

Optimizing Windows 10 and Mach3/4

Optimizing Your PC

If you are having issues where you are losing communications with your SmoothStepper, your PC may be causing the issue. These steps have resolved slow/overburdened PC issues for many SmoothStepper users, and have helped to prevent the creation of scrap:

1. Make sure your GCode that you are running, is on your PC's hard drive. It should not be ran from a network location, USB flash drive, external hard drive, or CD/DVD. These other data sources can have significant lag times or go to sleep, which can cause a job to fail!
2. Make sure your computer is disconnected from the internet (it prevents programs from updating).
3. Disable the WiFi Adapter while running Mach. Do you have a second Ethernet adapter or a WiFi Adapter on this PC? If so, you should disable them or shut them off before you run a program. You can do this by clicking the Network icon on the lower right of the screen and selecting Airplane Mode.
4. Don't surf the net while running Mach.
5. Don't play music, videos or games while running Mach.
6. Close your CAD and CAM software while running Mach.
7. Close all other programs on your PC when running Mach, especially CAD and CAM software. Are your Running any CAD or CAM programs at the same time as Mach3 or Mach4? If so, you should shut them down before you run Mach, since they can consume a lot of RAM.
8. Don't switch screens in Mach3 while running a job (this can sometimes cause enough lag to drop the connection).
9. Make sure that you have restarted your PC recently (if it has been a few days, it is probably time to restart).
10. Make sure your computer is not trying to do a Windows Update (Set it to notify you when an update is available for download).
11. Make sure your PC is not trying to automatically defrag your hard drives.
12. Uninstall any anti-virus software.
13. Make sure Windows Firewall is turned off.
14. Make sure your network adapter is not allowed to go to sleep.
15. Make sure your hard drives are not allowed to go to sleep.
16. Make sure your PC is not allowed to go to sleep.
17. Make sure your monitors are not allowed to go to sleep.
18. In Mach3, Menu -> Config -> General Config -> Lower Right Hand Corner (and then to the left one column) is Screen Control. Make sure that Hi-Res Screens are NOT checked.

19. If your hard drive is almost full, adding in another hard drive for data, or upgrading it to a SSD drive may help. Regular mechanical hard drives work just fine (as long as they are not full). However, the SSD makes boot times and load times so much faster, that we only run SSDs on my computers now.

20. Run your PC's Disk cleanup utility. It can sometimes remove GBs of useless information from your hard drive.

21. Defrag your mechanical hard drive(s) if you have not done that recently. This is not needed with a solid state drive (SSD).

22. Uninstall the Apple and Adobe update utilities, if they exist. They can peg out your processor long enough to disrupt the ESS.

