

MACH THREADING LEAD ERROR

HISTORY

Threading was actually broke in Mach back about a year or so. Since then it has constantly been tested and continues to be refined.

THREADING PROGRAMS - COMPARISON

You can't compare different controller programs. For example, I can use a different program which slaves the Z axis to the spindle and it will provide absolute perfect pitch threads within the limits of the mechanical system. That doesn't mean anything, other than to say, with another system you get some kind of threading. The control scheme uses an external device board (you can include the SmoothStepper). It would be like comparing apples and oranges. Same goes for higher end CNC lathe systems. A statement saying that perfect threading was done is a different "fruit" many times. The refinements going on here are about just using the PP along with the threading application.

CNC SYSTEMS

Don't care what your CNC lathe "SYSTEM" is like, your thread lead will only be as good as the screw / ball screw that drives the axis, how well that movement is implemented by Mach, and all the other electronic / mechanical items associated with that movement. It can quickly get complex, the stepper motor, the pulleys and their belts, the timing sensor, spindle motor and belts (variations in the motors rpm's and power / torque), backlash, etc. So it becomes a matter of degree as to the influences of those items. Checking each of the items may not even be practical or even possible for the average user. To simplify it all you can check the lathe 'system' and the controlling system.

TESTING

If you can confirm cutting, such that scribing of many passes, provides a single cut line, and is repeatable and measurable, then the lathe as a system is refined to a rather high level and can be used a base relative to the controlling software. There will always be inaccuracy in both the lathe system and the controlling system. As the inaccuracy decreases it gets more difficult to identify the cause such that a change on the software side may not be perfect based on a non perfect lathe system.

PUTTING THE CUT THREAD INTO PERSPECTIVE

I guess it's a matter of degree. There are a lot variables ie; the lathe, the type of cutter, experience, etc. that can have a big influence on the actual cutting of the thread and final outcome. One could say that if the nut goes on the thread it's fine while another would say the nut needs to track the thread perfectly with no play. Yet neither of those may meet a designed intent. So it comes down to standards and not personal opinion.

Lets say the lathe is perfect. Then the software side of it needs to be able to control to some level such that it can control to suite some standard. There is a lot of information about pitch diameter that can easily be found but not much on lead error. Pitch diameter is easily measured even at the hobbyist level. To measure lead you need gages and just

one costs more than many hobbyist want to spend (yes you can use a tapped piece, but you don't know what standard it relates to unless you have also have plug gages).Of course an optical device (optical comparator or microscope) can be used and that would negate needing plug gages.

MACH THREADING

In questing to improve the Mach threading I am using a standard to gauge it by. The testing done can only be within the machine and measuring capability available. So what's the quideline / standard?

STANDARDS and SUMMARY

There are a number of standards. The JIS (Japan Standard), ISO, BRITISH, ASME ETC.....?? In trying to put lead error into perspective I played with ASME B1.1. The RICH CHART shows a short length and the plus or minus variations for a 2A or 3A thread that cannot exceed that variation to stay in the class of thread. The chart covers 0 to 1" UNF and UNC. So the overall range is from 0 to 0.002" depending on the thread. SO for a 3/4-10 threadyou can't have 0.002 lead error in any .8 inches long piece of the threaded rod..... which means that currentlythe lead error shown in testing already equals or exceeds the standard error allowed. Tests imply that the lead error can be reduced by changing the feedrate based on user testing. But if the software can be refined then maybe the used "total system" will refine the threading such that it falls within or below the tolerances shown. In the end, long length threading will be satisfactory provided the lathe system part is satisfactory.

