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Intelligent program selection

AP201

Intelligent program selection

Problem

In situations where a wide variety of components are manufactured, particularly where these components are difficult to distinguish visually, there is a significant possibility that an operator may select an incorrect machining program for the component. Depending on the level of variation between components, this may result in a scrapped part or damaged tooling.

Such scenarios often incorporate a procedure designed to minimise the risk of an incorrect program being loaded, however this procedure requires additional overhead in terms of documentation and training, is not fail-safe and requires time and effort to trace paperwork and data input errors. Where a component requires multiple machining operations, the risk per component is increased and the corresponding overhead to maintain the process may become significant.

Solution

AP200 Part identification describes a method of using a workpiece inspection probe to determine whether the component blank loaded in the machine tool is the correct one for the machining program.

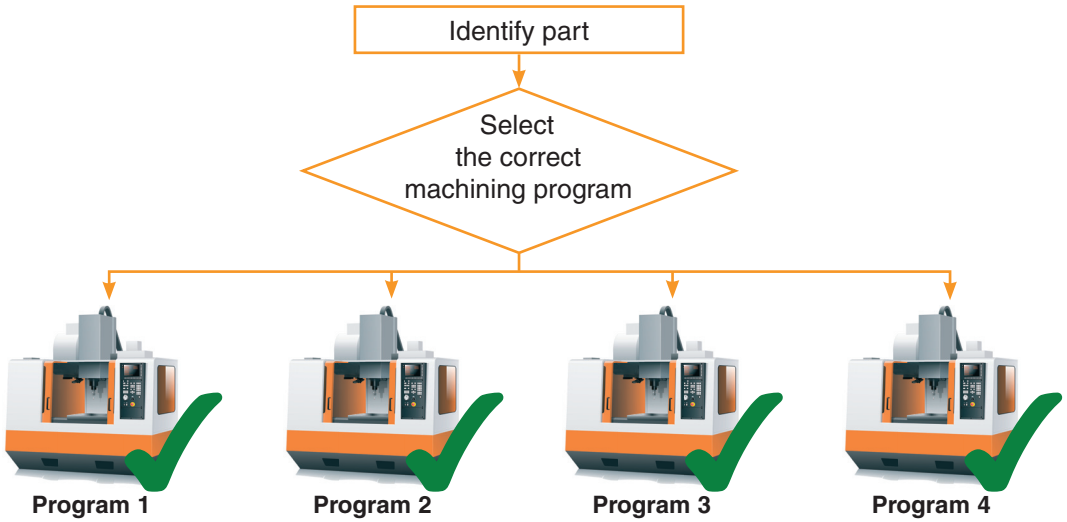
Where a unique, identifiable feature exists on the component (or one can be added) a probe may be used to make a logical decision about which of the available cutting programs should be used.

A 'program selection' program uses the probe to identify which of a range of components is loaded into the machine, based on the following criteria:

- A known, identifiable feature - for example, the size of a feature within a casting may indicate which one of a family of components is loaded
- An additional feature which is added to the component during the set-up phase - for example, on a fixture containing a socket for a range of dowel pegs, the height or position of the peg may indicate the component loaded in the fixture

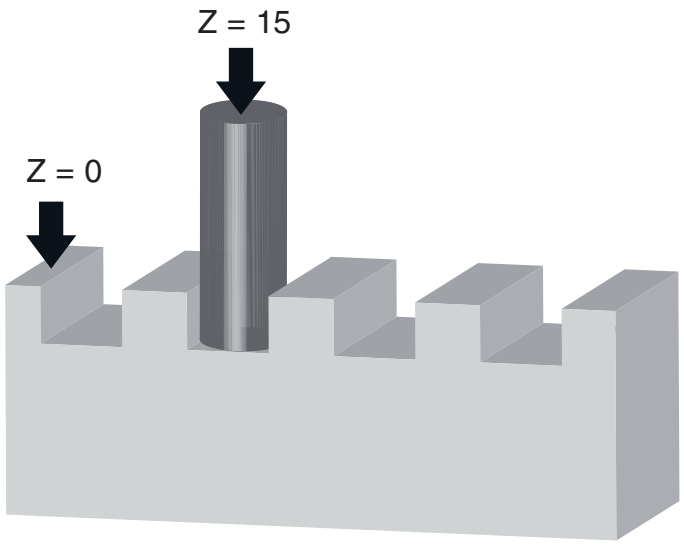
Benefits

- Eliminates the possibility of an incorrect machining program being run
- Greatly simplifies the process of managing correlation between processes and components
- Increases flexibility on the shop-floor when working with one offs and small batch components



Example: identifying a component using a row of pegs

A probe is used to test for the presence of a peg on a component fixture. When a peg is present, i.e. Z is greater than zero, the corresponding machining program is run. If Z is not greater than zero, move the the next position and test for peg presence.



Sample Productivity+™ probe software program

Inspection Cycle: MeasureZPosition Measured Point: MeasureZZero	Establish Z = 0 position.
Inspection Cycle: Peg_1 Measured Point: TestFirstLocation If: TestFirstLocation.Position.Z GT MeasureZZero.Position.Z Then: G-Code Block: Run_First_Program Goto: Finish_Program	Probe first expected peg location. If Z is greater than zero (i.e. a peg is present), run first machining program.
Inspection Cycle: Peg_2 Measured Point: TestSecondLocation If: TestSecondLocation.Position.Z GT MeasureZZero.Position.Z Then: G-Code Block: Run_Second_Program Goto: Finish_Program Label: Finish_Program G-Code Block: Finished	Probe second expected peg location. If Z is greater than zero (i.e. a peg is present), run second machining program.

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Sample Inspection Plus software program

T1 M6	Select the probe
G54 X0. Y0.	
G43 H1. Z100	
G65 P9810 X10. Y0.	Protected positioning move to first peg
G65 P9811 Z0.	Single surface measure of first peg
IF[#137GT0.]GOTO10	Jump to N10 and run first machining program
G65 P9810 X20. Y0.	Protected positioning move to second peg
G65 P9811 Z0.	Single surface measure of second peg
IF[#137GT0.]GOTO20	Jump to N20 and run second machining program
GOTO30	If the peg tests fail jump to N30 to alarm the machine
N10	
M98 P1001	First machining program
GOTO40	
N20	
M98 P1002	Second machining program
GOTO40	
N30	
#3000=99(NO PEG PRESENT)	Alarm - no pegs present
N40 (END)	

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- **Probe systems and software for job set-up, tool setting and inspection on CNC machine tools.**
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- **Styli for CMM and machine tool probe applications.**

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H-5650-4005-01

Issued 0712 Part no. H-5650-4005-01-D