23. For Windows 7 and newer: If you have 4GB of RAM or less, it would help significantly to get that up to 8 GB of RAM.

24. Make sure you disable unused network protocols. (See below)

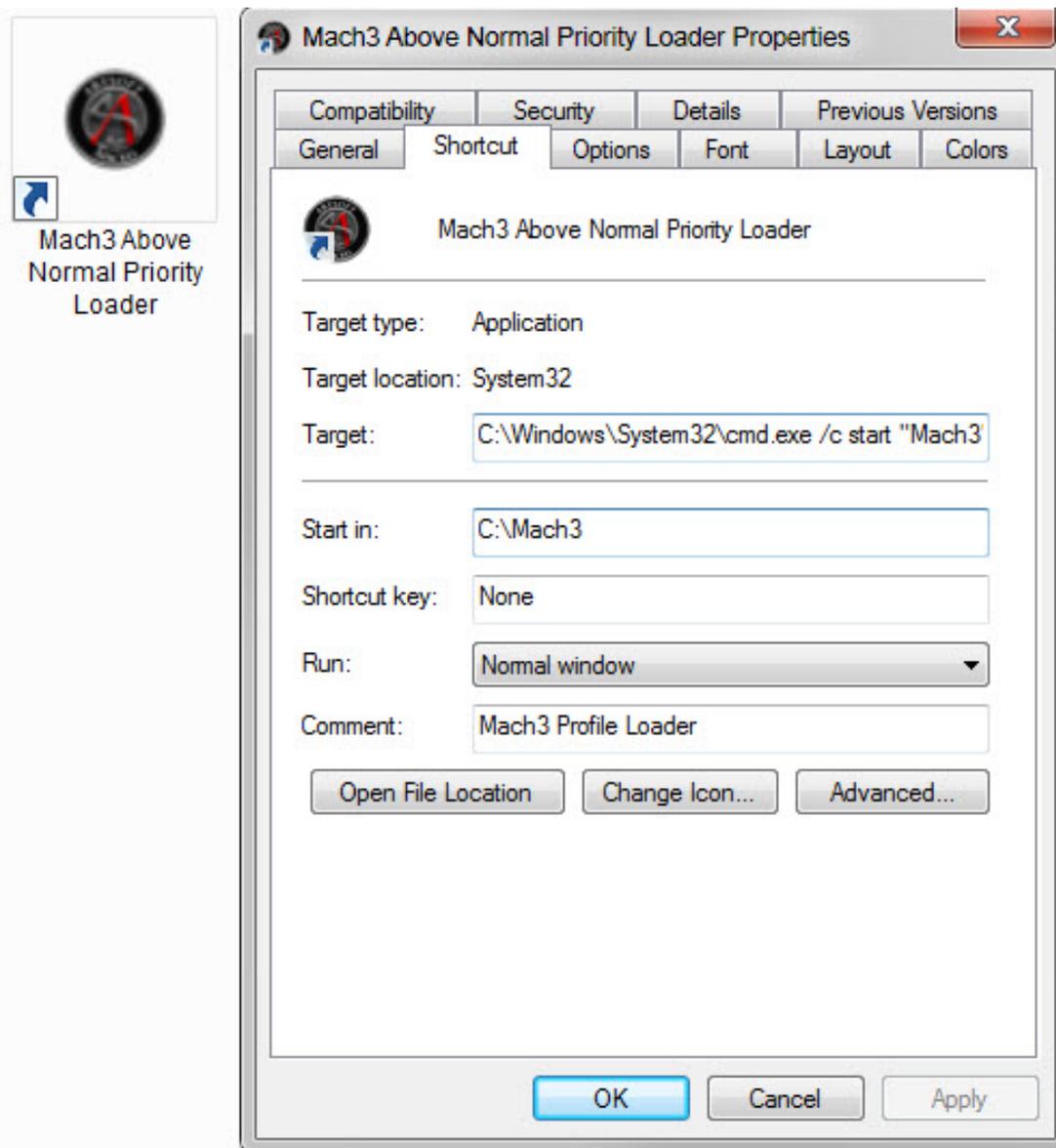
Make the changes on the following pages to further optimize you PC for use with Mach3/4.

Running Mach at a higher priority level

You can make Mach3 (or any program) run at a higher priority level by making a shortcut and changing its Target as follows:

```
C:\Windows\System32\cmd.exe /c start "Mach3" /AboveNormal "C:\Mach3\Mach3.exe"
```

You can also download a screen icon on our downloads page and place it on your desktop.



Set the PC's Power Settings

Go to Power Options in Control Panel and set the monitor and the computer to NEVER sleep.

Set the Network Adapter to NEVER Sleep



Go to Device Manager, right click the network adapter that the machine controller is connected to and select Properties. Click the Power Management tab and UNCHECK the box labelled "Allow the computer to turn off this device to save power".

