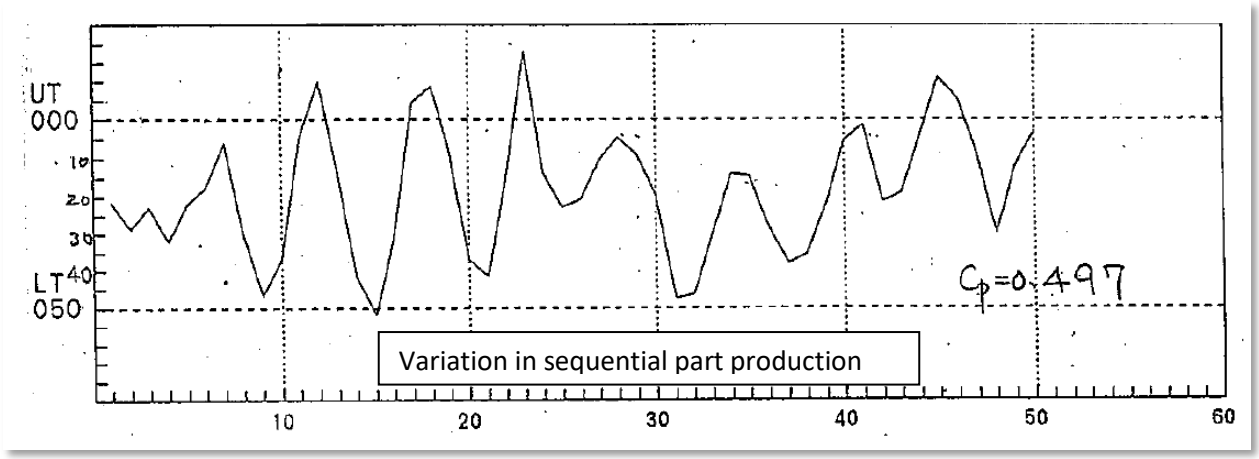
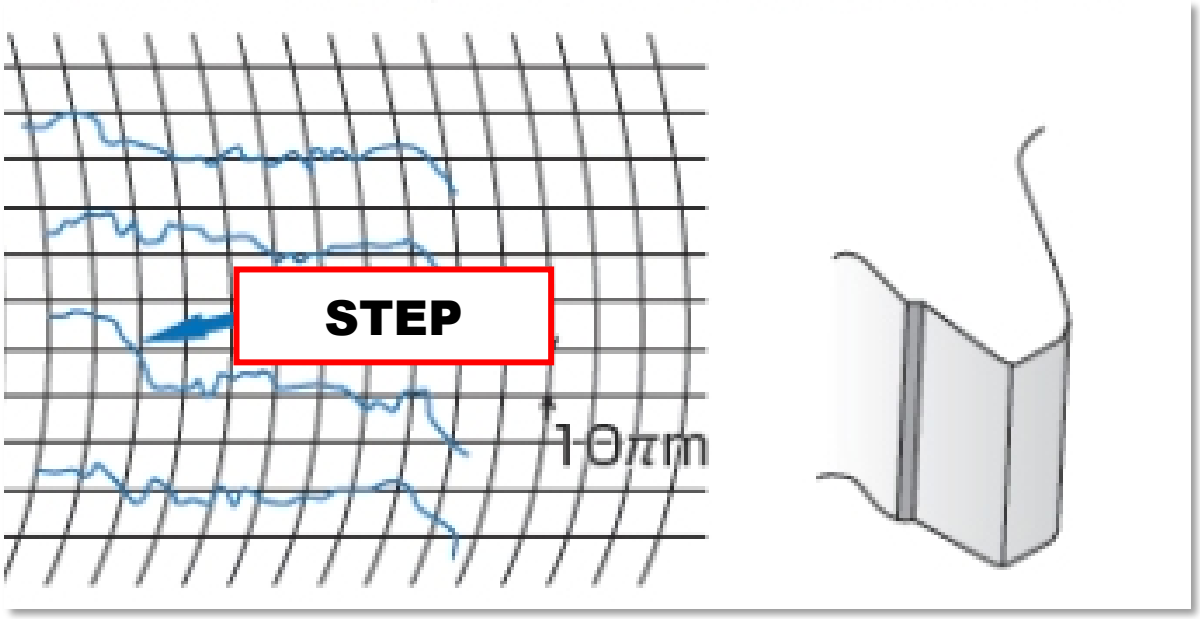
NIDEC Tech Tips: Indicating the spindle on gear shaping machine

If your shaped components have any of these errors, it is usually caused by cutter runout.

