



# Service Bulletin

Enabling Your Ideas

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**Product Identification:** Computers for Controlling PCNC Mills

## PLEASE NOTE!

While we continue to allow mill owners to use their own PC in order to offer the greatest possible economy, we also make a strong recommendation to use a Tormach Machine Controller. A proper computer and configuration is critical for dependable operation of your PCNC mill. Running with a computer that is not suitable is unlikely to damage your mill, but users may experience miscellaneous errors and poor cutting accuracy. Issues or problems related to a non-Tormach supplied control computer are the responsibility of the customer. The Tormach Machine Controller (TMC) can be found on our web site at [http://www.tormach.com/Product\\_PCNC\\_acc\\_controllers.html](http://www.tormach.com/Product_PCNC_acc_controllers.html).

### Background:

Many computers can be successfully configured for the PCNC (Mach 2/3) control software, however some cannot. The issues normally involve hardware or device drivers that generate interrupts, stealing time cycles from the background process that is critical to accurate and error free motion control. Recently we have observed that changes in PC component drivers and CPU architectures supplied by major manufacturers (Dell, HP, Lenovo, and others) have created serious problems for real time control programs such as Mach3, the program that operates the PCNC mills.

### General Recommendations:

The recent trends within PC component drivers and CPU designs have made it impossible for us to provide general guidelines for computer selection. Problems have been cropping up across CPU series (Celeron, Pentium, Core II, Athlon, etc) as well as manufacturer models (Dell Optiplex 330, HP Presario SR 5710, Lenovo ThinkCentre A57, etc). The issues are not related to processing power or general computer performance, nor are they explicitly related to operating system (XP vs. Vista) although we continue to have a preference for XP. Faster processors, more memory, or multiple core CPU's do not resolve these issues. Computers supporting the Energy Star certification are less likely to operate correctly. The primary test for correct operation is a diagnostic program included with the Mach3 software called DRIVERTEST.EXE.

The computer should be at least 1 GHz. A parallel printer port is required. A USB to printer port conversion will not work. Earlier Intel Celeron, Pentium, or AMD processors have worked just fine. While 256MB memory will work, we normally suggest 512MB or more. We hear reports of multiple problems with Hyper-Threading technology CPUs from Intel, but that feature can usually be disabled. Problems are more prevalent on computers manufactured after 2007.

The operating system should be Windows XP, or Vista. XP Pro offers no advantage over XP Home, but we have found that XP has fewer problems than Vista. Certain accessories can create problems. Use game controllers, wireless keyboards, and similar devices at your own risk. We also observe a higher frequency of problems with Intel CPUs that incorporate Intel Core®<sup>1</sup> microarchitecture. We suspect that AMD CPUs that incorporate the K8<sup>2</sup> microarchitecture have similar issues.

Do not use a laptop computer. Laptop computers use hard wired interrupts as part of their power management scheme. This steals CPU time and creates critical time slice errors. The machine control program may appear to run, but motion accuracy will

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<sup>1</sup> A list of Intel processors and the architectures used can be found at [http://en.wikipedia.org/wiki/List\\_of\\_Intel\\_microprocessors](http://en.wikipedia.org/wiki/List_of_Intel_microprocessors)

<sup>2</sup> A list of AMD processors and their features can be found at [http://en.wikipedia.org/wiki/Comparison\\_of\\_AMD\\_Processors](http://en.wikipedia.org/wiki/Comparison_of_AMD_Processors)



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suffer as well as operating reliability. Laptops are fine for running the machine control software offline, in demo mode, without a machine attached. If you are unsure if you can manage your own computer configuration, please review section 2.7 of the Tormach manual (available for free download at [www.tormach.com](http://www.tormach.com)).

## Specific Recommendations:

The following list has the Dell PCs that we have used in the past with success, along with some notes and comments. These models are no longer manufactured, but most can be purchased from a variety of sources such as off-lease vendors. We have no recommendations for current Dell, HP, Acer, Lenovo, Gateway, Asus, or Compaq models.

- Dimension 1100: An older model that works just fine. The BIOS is older and does not recognize USB devices, but Windows does.
- Dimension B110: This appears to be a variant of the 1100. It works just fine; we have shipped quite a few of these configured as mill controllers.
- Dimension 5150: This model works but it does not have a printer port on the motherboard so it requires a printer port card.
- Optiplex GX520: Works fine.
- Optiplex 210L: We prefer the small form factor.
- Optiplex 310: We prefer the small form factor.
- Optiplex 320: We prefer the small form factor.