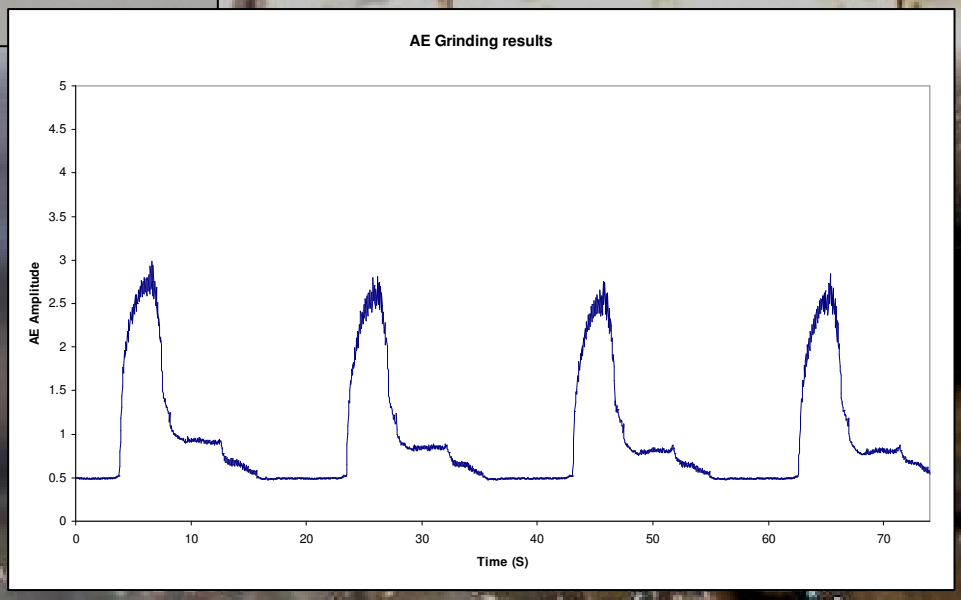
Fluid Acoustic Sensor for Grinder Gap and Crash Control

The SBS Acoustical Emission Monitoring System (AEMS) allows customers to monitor grinding processes with exceptional precision. Also known as 'gap and crash control' or 'gap-crash', AEMS uses proprietary acoustic technology to monitor high frequency signals generated on the grinding machine during key events in the grinding process. A range of different sensors such as 'in-spindle', 'mini' and 'external' as well as those fitted inside internal and external balance heads are available.

The latest addition to the Schmitt portfolio is the 'Fluid Acoustic Emission' sensor. The Fluid AE sensor is ideal for situations where direct acoustic contact is required during the grinding process. For example, where machine design, high frequency bearing, mechanical or electromagnetic noise prevents the use of other types of AE sensor. Typical applications include internal grinding using direct drive spindles and grinding between centres where AE signal is normally lost through the head-stock. The Fluid AE sensor uses the existing oil or water based grinding machine coolant with a separate feed from the cutting stream directed at the component or dresser. The noise of the grinding wheel touching the component or diamond is then transmitted back up the coolant stream to the AE sensor and detected by the Schmitt controller within 1 millisecond.

User benefits include elimination of the grinding-gap time in the grind cycle, notification and prevention of machine crash conditions, automatic quality monitoring of wheel dressing and machine positional control. The AEMS system allows rapid, automatic grinding wheel in-feed, right up to the point of initial contact with a new part loaded in the machine. The system can automatically detect the initial contact and very quickly report this event to the machine control, stopping the wheel in-feed without operator intervention. Typical cycle time savings of up to 20% have been achieved using this system.

Part crash occurs when a part or fixture is incorrectly loaded into a grinding machine or some abnormal condition occurs. Rapid in-feed of the wheel may then result in a dangerous or expensive crash. The AEMS system allows the CNC control to monitor the acoustic levels on the machine and detect any unexpected contact when it happens. The system then reports that abnormal contact has begun providing an output to the CNC to stop the grinding wheel in-feeding within 1 millisecond.



Positional control is possible with the AEMS system. Even though a grinding wheel has a constantly changing diameter as it wears or is dressed, the AEMS system can detect the edge of the wheel touching a reference point whose position is already known to the machine CNC. This means the CNC can accurately measure the diameter and exact position of the grinding wheel, zeroing the machine before beginning a grinding or dressing cycle.

Schmitt's AEMS system can also monitor the dressing process allowing the user to set up minimum and maximum acoustic levels expected during normal wheel dressing. The operator or CNC control can then determine if the wheel is being dressed all the way across its width and also control the aggressiveness of the dressing process and the resulting quality of the dressed wheel. This can be very useful when using expensive super-abrasive or CBN wheels where material removal needs to be minimised.

The AEMS system can be standalone or added to any SBS grinding wheel balancer controller providing two sensor input sockets. A four channel SBS controller can give up to eight inputs from eight different AE sensors. Data can be downloaded via a 0 – 10V analogue output to a PC or external data logger for QA purposes.

Schmitt's acoustic sensors including the new Fluid AE sensor are easy to retrofit, highly resistant to grinding machine coolants and grinding paste and give reaction speeds significantly faster than traditional methods of spindle load or current monitoring.

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