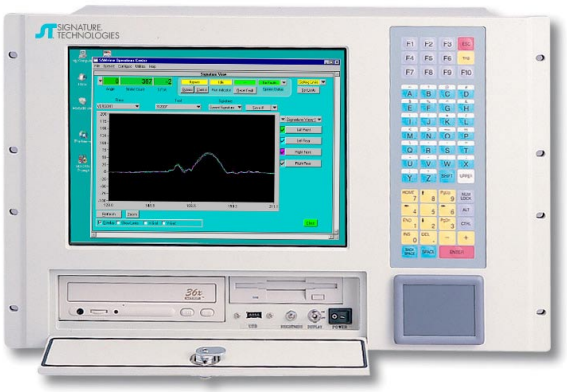
SIGNATURE TECHNOLOGIES



signatureACE®

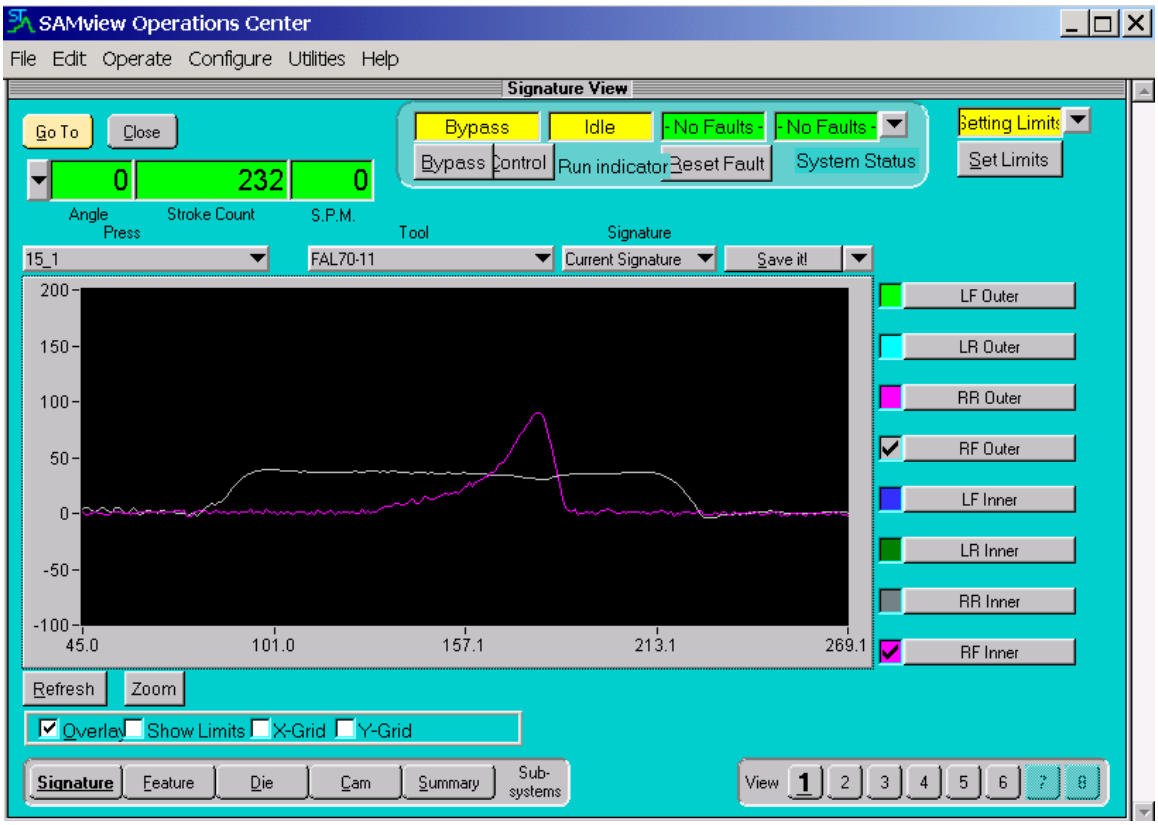
Press Process Control System

- **Simple operator inteface**
- **Advanced power engineer tools**
- **Windows-based with integration into other software products**
- **Proven high reliability with 10 years of continuous use in numerous industries**
- **Internet supportable**

Signature Technologies Signature based Process Control System should not be confused with a simple tonnage meter. This system has capabilities far beyond simple force monitoring and provides and excellent platform for press diagnostics, process diagnostics, setup consistency and verification, as well as product monitoring and machine status integration into a plant network.

The signature is developed as force as a function of ram position as shown in the signature below. The signatures shown are from a large automotive double slide press showing both inner and outer slide force. Note the dip in tonnage at about 180 degrees of the press rotation as the inner ram overcomes the outer ram tonnage.

