Profile Generating Machine

A fully automated Profile Generating Machine has been developed to provide accurate correction of radial run-out, radial force, and conicity

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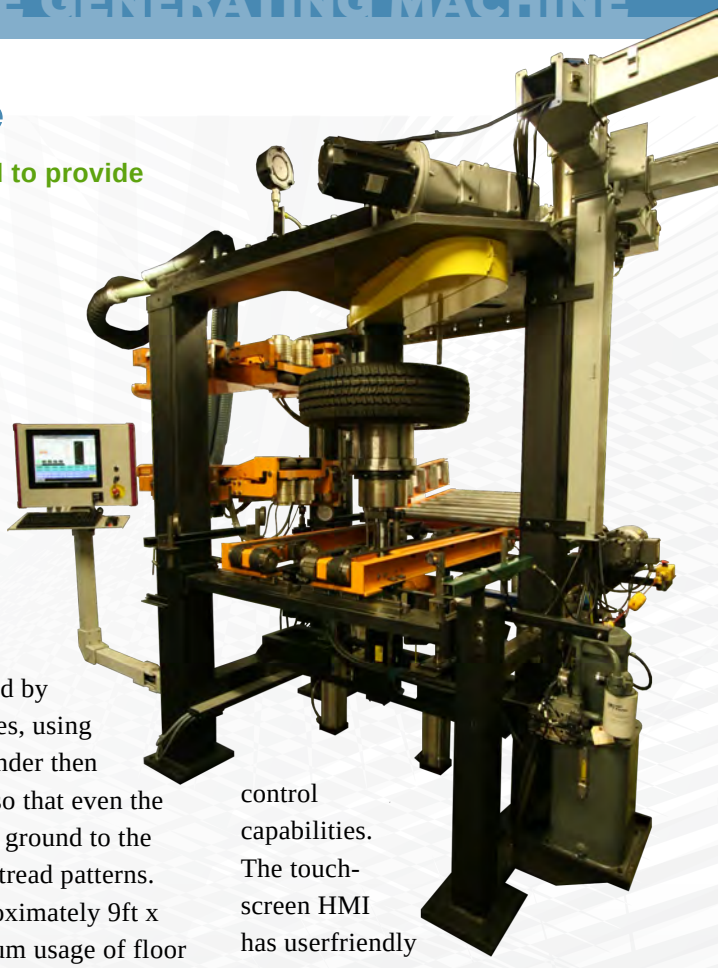

Akron Special Machinery has developed a worldwide patented Profile Generating Machine (PGM) to give the tire industry an accurate procedure for correction of tire radial run-out, radial force, and conicity, in a fully-automated production environment. Akron Special Machinery (ASM), a Poling Group member, has been developing, designing, and building custom machines for the tire industry since 1979. Seeing the need for a fully automated profile generating machine, ASM has developed a machine tool with the precise tolerances needed for generating profiles for a wide range of tire diameters and tread widths. Each tire is sculptured across the tread surface to the customer's predetermined profile and depth of cut by tire recipes retrieved from barcode readings as the tire enters the machine.

The PGM has two dualstone grinders, four stones in total, so that grinding times are dramatically cut from other grinding machines. Each tire recipe has more than 15 changeable parameters to customize grinding results and appearance for any tire type or compound. Some parameters included are spindle speed, tire inflation pressure, feed rate of grinders, tread width, bead width spacing, depth of cut of each grinder, number of passes, scan type, and a selection of run-out reading locations.

By choosing different grindstone speeds, rotations, and grits, the customer has numerous options to obtain the desired appearance and minimize heel and toe grinds. These recipe parameters can be stored by tire codes for retrieval by barcode readings. With the ASM-patented dust blow-off system, tire treads are free of grinding dust after profiling.

The PGM can be installed for either inline or off-line grinding in a production facility. Being barcode reader compatible, or used in conjunction with the ASM mixed-mode tire drive roll luber system, tires with diameters from 20in to 44in, and widths from 3in to 18in can be profiled in automatic mode. With profiles being generated by laser scan or stored CAD files, using various algorithms, each grinder then follows the developed path so that even the aggressive tread tires can be ground to the same appearance as smooth tread patterns.

With a footprint of approximately 9ft x 15ft the PGM offers maximum usage of floor space. Because of the close tolerances needed to repeat profiles at .001in range, linear bearings and servo motors are used on axis movements for smooth, precise motion. By controlling all aspects of the grinding process and grinding each tire in relationship to the centerline of both tread width and rotational center, tire diameters can be ground identically for a specific tire type. To obtain the desired appearance, each recipe has the following adjustable parameters: Tire rotation speed, grinder feed rate, tire air pressure, tire bead spacing, tread width, three radial runout positions, tire scan type, depth of cut per pass, and number of grind passes. Additionally, using different grindstone grits, stone width, direction of rotation, and stone rpm, a recipe can be developed for the best results.

The PGM controller developed by the MSI division of the Poling Group uses a Windows-based industrial PC. The controller has both networking and remote system control capabilities. The touch-screen HMI has userfriendly screens and can be password protected at different levels. With this fully automated profile generator, the cycle time can be greatly reduced over grinding machines available now. And with the auto loading and unloading of the machine, manpower is decreased significantly. Cycle time profile grinds depend on several factors such as width of tread, feed rate during cutting, and the desired appearance of the cut. An average cycle time for a tire with a 7in tread width, taking two grind passes at a depth of .004in per side per pass, is approximately four minutes. This will give a total of .016in removed from the diameter of the tire, thus reducing radial run-out of the tire. ASM/MSI is available to assist in maximizing tire quality appearance and reducing cycle time of the machine per recipe.