



## ONE AND DONE

The term “**One and Done**” in machining refers to the concept of manufacturing a piece in one single machining operation that would normally take more than one machine or operation to complete. There are multiple approaches to this methodology and influences for and against, but we will address piece part manufacturing and the challenges facing us today that predicates our need to manufacture in this manner.

Manufacturing products today can all be done from a variety of source materials like bar stock, a sawed or cut blank, or a forged or net-shaped material blank with manufacturers seeking to have the most efficient process with the least amount of waste. That statement hits the overall tenet of this exercise right in the GD&T Bullseye. Make the highest quality product that you can with the least possible waste in the shortest time. With that in mind, we will focus predominantly on the concept of “**Done-in-One**” (or “*One and Done*,” whichever floats your boat) from smaller piece parts, say under 2.5” diametrically.

It wasn’t long ago when rows of automatic screw machines and multi-spindles spun around the clock making fast, low-cost parts that were destined to another machining operation. These machines were almost impossible to beat in shear cycle time as the total time for a part was narrowed down to the longest single operation in the part with index time. Next up was how to finish these parts with live spindle work - such as flats, cross-holes, etc. – as well as work on the cut-off end of the part, deburring, grinding and more. This was also an era when you might see a person standing next to each machine as well.

It has become simpler to envision how a sequence of operations moving the largest amount of product possible through the shortest operation period has dramatically changed with all of the advancements in modern manufacturing. Multi-tasking lathes and machining centers have become prevalent in today’s manufacturing

### CONTACT INFORMATION:

4406 Technology Drive  
South Bend, IN 46628, USA  
Phone: +1 574.472.7850  
[www.citizenswiss.com](http://www.citizenswiss.com)

### THE AUTHOR

Gannon Clark  
President/CEO  
4406 Technology Drive  
South Bend, IN 46628  
(Cell): 574-339-7024  
(TOLL FREE): 800-425-7380  
(Office): 574-472-7850 ext. 100





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## THE AUTHOR

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President/CEO  
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South Bend, IN 46628  
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world, but let's not forget where much of this began: Swiss CNC Lathes. Swiss CNC lathes started originally as high precision watch-part making machines that evolved in size, capacity, and capability to absorb a large part of today's small part manufacturing. Utilizing the subspindle to pick off the part from the cut off operation, we have eliminated the usual cutoff burr. We also have the ability to move the subspindle over to additional tool stations in the machine to perform a variety of machining operations on the back of the part that helps us forego having to put the part in another machine to perform further machining operations. In addition, we are doing this machining simultaneous to the main spindle operations, giving us a theoretical "freebie" in our cycle time calculations. 40 seconds of work on the main spindle with 20 seconds on the subspindle mean we can get a 60 second of machining in 40 seconds without human interaction. Wash. Rinse. Repeat.

The addition of live cross and face tools for both the main and subspindles has changed the dynamic as well for what can be done on a machine. Live tooling operations range from cross drill and mill, to face mill

and drill, thread whirling for bone screws, gear hobbing and splines, angle and 5-axis milling, polygon turning and much, much more. Each of these operations could, in effect, be another machine that you would potentially have to move a part to and fixture, etc. to complete. Now we rely on the capability of our machine to perform as much as we choose on a given production part.

If we add the one overlooked quality of these machines and processes, it would be their accuracy and precision - remember, their DNA is from watchmaking. Consistently, these machines will handle OD tolerances of 0.0003"-0.0005" overall. Those were grind tolerances years ago, and now they are made on machines that run lights out.

Another often overlooked aspect is personnel. Let's face it that we are all struggling to attract, generate, develop, and retain talent in our manufacturing world. If I have to think about an individual touching a process multiple times in its manufacturing, I am looking at a lot of variables out of my control as well as the fallibility of being human. Let's stand back and understand that in our position of

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being an industry leader in “**One and Done**” with Citizen Swiss CNC and Miyano, we have machinists that can operate more than one machine at a time as well as recreate what a machine tech truly is. These machines are automatic, running from bar stock with automatic bar loaders manufacturing complex and tight tolerance parts with virtually no interaction from an operator. Automatic machines running extraordinarily tight tolerances on parts complete without the need for secondary machining operations with a minimal amount of involvement is exactly what we are doing now.

While this may not be the one size fits all solution for all parts, our team at Millennium are experts in working with manufacturers to develop processes on the appropriate applications of these technologies to increase production, minimizing human involvement and error, and lowering the overall price to manufacture. Your part that takes 2 lathes and a mill operation to finish and a grind at the end could be done complete in many instances, while freeing up valuable machinery and human resources for other work. Fewer human resources required, less scrap and waste,

reduced set-up and change over, with more resources available for other intensive operations in your manufacturing leads to not only a better bottom line for your business, but also an edge in the future with technology leading us to manufacture more intricate parts with tighter tolerances than ever.

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