

Laptop Purchasing Considerations

First, you probably will not find something high end at the price you want in a local brick and mortar store. I wouldn't be afraid to buy a laptop online, but be sure it is from a reputable dealer, and I would not recommend a "refurb" or refurbished unit. The one local store you might find something in is the Microsoft store, however there are likely still better deals to be had online.

On screen size, choose something that gives you adequate size but is not gigantic to carry around. Screen size also plays into keyboard layout. For lots of numerical data entry, a 10-key number pad is nice. Also consider the style of keys. It could be worth visiting a local store to try practice typing on a laptop with a similar keyboard.

Take a look at ports around the perimeter of the chassis. How many USB ports, what type of video output, etc. Some things you wouldn't think of is which side the video or network port is on, and if this will cause an annoyance when using it as a desk, or with a wired mouse. Some laptops (like the Apple Macbook Pro) have the USB ports so close together they are almost unusable simultaneously.

For myself, I prefer a hardware wifi switch, or at a minimum a dedicated function key for it on the keyboard.

1920x1080 screen is a must. Most lower end laptops are 1366x768. So, on a 1920x1080 screen, everything will appear smaller, but you'll have more screen real-estate. I wouldn't be afraid of going to full 4K, if you found the right laptop with the right other specs at the right price. If you happened to find some kind of laptop with a higher than 1920x1080 but lower than full 4K (3840x2160) resolution, that would be great too!

8GB RAM is a must, and in most circumstances can be upgraded to 16GB later, but you'll want to research if it has just one slot or two, and how they are populated from the factory. You may want to save the money for now and hold out on 16GB until you really need it years down the road if ever.

Core i5 or i7 processor is a must. However, look closely at the specific model numbers. 4th generation processors start with a "4", 5th generation (newer) start with a 5. Some have a "U" after the part number which means "underclocked." These processors are often designed for battery life over performance. If you want a long battery life, this is a good choice. If you want high performance with applications like Autodesk Inventor or Solidworks, you may be better off with a non "U" model. You need to Google the processor model number (such as i7-5500u) and look at the specs on the Intel ARK website (first google result) to look at specs such as cache, cores, # of threads, base frequency, turbo frequency and TDP (total design power). The TDP is a good indicator of battery life. A higher TDP uses more power. Turbo frequency is used in single-threaded short duration operations. The base frequency is used for longer multithreaded tasks such as rendering and video transcoding. Also, in the Google search results, click the link for www.cpubenchmark.net and look at the big red score, as well as the "Single thread rating" number below it. This is a good comparison of performance between processors. Newer processors sometimes have lower clock speeds, but are able to complete more instructions per cycle, leading to an overall higher benchmark score. For CAD performance, as high of a clock speed (GHz) and as high of a benchmark as possible are preferred over multiple cores. For most types of CAD work, a higher clocked dual core will outperform a lower clocked quad-core. Most applications including Inventor do not yet make significant use of more than two cores. So, there are some instances in which certain i5 processors will perform better than certain i7 processors. Again, look at the specs. The common exceptions are video editing, rendering, and transcoding, where these sorts of applications and processes will use all available cores. So, if you're doing rendering, more cores, and even hyperthreading (i7) can be very beneficial.

On video graphics, Inventor is certified to work with Intel HD series graphics (such as HD4600) and performs reasonably well for small to medium size (500 parts) assemblies. Intel HD graphics is built in the CPU, and uses some of the CPU's capability to render the 3D graphics. Animation programs such as 3Ds Max will benefit substantially from dedicated graphics.

A dedicated graphics card will perform better, offering smoother rendering of complex 3D assemblies and simulations. This is recommended for advanced work, or live simulation such as CAM programming (like in Inventor HSM). Inventor uses a graphics mode called DirectX which works well with gaming-oriented cards such as an nVidia Geforce. Solidworks (more common in colleges and universities) uses the OpenGL rendering engine, which really needs a workstation-class video card such as an Nvidia Quadro or FirePro or FireGL. Video cards have memory of their own, 1GB is adequate, 2GB (or more) is better, 4GB is fantastic. Nvidia cards are preferred over AMD/ATI cards in most circumstances. While Solidworks will work better with a card like a Geforce as opposed to onboard (IntelHD) graphics, the gaming-oriented card will not render as well as a workstation-class card that has better OpenGL support.

Significant improvements will be seen in boot times, application launch times, and overall system responsiveness by going with a Solid State Hard Drive (SSD). Also, these are more impervious to accidental drops and knocks, and may offer a slight bit of increased battery life. However, their capacity is often significantly less, and their price significantly more. A new compromise is a Solid-State "Hybrid" Drive (SSHD) which is a traditional spinning platter disk, with a modest amount (8GB) of high speed onboard solid state storage, where the drive's controller automatically caches the most commonly accessed files. These offer performance gains over just spinning disks, but do not see the full benefits of a true SSD. A lot of times you'll find a laptop with all the other features you want, but without an SSD, and with a traditional spinning disk instead. That's okay. You can purchase an SSD separately and swap it in either now or later, with a bit of work involved to move over all the data.

On batteries, life is measured in Watt-Hours (W-Hr). This is a good indicator of battery life when comparing different models. Batteries also have varying numbers of "cells". More cells will provide longer run times but be heavier and more bulky.

Most importantly, extensively read consumer product reviews, especially the detailed and well written ones, to see what other people think of any one particular model. The product reviews on newegg and amazon provide insight that tech magazine reviews sometimes don't. You want to pay particular attention to reviews of things like trackpad performance, because poor trackpad performance annoying thing that is just not at all correctable on certain laptops.

Good luck!