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Process control within an SME to increase output and achieve consistent manufacture of components

D. Wright, S. Murgatroyd, A. P. Longstaff, A. Myers, S. Fletcher

Introduction - Process control is a key aspect to any company looking to increase machining output and availability, and also those who strive to achieve automation. The dangers associated with this philosophy can be seen when producing batch’s automatically. With no operator intervention, any weakness in the process control chain can result in high levels of scrap being produced. To achieve consistent manufacturing it is necessary to look at the processes which make up the whole operation. The majority of the components manufactured within the case-study SME can be single or batches of very few parts.

Outcomes - On-machine probing of a component has been used as a first-line diagnostic tool when comparison with manual inspection identified errors in the production machine. Collisions on the machine tool gives need for testing with the ballbar as a damage indicator and allow for maintenance to take place if necessary. Processes within manufacture have been standardised and allow for greater control of the components produced across a number of Machine Tools.

On machine collision causes crash within machine damaging work piece, smashing probe and possibly causing machine error.

Ballbar graph showing the machine error relating to the large crash of probe body into the side of the work piece.

Component re-checked after machine alignment and showing a realistic dimension report which is comparable to manual inspection

Component measured on the machine tool highlighting large errors. First checks are made with a quick ballbar test

Tooling file created for standardisation across machining centres. Standard tools are kept within the machine for common jobs and includes the Touch Probe. Pockets are left blank for job specific tooling and are changed as necessary. All tool information is recorded including grades, speeds, feeds lengths and manufacturer.

Component correctly secured to correct fixture check. Modification taken place within this example to allow for measurement to occur using touch probe.

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- **Informative**
  - Updates
  - Finished AND roughing data

- **Active**
  - Thermal Track
  - Tool offsets
  - Broken Tool Check

- **Predictive**
  - Machine Check
  - Tooling Suite Check
  - Component in Feature check
  - Correct part check
  - WCS Set
  - Tool Set

- **Preventative**
  - Design For Manufacture
  - Feed and Speed Rates
  - Machine Capability – BallBar Testing
  - Probe Qualification

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Critical features

ONLY

PROCESS SPECIFIC

Indication of Process

Protec from Manual Errors

Regular Maintenance

PART

Information to help develop new processes

- Updates
- Finished AND roughing data

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Machine checked using ballbar test equipment to evaluate machine alignment post incident

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