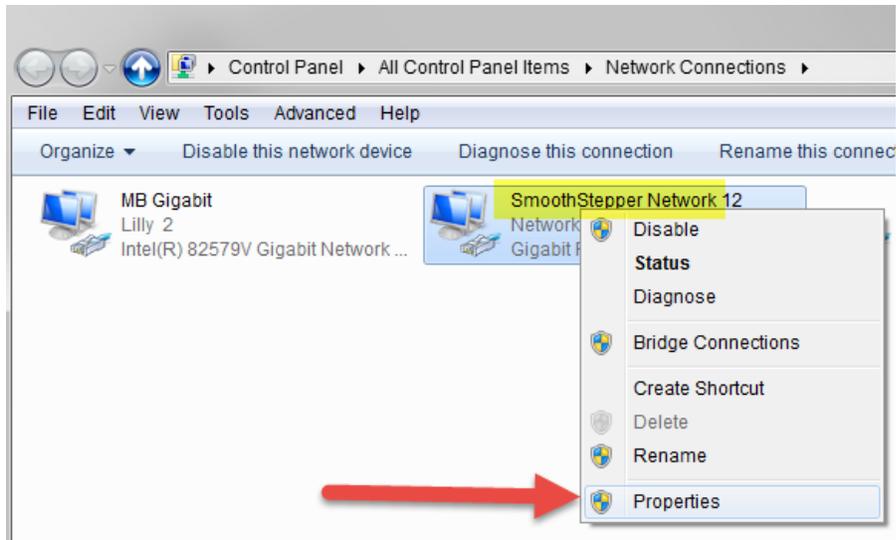
Set the Screen Saver and Background Wallpaper

Go to Display Properties and turn off the screen saver and do not use any sort of animated slide show. Choose a solid color for your desktop background. Animations and fancy graphics just consume memory.

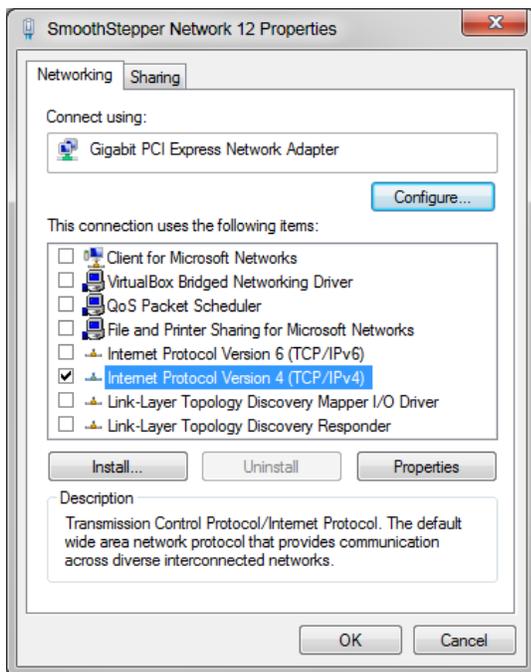
Disable unused network protocols

The ESS only needs UDP protocols contained in the TCP/IPv4 protocol. All other protocols may be disabled on the Ethernet Adapter interface, and it may increase the performance of your PC.

Open the Network Connections folder, and then right click on your adapter dedicated your SmoothStepper. Click on Properties.



In the Network Properties window, leave Internet Protocol Version 4(TCP/IPv4) checked. Then uncheck all of the protocols and services in the window.

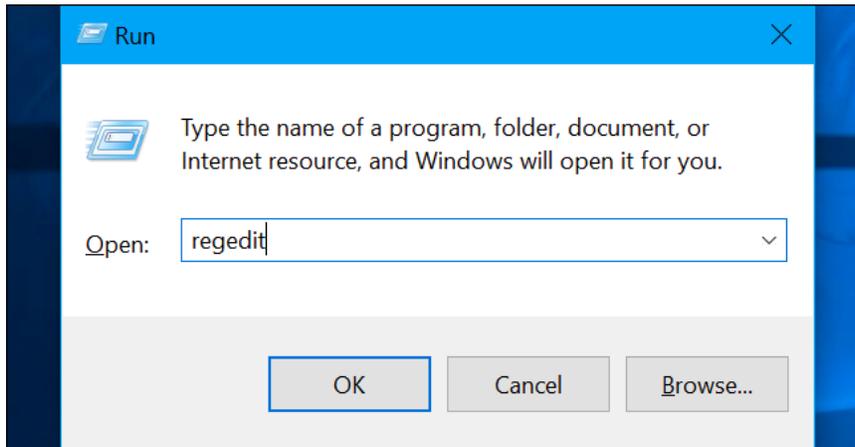


Disable Cortana

Windows Cortana can suck a fair amount of processor power and RAM. Microsoft is very determined that you should always be running it. Here is how you disable Cortana: (Warning: This requires a registry hack)

Standard warning: Registry Editor is a powerful tool and misusing it can render your system unstable or even inoperable. This is a pretty simple hack and as long as you stick to the instructions, you shouldn't have any problems.

