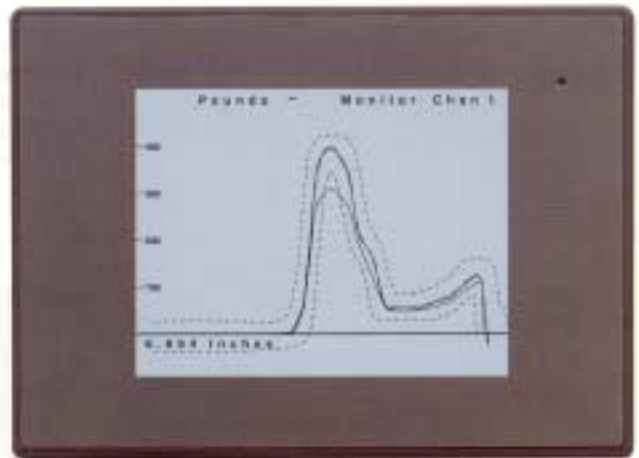
Protection from slugging in the die before damage

Protection from pulled slugs in the die are perceived by the system as a 'thickness' change after the tool has started working the part and limits are violated in mid-stroke. Slug build-up within the die is a gradual process and is detected before excessive damage is occurs. Note that slugging usually occurs in parts of the signature other than the main peak. Using our CSL sensors and SPCview™ you can monitor punches directly thereby measuring wear precisely using either punch signature widening or work as the basis for determing need to punch replacement.

100 percent real-time monitoring for defects

SmartSAM checks for consistency of every part while it is being made by comparing process characteristics with those previously stored of a known good sample part which has had statistically derived control limits. Variations from limits are either annunciated or automatic control action taken for both warning and fault signature limit arrays. Portions of the signature violating the limits are clearly identifiable and can be magnified for closer inspection. Years of field proven use have resulted in many advanced functions such as "living limits™" that predict future process changes based on past statistical variability and thereby establish process limits free of nuisance faults.

The simplicity of a load monitor
. . . with advanced process control

Real-time signature-based process control

Peak load monitoring systems have had limited success in the metalforming industry. Now the demand for increased productivity by reduced down time from equipment damage and quality control is answered with signature-based process control.

The SmartSAM™ Statistical Process Controller® uses new digital signal processing technologies to remove many traditional process control limitations. This new controller captures not just peak information but thousands of samples from sensors throughout the process for every part.

Showing a visual graph of the sensor outputs has value since material defects and tool related problems can be observed by experienced operators. However, the speed of the modern press and varying degrees of operator experience have led to development of the Statistical Process Controller.

The SmartSAM system from Signature Technologies adds automatic signature analysis with real-time control to the operator's list of tools. Regardless of whether the operator monitors peak-load values or actual signature screens, the SmartSAM controller provides real-time signature analysis for every active sensor while each part is produced.

There is no need to consider a conventional load monitor when the SmartSAM will perform the same function better and do so much more for the same investment.

- The operator can "see" into the process by displaying the load as a function of the ram position and represented as a process signature.
- Display features of high-end load monitors.
- Digital display of peak loads, peak angle or graphical signatures.
- Calibration performed via a graphical interface.
- SmartSAM has the intelligence to study the process, establish operating parameters, limit sets and tuning constants.
- SmartSAM is upgradeable offering network, PC interface, tool database, additional channels and features without scraping the basic system.
- Available with simplified push-button indicator light style operator interface with network option.
- Exclusive multiple limits for both warning and shutdown for greater quality control and machine protection.


Familiar load-monitor display mode

Upgrade path to a high-speed network and SAMview™ software.

SmartSAM uses the same Statistical Process Controller, packaging and base module as the rest of our product line. This facilitates upgrading to PC networked product and adding additional processors without re-investment in product platform. Also, it is easy to upgrade your current processor to function on SAMnet™ with SAMview, a real-time ultra-high speed network and PC software package. SAMview improves productivity by allowing you to watch signatures while the hit is taking place, playback hits leading up to a bad hit, and utilize a tool oriented database for setup storage and retrieval.

# Part quality monitoring integrated with ... tool condition and press protection
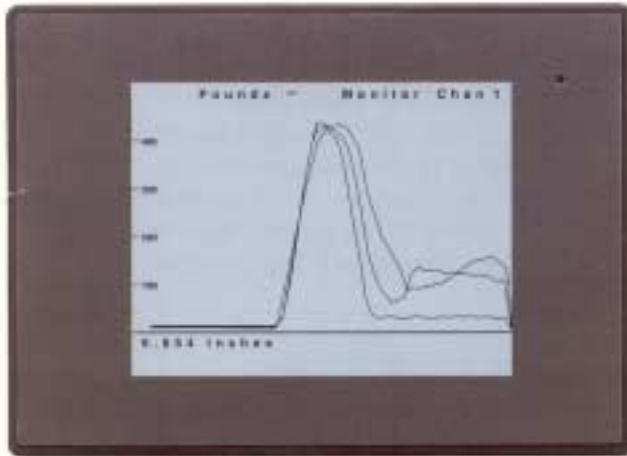
Die-wear monitoring and protection

A system sensitive enough to detect variations in material and slugs also can detect variations in die-wear. Although observation of die-wear is difficult, the effect of die-wear and damage on part consistency is not. Die-wear is monitored via the gradual degradation of the signature requiring signature limit-set recalculation. Because the recalculation must be activated by the operator to continue operation, die wear is usually detected before breakage.