Tooth thickness variation (DOB dimension over balls, also called OBD – over ball dimension):



Steps on profile near the root:



There several sources of this runout:

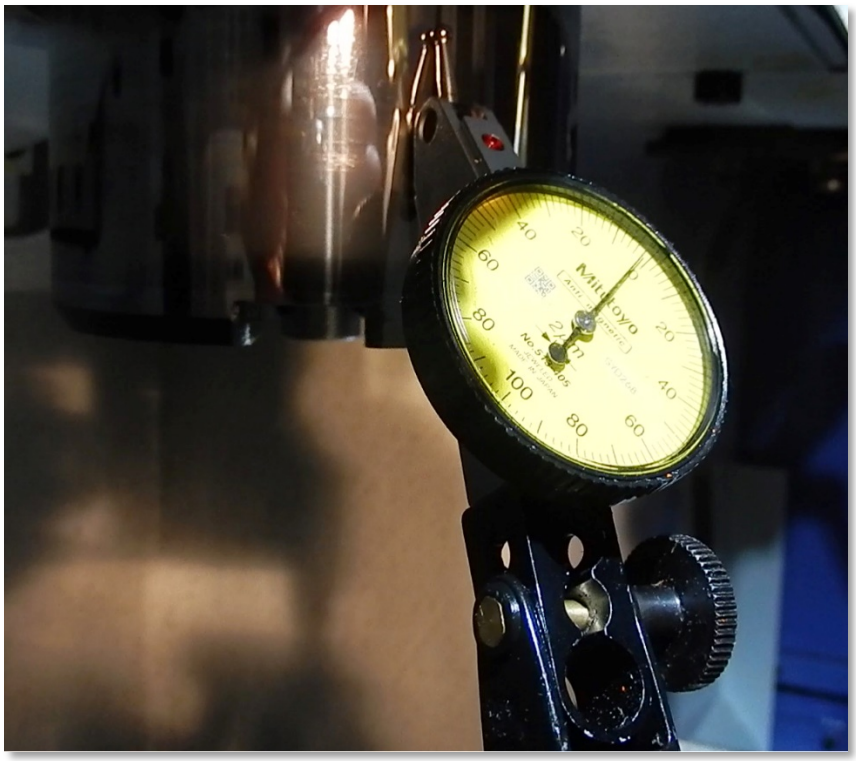
- The shaper cutter itself
- The mounting condition of the cutter on the cutter arbor
- The cutter arbor itself
- The shaper tool spindle runout

If the inspection charts for the gear or spline being shaped show excessive run out or pitch steps, it is important to determine the root cause. If there has been a machine crash, you should check the spindle immediately.

Remove the cutter and tool adapter from the spindle and clean the OD, ID and face thoroughly. Mount the base of the indicator on a stable fixed surface, preferably the work table. Just don't put it onto a sheet metal cover. Position the indicator to touch the OD of the spindle. Note: on some models such as ST40 there is a sleeve for the taper.

To avoid false readings, indicate all OD checks above the mating line or approximately 25mm above the spindle face. If you mount the indicator on the table, you can move the X axis with the handle mode of the pulse generator so the indicator can reach the spindle.

Position the indicator tip on the outer diameter of the spindle. With the mode switch set to handle mode, select the Y axis. Select x100 for the speed and rotate the spindle. Note the high spot on the spindle and mark that position with a paint marker or piece of tape.



Next, re-position the indicator on the internal spindle taper in a similar manner to the OD. Note any markings or damage to the ID. It should be a smooth ground finish. Rotate the Y axis again and mark the high spot of the runout on the spindle.

The ID runout high point of runout should match high spot positions of the OD and be less than five microns to be within factory specification. If the high spot of the runout are the same and greatly exceed the specification, it is possible the spindle taper shaft is bent from a crash or the lower guide bushing is damaged. In either case, the hydrostatic pressure should be checked.

If the spindle indicator checks are within the factory specification of five microns or less, then proceed to check the tool adapter (or arbor) pilot diameter. All Mitsubishi shapers are shipped with a standard and certified 1.25” pilot diameter tool adapter. Clean the spindle and the tool holder thoroughly.

With the cutting tool removed, clamp the tool adapter into the machine spindle. Position the indicator on the ground 1.25” pilot OD, similar to the method used for checking the spindle OD. The indicator reading should match the high spot on the spindle OD and also be within the factory specification of no more than five microns.

If the runout exceeds the factory specifications, the machine needs service from Mitsubishi Machine Tool.

If all the runout checks on the spindle and the tool arbor are within specifications, mount the cutter on the arbor, mount the arbor on the spindle, and check the runout of the cutter.

If the cutter runout is excessive, the cutter may be out of tolerance.

Check out the video on this topic: **(insert link to YouTube video)**

For more information or to talk with our experts, contact NIDEC Machine Tool America at 248-669-6136. Be sure to visit our website at www.nidec-machinetoolamerica.com