Automatic Changeover Thrufeed Centerless Grinder MSL-600 model and MFC-600 model

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1. Centerless Grinder

In general, grinding a workpiece in a mechanically fixed system—like in a chuck or on centers, the roundness of the part is limited by the accuracy of the workhead chuck spindle or machine and part centers . However, in a centerless grinding process, the workpiece is not held in place mechanically—Instead, the part rests on a blade between a regulating wheel and grinding wheel. The part rotation is controlled by the rotational speed of the regulating wheel. Because the center of the part is constantly changing as the part is ground to size, the high spots on the part are continuously being removed—producing better and better roundness, during the cycle. The geometry between the blade, regulating wheel, and grinding wheel is critical to good roundness in this process, so proper set-up is very important and takes more time than the chucking and center type processes. The advantage of this process is that you can produce parts with better roundness in much less time than it takes with the other processes.

2. Conventional Changeover

With a conventional centerless grinder, performing a changeover from one part diameter to another requires the following:

A) Open or close the upper and lower slides as necessary to fit the new workpiece.
B) Adjust the upper slide and the blade to maintain the correct part center height.
C) Adjust the part guide plates to compensate for the new regulating wheel position.
D) Adjust the feed system as necessary to compensate for the new regulating wheel position.

Changing the position the regulating wheel slide necessitates the guide plate and feed system adjustments (See Fig. 1).

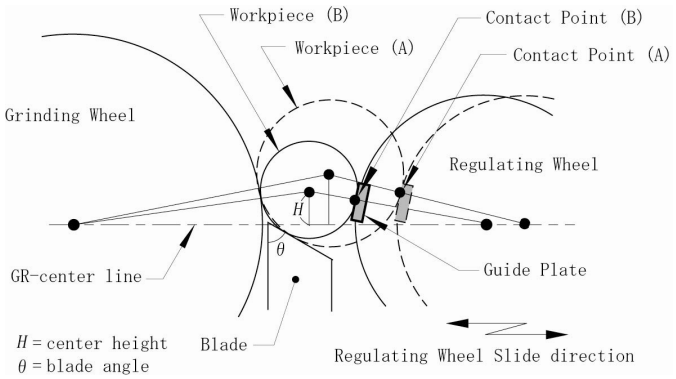

Fig. 1 Changeover of Conventional Centerless grinder

3. Changeover based on the concept "Constant Contact Point"

From the start of the development of the automatic changeover thrufeed centerless grinder, we had suspected that many actuators and sensors would be required on the tools which the operators had to adjust during the changeover. Then, we came up with the concept of changeover which kept the workpiece-to-regulating wheel contact point constant. The regulating wheel on a conventional centerless grinder will be moved along the GR-center line. The regulating wheel on the "MSL-600III" model, developed in 1994, can be moved by a unique angle to the GR-centerline. This is used to keep the contact point constant (See Fig.2). Therefore, many critical tool adjustments become unnecessary, and automatic changeover became possible by just moving the regulating wheel.

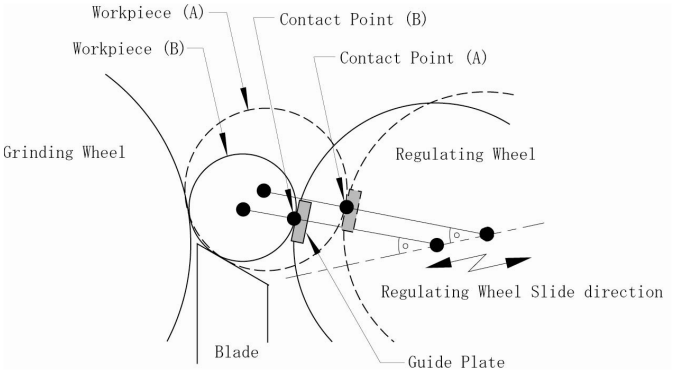

Fig. 2 Changeover by keeping contact point constant

4. From "Constant Contact Point" to "Contact Point Control"

The "MFC-600V" model, developed in 2008, will expand the application of the automatic changeover function. By independently controlling the positions of the regulating wheel, grinding wheel, and blade with servomotors, all tool contact points can be controlled with wide flexibility. Figure 3 shows one of the applications of the automatic changeover. With this method, the blade-to-workpiece contact, as well as the regulating wheel-to-workpiece contact point can be kept constant, before and after changeover. This allows a range in diameters from 10 – 240 mm; and also simplifies, or completely eliminates, the adjustment of the workpiece-supply equipment connected to the machine.

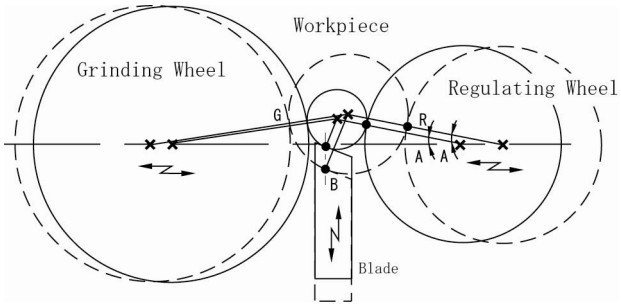

Fig. 3 Changeover by controlling contact points

Fig. 4 MFC-600VI model

5. Sales Results

So far, 17 of these machines have been delivered to the manufacturers of automobile parts, bearings, heavy equipment, and so on. This design has been patented in Japan and the United States, and an international patent is pending approval.