Toni Schwer,
President and Co-Owner of
Schwer + Kopka GmbH

Foxmatic - the next generation in advanced load monitoring

Historically, the optimum way to monitor force curves in metal forming processes was to set envelope limits as narrow (tight) as possible. Yet everybody knew that using such settings were impractical because the control limits stopped the machines too frequently without reason. Using wide (loose) settings, however, prevented the reliable detection of many types of errors.

The new Foxmatic technique developed by Schwer + Kopka represents a completely new approach to monitoring by utilizing algorithms that operate completely independent of the standard envelope limits. Foxmatic sets error detection capabilities at the highest level while avoiding nuisance machine stops at the same time.

Foxmatic complements the proven Mandon-philosophy

SK's **Mandon**-philosophy is geared towards immediately informing the user about any deteriorating machine or process behavior. "The **Mandon-Apps** available in our process monitoring systems provide the machine operator with a number of easy-to-read indicators enabling him to judge the current performance of his machine" describes Toni Schwer. "With this information, the operator is in a position to intervene immediately in order to prevent any bad trends from continuing over longer periods of time. In addition, it is absolutely mandatory to continuously improve the performance of the machine. The goal is to detect process deviations as soon as possible to prevent the production of bad product."

The **Mandon-Apps** provide in depth information and assisting tools for a quick assessment of the running process.

Foxmatic features automatic drift compensation

Up until now, all process monitoring systems required ever tighter limit settings to react to the tiniest changes in the measured force signals. "It is vital to be able to tell the difference between normal process variation and what changes are caused by true errors", comments Toni Schwer with regards to the difficult task that had to be overcome by the SK engineers. "We all know that an incorrect interpretation of the force signal leads to unjustified machine stops which, in turn, cause the monitoring limits to be set wider and wider. Detecting small errors becomes virtually impossible for the process monitor. **Foxmatic** now offers a way around this inevitable problem by functioning independently within the set envelope limits."

Typical errors that have been detected with **Foxmatic:** Cracked heads, small punch breakages, etc.

Foxmatic tracks very small changes in the force signals at a point when it is not yet clear if these changes are actually associated with an error. **Foxmatic** uses intelligent mathematical routines and pattern recognition procedures to decide whether or not the detected change is associated with an error, or if it is just normal process variation caused e. g. by material, machine, or lubrication. In addition, the new drift compensation technique calculates if the signal behavior is within the permitted drift values for the process, or if a signal change can be related to an error, even if the change is only minute. Practical tests carried out in the field have proven that the drift compensation feature is the decisive tool to guarantee error detection while preventing unnecessary machine stops.

The foxwise approach

When **Foxmatic** recognizes a change in the force signal, the monitoring software starts to determine what it should do based on the variability of the signal. When the force changes are very small, the machine is not stopped immediately. If the changes are seen over several machine cycles, and if the rules of the drift compensation have been applied, **Foxmatic** will initiate the proper action. Either the machine is stopped, or a sorting device is activated to separate the potential bad parts. Using a sorting device can be very advantageous for both quality and productivity because the machine does not need to be stopped for every randomly occurring process error.

Older machines tend to produce more "noise" which can affect the force curve independent of the actual process. Such events can be eliminated by means of the new STOP-control function. When the machine is repeatedly stopped for no reason, a simple push of a button will ignore this curve segment from the sensitive **Foxmatic** routines.

Hit rate of Foxmatic: 100%

"We have taken force readings from almost sixty (60) machines of different makes and types" explains Toni Schwer as **Foxmatic** was being developed. "The ana-lyzed machines were producing various parts from different materials, and we now have a data base with millions of part signals available for testing purposes. Our standard Mandonic auto enveloping technique already produced excellent results and small errors such as cracked heads are detected with a high degree of reliability. But if the signal change caused by a small error remains within the Mandonic envelope limit, this error usually could not be seen. If the process is less stable, envelope limits will produce even more nuisance machine shut downs which increases an unde-sired side effect".

Foxmatic virtually eliminates this problem using its auto drift com-pensation and special algorithm. **Foxmatic** was able to reliably detect all errors in the test data base without producing any unjustified machine stops.

Foxmatic is available for our models **SK 400** - **SK 800**.