Separate limits for protection and quality monitoring

SmartSAM automatically computes three sets of control limits. These are referred to as warning and fault limits, each with hi/lo, and press design load limits. The broader level (shown by top and bottom dotted lines) protects tools and presses while the tighter set (inner pair of dotted lines) warns the operator of process inconsistencies. A third set (not shown) use the press manufacturers design load curve to stop the press instantly when operating outside of this critical design load (Critical Curve Monitoring).
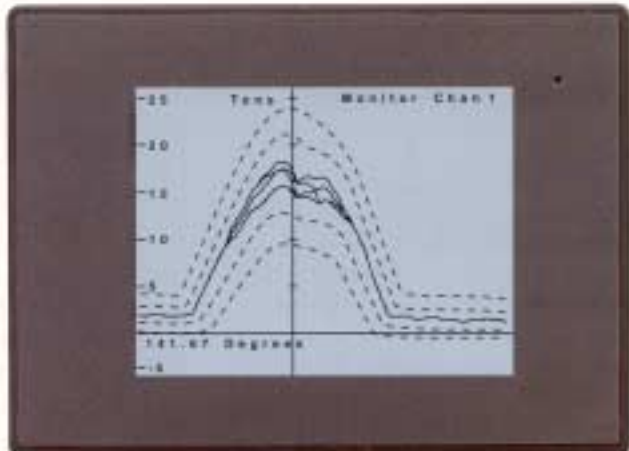
Statistical Process Controller® ... a modern tool for quality management.

The high-speed signature processing techniques used by the SmartSAM Controller sample up to eight press sensors on a real-time basis. On operator command, the controller calculates two limit sets for each sensor using small-sample statistical analysis. Integrated control functions provide immediate response capabilities that can change machine operation at any point in the process. The operator not only has a visual window into the process but an untiring guardian to help produce higher-quality parts in less time.

Advanced SmartSAM Features:

- PartTrack™–Tracking of individual parts for auto-eject of bad parts.
- RampWatch™–Automatic modification of control limits to allow for press-speed variations.
- GearShift™–Variable data collection rates during the cycle for higher resolution during critical regions of the stroke, like trim at the end of a forming operation.

For more information

When you want improved productivity, faster setup times and superior quality control, call 972-488-9777

SIGNATURE™ **TECHNOLOGIES**
...Bringing Process Control Out of the Dark

Modular design supports easy upgrades and custom installations

ENCLOSURE
SmartSAM is enclosed in a NEMA 3 industrial enclosure. All components are easily serviced with plug-in modules and cables. A non-packaged option is available for incorporating components into existing control panels.

FIELD ACCESS
Field terminations are located for easy access by an electrician or technician.

MAINTAINABILITY
Spare fuses, status LED and fuse tester are built-in.

MISTAKE PROTECTION
The part of SmartSAM most susceptible to damage from in-plant electricians or other vendors can be replaced quickly, easily and at very low cost.

MODULAR BASE
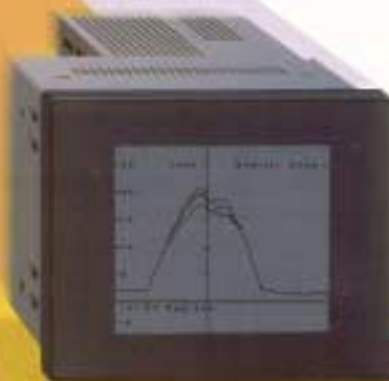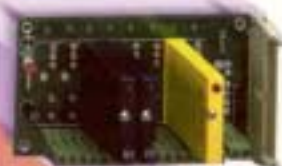Base modules come in 3 sizes and support up to 4 SAM modules (32 channels).

POWER SUPPLY
A modular plug-in base module and worldwide power supply provide excellent serviceability, expansion options and upgrade environment.

CONTROL CONNECTION
Industry-standard control input and output modules available from numerous suppliers in most major cities worldwide enable a multitude of different interface types.

SAM500 CONTROLLER
Numerous versions of the Statistical Process Controller support 4 or 8 channels, resolver or encoder pacing, a variety of sensor types and specialized control functions. The latter includes PartTrack™ for automatic part tracking and ejection, RampWatch™ for control during start-up of large presses and transfer presses.

PMA'S AWARDS of EXCELLENCE

PMA PRECISION METALFORMING ASSOCIATION

SIGNATURE™ TECHNOLOGIES
...Bringing Process Control Out of the Dark

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Signature Technologies has dedicated over a decade to research, development and application of signature-based process control. We are committed to solving the process control problems of our customers thereby assuring them a reasonable and strategic return on their investment.