

Image 1

PROBLEM:

It was impossible to get an acoustic emission signal for monitoring the grinding process with the change from steel to carbon CBN grinding wheels.

One of the main advantages of carbon CBN grinding wheels is the much better damping. Carbon hubs reduce the vibrations in grinding and manufacturers of this technology, like Mach Rotec, speaks of a vibration-free grinding processes.

This vibration damping advantage for the grinding process is a big problem for the acoustic emission sensor. As better damping produces a weaker acoustic emission signal. This customer was unable to measure any acoustic emission signal with the existing acoustic emission ring sensor on his machine, as to be seen in the screenshot of the acoustic emission signal during dressing. Only disturbances had been visible (see image 1).

Monitoring the dressing process of CBN grinding wheels is a standard and a must-have. The very high price of a CBN grinding wheel makes every dressing cycle extremely expensive. Therefore dressing needs to be monitored so that users do not dress too much which is too costly, and not dress too little which would lead to quality problems. The precondition for monitoring the dressing process is to get a good acoustic emission signal.

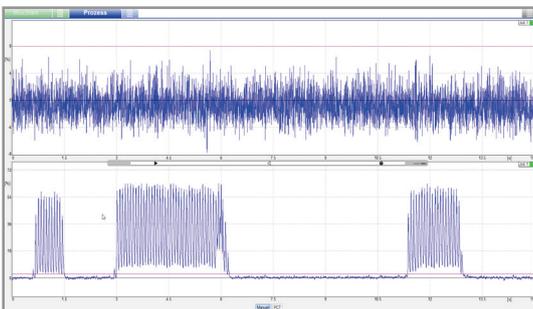


Image 2:
Counter-directional-dressing,
infeed $0,5 \mu\text{m}$ (radius), $n_{ss} = 6.350 \text{ 1/min}$,
 $n_{WSS} = 782 \text{ 1/min}$

SOLUTION:

Using an SBS ringsensor.

We have installed at the same machine an SBS balance head with an integrated SBS acoustic emission sensor and an SBS ringsensor at the workpiece spindle. We observed the dressing with the same grinding wheel and the ringsensor had been positioned at the same position as the former sensor (see image 2).

The upper graph on the left is the signal from the acoustic emission sensor integrated inside the balance head. With this sensor it is impossible to see the signal of the dressing process. With different settings it had been possible to see a part of the process. But the results have not been adequate. The lower graph shows the acoustic



Image 3:
SBS ringsensor

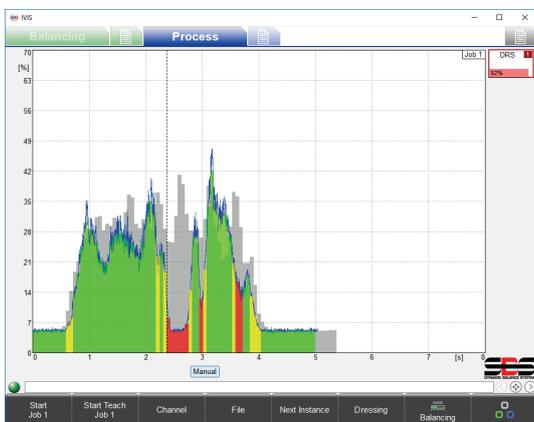


Image 4

emission of the dressing process seen from the SBS ringsensor fitted to the workpiece spindle. The perfect dressing signal can be seen very clearly and can be used to monitor the dressing process. The new acoustic emission technology from SBS makes the sensor much more sensitive, which leads to an advanced signal to noise ratio. With this sensor it is possible to monitor the dressing of carbon CBN wheels.

SBS has not only increased the sensitivity but has also worked intensively on reducing disturbances in the signal. The disturbances which had been seen in the former system had been eliminated by the SBS system, which makes the AE signal clearer and perfect for process control.

BENEFITS:

The SBS acoustic emission technology makes it possible to monitor the dressing process of a carbon CBN grinding wheel and it helps to considerably reduce the cost for CBN grinding wheels.

The testing results prove that with the SBS hardware it is possible to monitor the dressing of carbon CBN grinding wheels. The signal-to-noise ratio (S/N) is much better and the system eliminates disturbances much better. In comparison with the existing technology with this result the decision had already been made. But SBS provides much more advantages for this application.

SBS has developed several new process evaluation strategies. All strategies have in common that they are very easy to be set up and to be operated. For monitoring the dressing of standard carbon CBN grinding wheels, SBS offers different alternatives. The standard dressing process control strategy is ExactDress. The SBS is taught a 'good' grinding wheel dress pass, and all following dress passes must match the taught AE pattern. This ensures that dressing is never too long and never too short. Originally this strategy had been developed for profiled grinding wheels, but the simplicity of the integration and use makes it the best choice for all dressing processes..

For monitoring the dressing processes of grinding wheels SBS offers superior products with better signal detection and advanced evaluation technologies. Especially in dressing of CBN wheels the effect on cost reductions is tremendous.