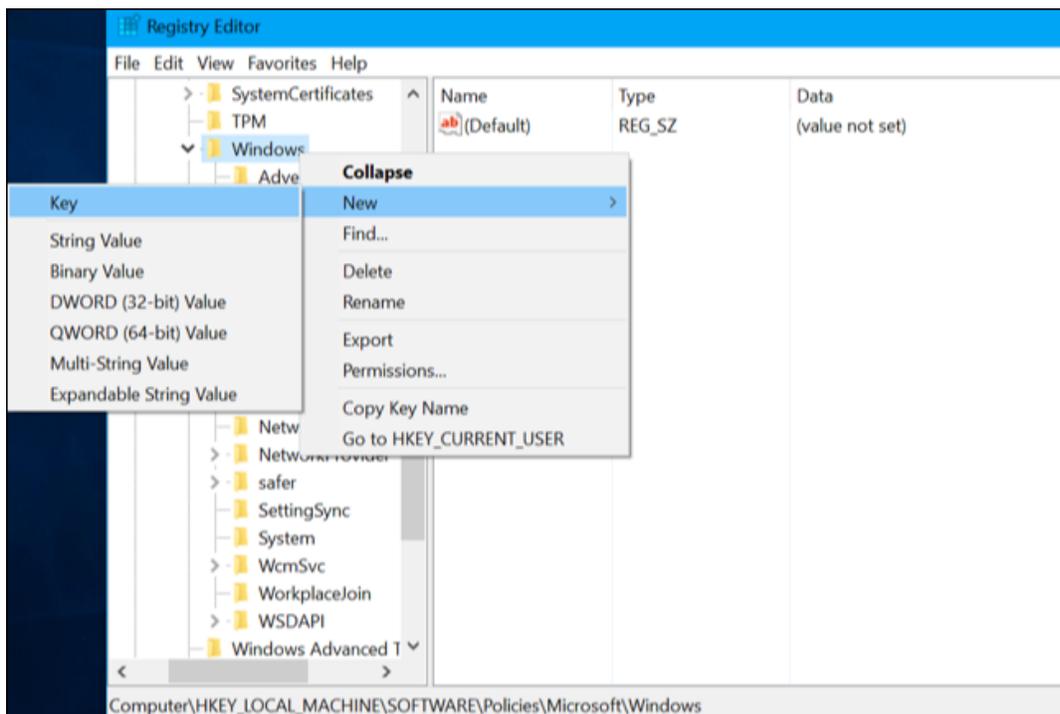
open the Registry Editor by pressing Windows+R on your keyboard, typing “regedit” into the box, and pressing Enter.



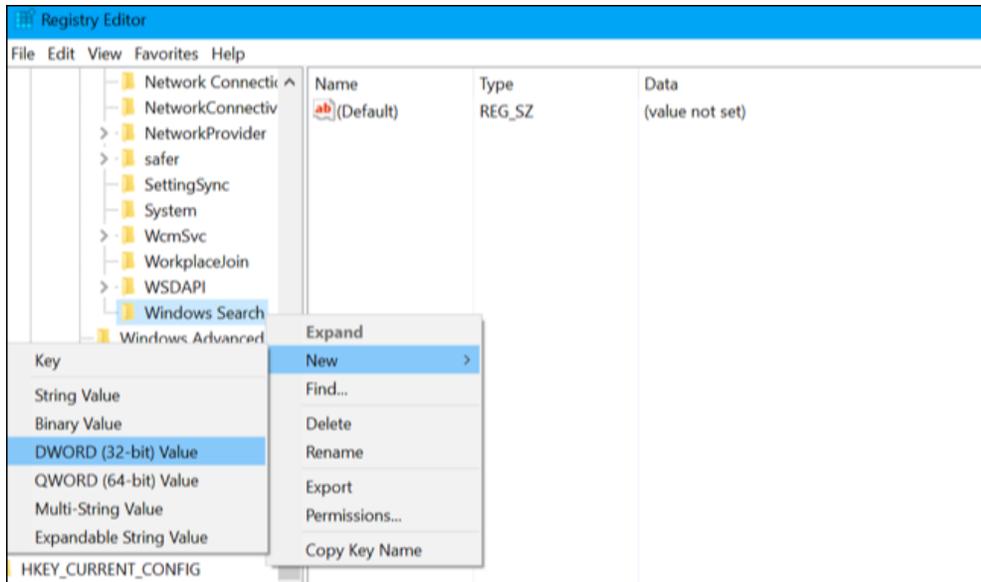
Navigate to the following key in the left sidebar:

HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows\Windows Search

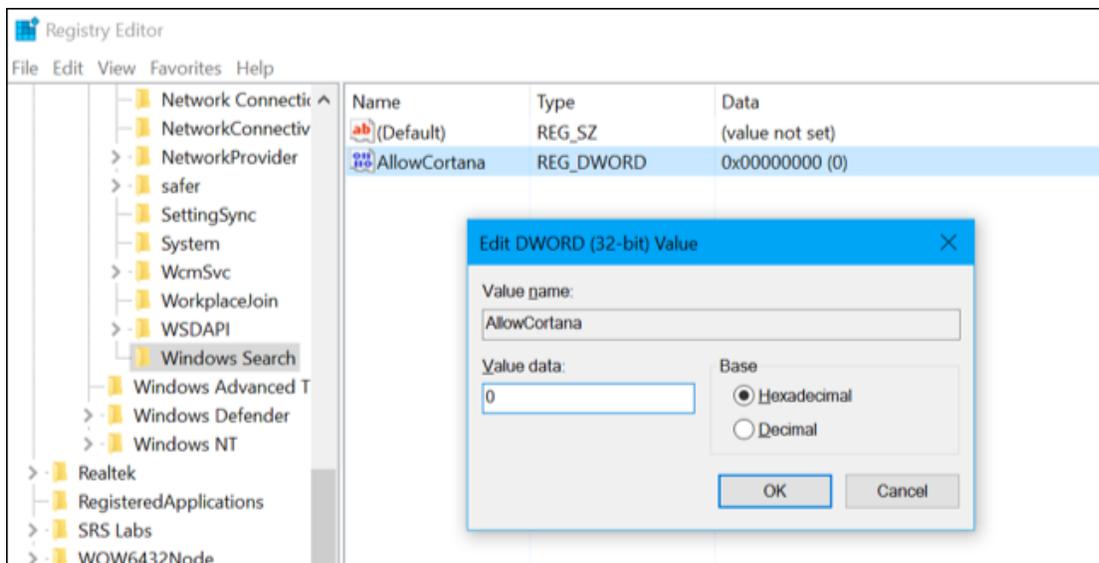
If you don't see a “Windows Search” key (folder) below the Windows folder, right-click the Windows folder and select New > Key. Name it “Windows Search”.



Right-click the “Windows Search” key (folder) in the left pane and select New > DWORD (32-bit) Value.

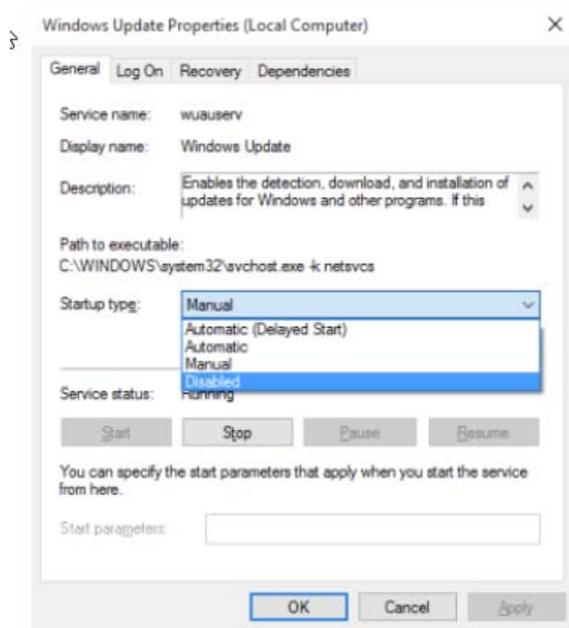


Name the value “AllowCortana”. Double-click it and set the value to “0”.



