

Cycle Time Reduction

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Let's get to the heart of automated machining - **CYCLE TIME**. We want to help you reduce it without having to change the cutting process.

We'll take a look at a test conducted at Murata to show how reorganizing your tooling, reaching proper turning speeds faster, eliminating wasteful turret movement, and adding one simple code at the end of your program can greatly reduce time when manufacturing a product. As we all know, **the less cycle time it takes, the more profit you make!**

We started with a disorganized cutting program that included unnecessary turret movement, both indexing and linear wise. It also included excessive wait time where the spindle was trying to get up to the proper turning or RPM speed, as well as, waiting to slow down and stop. Program changes were made to help reduce the time. Here's where we started with cycle time and the steps taken to improve efficiency:

Starting Cycle Time: 51.2 seconds
Number of Tools : 9
Process: Simple turning and boring

STEP 1: ORGANIZE YOUR TOOLING

It cannot be stressed enough how important it is to the machining process that your tools are setup in a well-organized manner or "flow" in order to reduce excessive turret indexing.

Old Tooling Sequence

Tool 1, Tool 6, Tool 3, Tool 7, Tool 2, Tool 5, Tool 8, Tool 4, and Tool 9

New Tooling Sequence

Tool 1, Tool 2, Tool 3, Tool 4, Tool 5, Tool 6, Tool 7, Tool 8, and Tool 9.

Cycle Time without Changes: 51.2 seconds

Cycle time with Changes: 49.3 seconds

Reduction: 1.9 seconds

STEP 2: ELIMINATE ALL EXCESSIVE LINEAR MOVEMENT OF THE TURRET

This is a simple, yet, effective way to reduce time. You do not need to move the turret in the "home" position before you index. Why move 300mm when 50mm will give you plenty of clearance for calling up the next tool? It takes a lot more time to move 300mm than 50mm. Also, be direct and to the point with all program movements, whether you are in positioning ("rapid") mode or cutting ("feed") mode. Less movement equals a faster cycle time.

NOTE: While it is not necessary to always move to the "home" position, always move the turret to a position that allows enough clearance for the next tool to index without any interference.

Cycle Time without Changes: 49.3 seconds

Cycle time with Changes: 47.4 seconds

Reduction: 1.9 seconds

Total Reduction (Steps 1 and 2): 3.8 seconds

STEP 3: GET YOUR SPINDLE UP TO SPEED MORE EFFICIENTLY BETWEEN EACH TOOL

After a tool has finished its cutting, on the very next line of your program, if possible, go ahead and program in the turning speed or RPM for the next tool. Murata machines are setup to wait until the proper RPM has been achieved before they start cutting.

NOTE: You never want to start cutting on a part before it reaches the proper RPM or cutting speed for a particular insert. All inserts are designed to be run in a certain range for different types of material. We refer to these as Surface Feet per Minute (SFM) for standard or Surface Meter per Minute (SMM) for metric. Excessive tool wear and breakage are caused when they are run outside the proper range.

Cycle Time without Changes: 47.4 seconds

Cycle time with Changes: 46.3 seconds

Reduction: 1.1 seconds

Total Reduction (Steps 1 thru 3): 4.9 seconds

STEP 4: ADD A SPINDLE STOP COMMAND (M5)

This step is the simplest of all the cycle reduction methods. By adding a spindle stop command or "M5" right after the last tool finishes cutting, you can significantly reduce the time it takes to bring the spindle to a complete stop. Do not let the actual end and resetting of the program stop the rotation. Do it with an "M5".

Cycle Time without Changes: 46.3 seconds

Cycle time with Change: 45.8 seconds

Reduction: .5 seconds

Total Reduction (Steps 1 thru 4): 5.4 seconds

As you can see from the results, we had a 5.4 second or 10% reduction in cycle time by following a few simple steps to make the process more efficient. Of course, results will vary (maybe more maybe less) but by following a few steps you can minimize your time, which in the long term will give you an advantage over the competition.