



*Application Story: aba z&b*

## SINGLE CNC REPLACES THREE PROCESSORS AND OPERATING SYSTEMS ON WORLD'S LARGEST CREEP FEED GRINDER

Less than three years after opening its doors in Orangeburg, South Carolina, aba z&b, USA, Inc. is already making its mark on the surface and profile grinder markets. This firm, headed by president Leonard Cody, is the U.S. operation for aba z&b Schleifmaschinen GmbH, based in Reutlingen, Germany. Its mission is the in-house rebuild and field service of existing machines, as well as new machine sales, installations and spare parts fulfillment for aba z&b grinders. The company's machines are sold to a broad spectrum of American manufacturing, including automotive torque converters, linear guide rails, heavy construction machinery, aircraft engines, oil pumps, compressor shafts and other large components, plus mold-making, tool and die work, among others.

On one recent installation, an aba z&b PSM creep feed grinder, said to be one of the most powerful in the world, has been installed for work on undercarriage links for a large piece of earthmoving equipment. Deep profile creep feed grinding is done on cold-rolled and forged steel parts. The machine has a working length of 1000 mm (39.4"), grinding width of 550 mm (21.65") and grinding height of 550 mm (21.65"). Because it has a traveling column design and small footprint, the machine was easily integrated into a work cell at the customer's location.

An indexing worktable with two workpiece clamping fixtures allows simultaneous

load/unload and grinding operations. Linear guideways and ballscrew drives are onboard for the main X-, Y- and Z-axes. The overall motion control of this giant grinder is performed by the Siemens SINUMERIK 840D CNC with digital drives and motors that allow free contour programming for interpolation grinding applications.

The SINUMERIK 840D is a state-of-the-art CNC system that offers a wide range of specialized functions for milling, drilling, turning, grinding and material handling technologies. Its capabilities also include nibbling, punching and laser machining. Special functions such as machine kinematics, five-axis transformation, orientation interpolation, high-performance 3-D tool correction and manual five-axis functions make five-axis machining simple and convenient.

The open architecture of the SINUMERIK 840D is ideally suited for integrating sophisticated five-axis functionality. The control offers users innovative, high-speed features such as NURBS and Spline Interpolation to boost productivity without compromising precision or surface finish. These unique features provide increased productivity on the factory floor, especially in the challenging segments of high-velocity and five-axis machining. Unlike conventional point-to-point programming, interpolation grinding is done on this machine by transformation orientation (TRAORI)

**Above:** This machine, said to be the world's largest creep feed grinder and built by aba z&b, is controlled by a single Siemens SINUMERIK 840D CNC with integrated Siemens PLC.

pioneered by Siemens for use in aerospace, automotive and other high-accuracy, precision finishing operations. In essence, the part position, not the machine coordinates, drives the program and its cutting path execution. The result is a higher quality finish, less rework and a marked decrease in time-to-part production.

On this large capacity aba z&b creepfeed grinder, a 1750 mm (69") diameter worktable has two workpiece clamping fixtures, each with a qualified surface of 900 mm x 600 mm (36" x 24") and maximum load capacity of 2000 kg (4400 lbs.).

The X-axis longitudinal movement of the wheelhead column is run by a Siemens CNC-controlled electro-mechanical drive system with stick-slip-free high-precision linear guideways to guarantee the highest possible positioning and repeating accuracies. The Y-axis vertical movement of the grinding wheelhead is performed by a variable AC motor and ballscrew, in anti-friction guideways for superior accuracy even in the smallest downfeed increments. The maximum achievable feedrate is 3000 mm (118") per minute. Finally, Z-axis transversal movement of the wheelhead column is run by a Siemens digital AC servomotor package with resolution to 0.0001 mm (.000004").

The CNC itself features PC-based continuous path control, with an integrated Siemens SIMATIC S7 PLC and Safety-Integrated software for monitoring all feed rates and axis positions.

Key to the efficiency and effectiveness of the overall grinder performance, according to Leonard Cody, president of aba z&b in the U.S., "This single CNC-controlled grinder replaced a machine with three different processors and operating systems. The customer is realizing tremendous savings in set-up, training, programming and maintenance time, as a result of this engineering achievement. Between our support from aba z&b and that of Siemens, the time-to-production on these gigantic workpieces has been dramatically improved, as has the overall part quality and cost reduction scenario." Currently, this aba z&b unit is said to be the largest and most powerful creep feed grinding machine in the world. Cody also noted aba z&b utilizes Siemens controls and drive packages as OEM components on most of the firm's various grinding and surface finishing machines. ■



**Above:** The SINUMERIK 840D CNC and SIMATIC S7 PLC control package replaced three processors and independent operating systems on the customer's previous machine used for creep feed grinding of undercarriage links on a giant earthmover.



**Left:** Undercarriage links are held in opposing dual workpiece fixtures on a turntable to allow simultaneous grinding and load/unload operations.

For more information, please contact:

**SIEMENS MACHINE TOOL BUSINESS**  
390 Kent Avenue  
Elk Grove Village, IL 60007

**Phone:** (847) 640-1595

**Fax:** (847) 437-0784

**Web:** [www.SiemensCNC.com](http://www.SiemensCNC.com)

**E-mail:** [SiemensMTBUMarCom.sea@siemens.com](mailto:SiemensMTBUMarCom.sea@siemens.com)

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