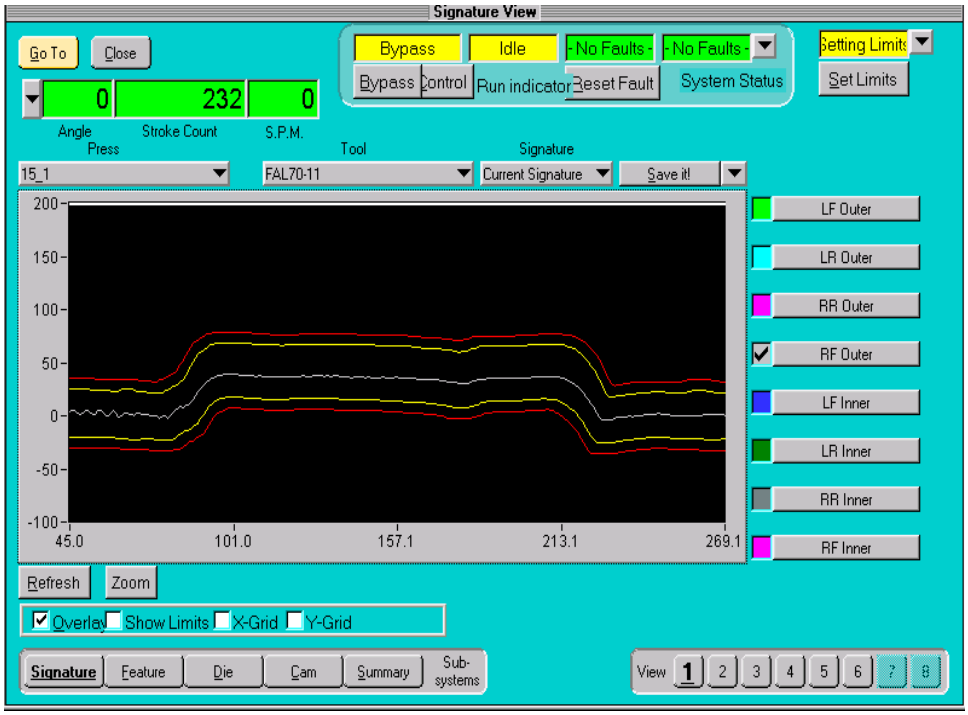
Signatures can be saved as Masters and will be brought in when the tool is reloaded. This offers the operator a means of comparison and is used as a setup tool. Signatures of inner and outer slides shown are the Right Front Outer and Right Front Inner signatures. Note that it is possible to display any or all of the 4 corners of the press.



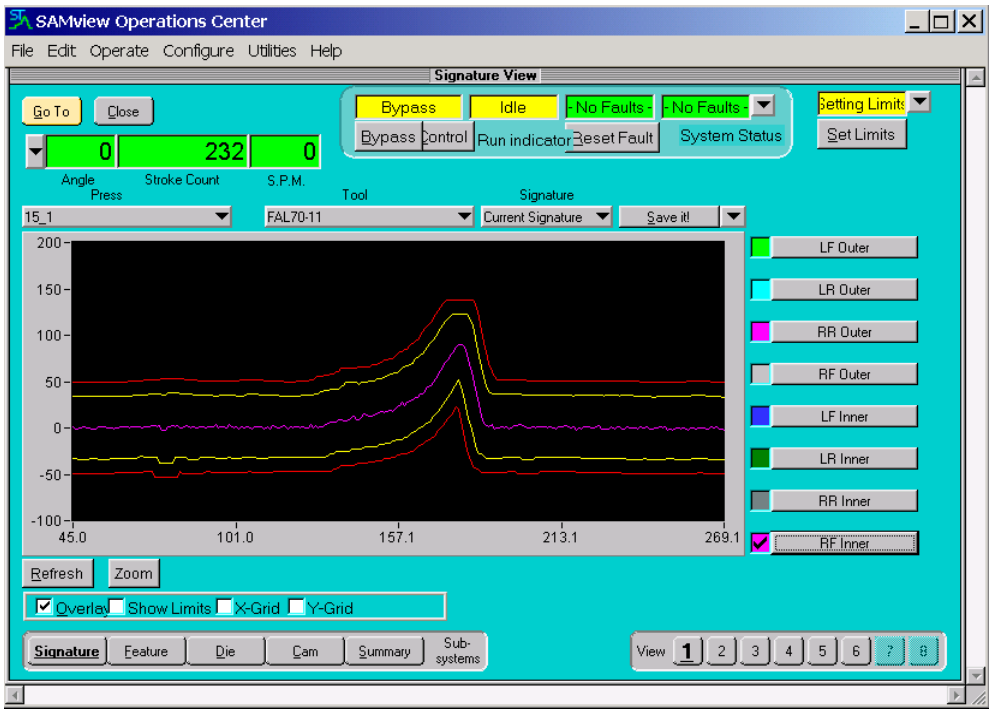
More valuable are the limit sets that are established by the system as the means to compare the process from hit to hit. The next 2 signature screens display the outer slide force signature with limits. This is a Master Signature for the outer slide of the press and is used for set up and is the means to compare the process on a hit to hit basis. If the process changes and limits are broken the system will out put a top stop or E stop signal depending on what set of limits are broken.