You can now close the registry editor. You’ll have to sign out and sign back in or restart your computer before the change takes effect. To undo your change and restore Cortana in the future, you can just return here, locate the “AllowCortana” value, and delete it or set it to “1”.

You can also download the one-click registry entry in our downloads section under support. When you unzip this file, you will see two files, **Disable Cortana.reg** and **Enable Cortana.reg**. Double click Disable Cortana.reg and press Yes to accept the registry change.



Turn Off Windows Updates in Windows 10

Please keep in mind, that Windows Updates are now MANDATORY in Windows 10. We have seen an issue where Windows Update still tries to take control and update (without an internet connection) and it causes a large processor load, and interrupts communications with the ESS, and this can happen during the middle of a job. To disable this, please turn off the Windows 10 Update service with this method.

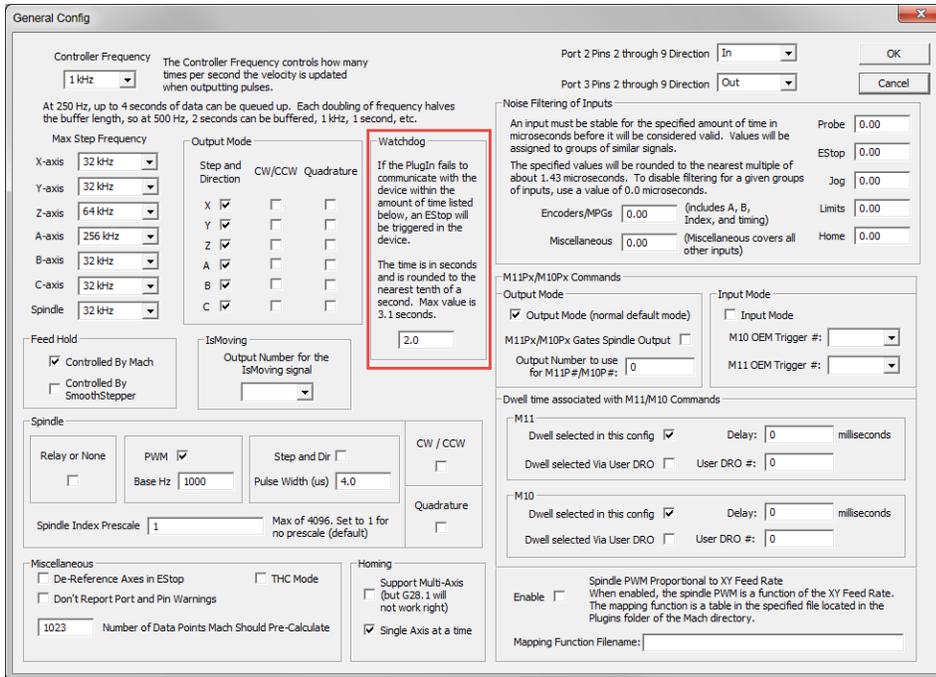
You can do this using the Windows Update service. Via Control Panel -> Administrative Tools, you can access Services. In the Services window, scroll down to Windows Update and turn off the process. To turn it off, right-click on the process, click on Properties and select Disabled. If the update process is running, click Stop to stop the process. That will take care of Windows Updates not being installed on your machine.

Set Watchdog Timer in ESS Configuration

If you are getting "Watchdog" or "Out Of Data" messages, that means that Mach3 and your PC were not able to communicate with your ESS in the required amount of time. At 2.0 seconds that means Mach3 did not successfully talk to the ESS for 20 times in a row. At 3.1 seconds that means Mach3 did not successfully talk to the ESS for 20 times in a row.

