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THE FUTURE OF AUTO PARTS MANUFACTURING

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Is your tooling 100% inspected?

Manufacturers vying for ISO 9000 certification face the frightening reality that cutting tools require 100% inspection. To respond to this challenge, industry has to make a difficult choice — invest in incoming inspection equipment and personnel, or let tooling manufacturers take on this responsibility.

For most of the 1990s, the push in metalworking was to eliminate incoming inspection. This approach has become futile, as the vibrant economy has created a diverse supply base and correspondingly variable tooling characteristics. You have to inspect what comes in to know what you're getting.

Unfortunately, tooling inspection requires the knowledge of a well-seasoned tool grinder, often only found in the shop owner himself. Thankfully, a new technology has been developed to overcome this skilled labor shortage — automatic tool inspection.

Machine tool builders have now managed to couple tool grinding software with multi-axis CNC controlled cameras to provide automatic gauging. The most capable of these machines:

- Offer accurate inspection independent of the operator
- Inspect both exterior and interior tool features (e.g. rake angle).
- Print complete inspection reports
- Communicate with the CNC tool grinder to help produce in-spec tools

The key to these automatic tool gauges is the high-powered halogen light sources that are filtered by edge-seeking diascopic camera lenses. Unlike the old days, with the TIR and eccentricity concerns inherent to V-blocks and shadow graphs, this new breed of gauges automatically pro-

vides digital offsets that fully compensate for these profile distortions. After these auto compensations, the cutting edge is automatically focused and the machine's episcopic lens system takes over to inspect 100% of the tool's geometry under full CNC control.

All of the following geometries are measurable with advanced automated gauging: step, core and coolant hole diameters; step lengths; clearance, gash, included and rake angles; concave and convex radii; drill point forms; cylindrical margins; honed edges; and k-land widths.

It is even possible to measure the free profiles common to the screw machine and woodworking indus-

try. Payment in full from the client.

One of the greatest potentials for this form of gauging lies with the tool fabricator who has closed loop tool grinding with automatic feedback and compensation to the CNC tool grinder. Any measured deviation is used to offset grinder data so that the next tool comes closer to spec. This form of closed-loop grinding is expected to show great promise, as JIT batch production requires strict process monitoring to minimize expensive scrap.

With minimal extrapolation, it is obvious that this whole technology is also leading towards reverse engineering of tool geometries. This technology will open the floodgate for the

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tries. Once measured, software goes a step further to compare the true measurements with the nominal dimensions defined in the tool designer's CAD/DXF files. The software can then display the amount of deviation at each point along the profile and whether or not that deviation is within the tolerance band. This capability provides the operator with valuable go/no go feedback.

Taken a step further, data can be formatted several ways: printouts for in-house records or client verification or electronic records for SPC analysis. It is also common to generate shipping reports for serialized tooling that are maintained on file at the tool fabricator, pending acceptance and

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Due to the highly skilled nature of inspection, and the high potential for operator interpretation, automation of the process is critical to growth and the generation of indisputable geometry reports. The fabricators and metalworkers that take the quantum leap into automatic tool inspection machinery will continue to maintain their industry leadership roles. Are you certain your tooling is 100% inspected?

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