Limits are colored Red or Yellow: Yellow limits are used as warnings to let the operator know that the process has changed and that and may require some attention. Red limits are fault limits and as such identify a significant process change that could result in poor part quality or damage to the die or press.

Right Front Outer signature with limits



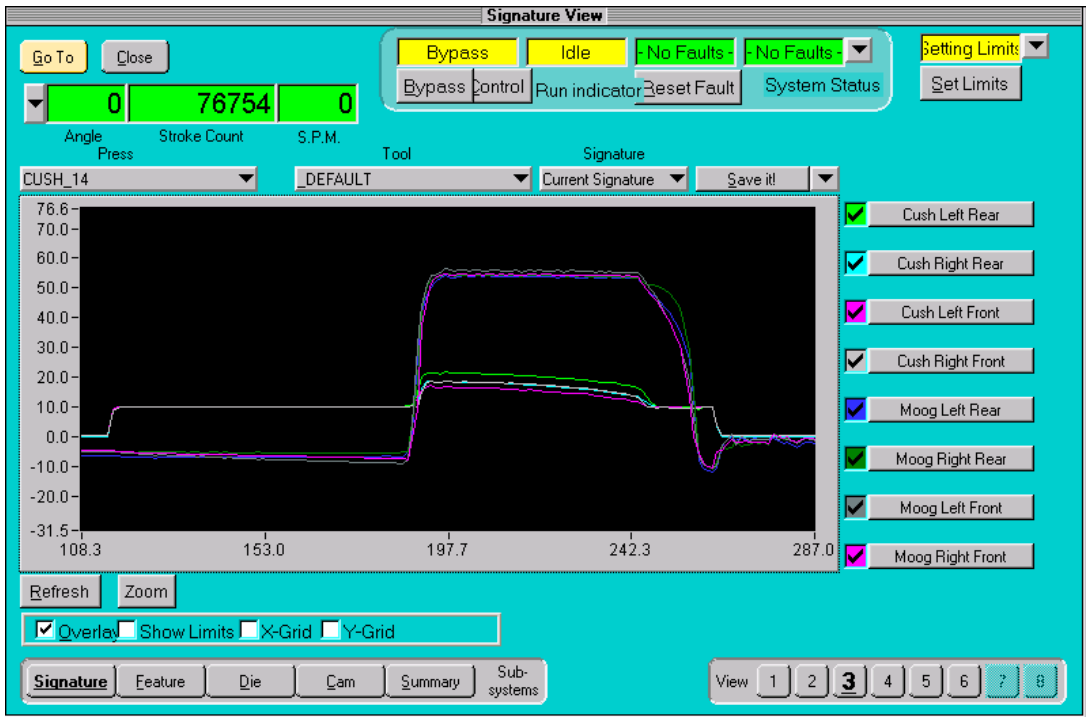
Right Front Inner with Limits



Limit parameters are set by the operator or system administrator and five layers of security prevent unauthorized access or changes to the system. All system or user actions are event logged for later review and security access is customized for each users capabilities.

The signatures below are taken from a Signature Technologies system used on a Large Schuler Crossbar transfer press. The system is used to monitor the lead press. Shown are the position signatures from the slide and the cushion as well as the trigger point for the pre-accelerate valve. With this tool it is possible to not only monitor the position of the slide and cushion relative to each other in real-time but also establish the trigger point for the pre-accelerate valve. When saved as a master signature the next setup is automated.

Slide position (Green) Cushion position (Lt Blue) Pre accelerate valve (Magenta)



The above screen shots also display the cushion force and Moog valve control current. All 4 corners are shown overlaid for comparison as are the Moog current signals.

This display can provide the user with a visualization of all 4 corners of the cushion force plus the current signals from the Moog control system to the control valves.

By scaling the current signature up so that 6 milliamps appear as 60 milliamps one is able to display the two signatures together and allow the current signatures to be interpreted in real numbers. This is a trouble shooting tool for the technician which allows them to visually see which corner may be producing a problem.

The cushion monitoring system allows for the comparison of many different signals for set up and trouble shooting the process, especially helpful for training, new tool startups, and maintenance.

This system monitors 15 different signals:

- Force on 4 corners of the Slide
- Slide position
- Cushion position
- Force on 4 corners of the cushion
- 4 Current signals from the Moog control
- Pre accelerate valve trigger point

The above information is just an overview of the capabilities of this powerful system.

Signature Technologies, Inc.
1225 Yacht Club Road
Oak Point, TX 75068

PH: 972-488-9777
FX: 214-242-2924
www.signaturetechnologies.com
email: mo@signaturetechnologies.com