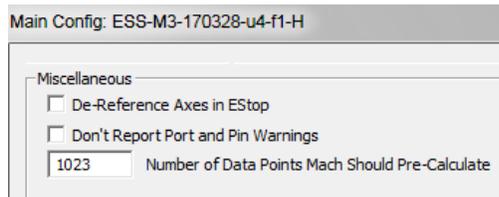
One cause of this is that the ESS should be powered for 5 to 10 seconds before starting Mach3. This allows the ESS enough time to boot up and be ready for an incoming connection. (This will only affect you when initially trying to start Mach3, not later on.)

Another cause can be the ESS's watchdog value. Go to Mach3's Menu -> Plugin Control -> Main Config: ESS-M3-version. If your Watchdog value is less than 2.0 seconds, we would strongly recommend increasing it to at least 2.0. If it is already at 2.0, it is okay to set it to 3.0 and it will prevent needless messages from popping up.



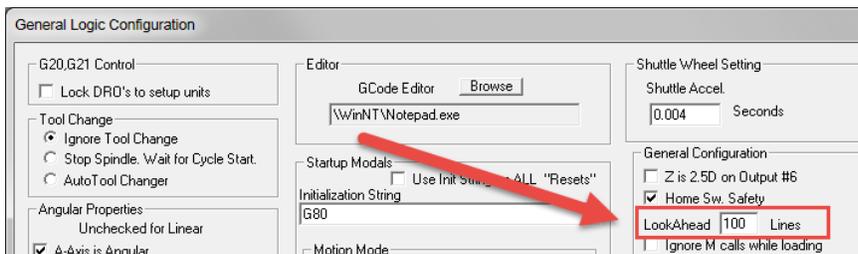
Increase the number of Data Points

Increase the number of Data Points that Mach should pre-calculate. This defaults to 1023 and you may increase it to 1500 or up to 2000. Going above 2000 may negatively affect system performance. Go to Mach3's Menu -> Plugin Control -> Main Config: ESS-M3-version.



Adjust the Look Ahead value

Adjust the Look Ahead value, which is normally 20 lines of code. Try increasing this to 100 lines of code or more. Go to Mach3's Menu -> Config -> General Config...



Possible Hardware Issues to check (If the above does not help)

1) Check your Ethernet cable to make sure it is securely connected at both ends. Try replacing the Ethernet cable with a new one, since we have seen "Ran out of Data" messages caused by bad Ethernet cables.

2) Make sure your PC is not set to speed stepping in BIOS or other similar setting that throttles back the CPU speed. If you are experiencing Ran Out of Data Messages or Watch Dog messages, you want your PC running at full speed.

3) Make sure that your PC is not overheating. Try checking the CPU temperature with a monitoring program, and see if it is running too hot, which will make it reduce its CPU speed to keep it from damaging itself. If you are running the PC in hot weather (without air conditioning) this can exasperate this problem. Having a fan blow on your PC may be able to cool it enough to keep running without these problems.

4) Try air cutting your GCode with Dry Run turned on. If you can run your GCode without the "Ran out of Data" messages and the torch is off, then it is likely that electronic noise or ground loops from these devices may be causing the problem.

5) PC RAM. If you don't have enough RAM, your PC is forced to swap data between the RAM and the hard drive using page files, which can cause significant delays, especially when using mechanical hard drives. These delays can easily cause 'Ran out of Data' messages. Recommended amounts of RAM for different versions of Windows are as follows (32 bit Windows will limit you to 4GB of RAM, 64 bit Windows will allow more than 4 GB of RAM):

- Windows 7: Minimum 4GB (you will need to make sure all other programs are closed); preferred 8 GB.
- Windows 8: Minimum 4GB (you will need to make sure all other programs are closed); preferred 8 GB.
- Windows 10: Minimum 4GB (you will need to make sure all other programs are closed and you will need to disable Cortana). 8 GB to 12 GB is preferred.