



# 9 Essential Features for Medical Computers

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## What are the absolute non-negotiables?

The plethora of options for computers presents a challenge when allocating resources and approving large budgets for electronics purchases. The all-digital medical system is creating a higher demand for medical computers and other digital devices.

There are three typical use-case scenarios for computers with higher processing power and durability.

First, in the operating theater, the computer is used many times during a surgery. Pre-surgery the doctor will take high-resolution images of the patient's injured parts to ensure complete records of the procedure for archival and review.

Additionally during this phase the doctor can check the patient's medical history and review the surgery to-do list. During the surgery the added power of an video capture card allows the same computer to capture 4K video of the entire process, a vital tool for crystal-clear recordings of the procedure.

Second, also in the operating room, is working as a connection point for the other devices in the room, providing a stable, reliable and powerful connection point for the delicate instruments and devices. It is critical that this hub of data collection and processing function flawlessly every time.



Third, a more powerful computer can handle the environmental control system in the operating room or ICU, monitoring the temperature, moisture and other factors that are carefully controlled within the confines of the hospital.

Making sure that all the essential features are included protects this major investment from overspending and under specification.

What features are essential?

What features can be done without?

What features can be upgraded at a later stage?

Let's dig in to the nine non-negotiables for a medical computer.

*Previously voluntary compliance is now (as of '18) mandatory in both the US and the EU.*

## Compliance



Compliance is now compulsory (starting 2017Q2 in US and 2018Q1 in the EU), putting this previously voluntary feature at the top of the list.

Consumer electronics equipment is not held to the same standards as those that are designed for use in hospital environments.

Picking the required extras and necessary features is important, but all those bells and whistles are worth nothing if they don't meet standards and

put the integrity of a digital medical system in jeopardy.

IEC, ISO and FCC standards are a good benchmark, are recognized worldwide and will provide broad confirmation as to the computer's basic level of reliability.

Particular standards to check for are:

IEC 60601-1 V3.1, IEC 60601-1-2 V4.0, IEC 62366, ISO 14971 and FCC part 18 class B.

## Speed *More is not always better.*



With the efficiency of electronics ever increasing and the processing demands remaining somewhat stable there is a point where less is, in fact, more.

The reliability of the current generation of technology and the increasing affordability of higher end components affords some neat perks.

Processing large medical images is handled quicker and easier with a faster chipset. Even with expansion cards to handle a lot of the heavy processing work, faster speeds will pay off in the long run.

Intensive HD video imaging is best handled by add-on cards that provide flexibility in their own specs and pricing.

## **A Fanless** *Fans must be avoided.*



Previous generations of computer chips produced lots of heat. A heatsink (typically aluminum block with fins) was attached to the CPU with a fan on top. Due to space limitations the CPU fan was small and had to spin fast, making it noisy and susceptible to wear and tear.

Add to this that the heat would then build up in the case, so another fan was needed to pull cool air into the system, and then the installation location needed to provide adequate ventilation.

Fans and other mechanical parts are the enemy of reliability. Prone to total failure that can potentially damage equipment and cause downtime that disrupts service delivery while the computer is offline.

More reliable fans provide only a partial solution.

A computer that is designed with cooling fins and heat dispersing material, instead of fans, can safely release all the heat into the surroundings without the direct movement of air on the chips themselves.

## **A Waterproof** *Keeping it clean.*



Hospitals and medical centers are clean working environments. These must be kept as clean as possible all the time. Thorough cleaning requires the use of cleaning liquids and water.

Waterproofing is not critical. We are well accustomed to electronics not being used around liquids. Computers are not installed near running water or in the kitchen near the sink.

However, to make cleaning as easy and efficient as possible and protect in the case of any accidents, more protection is better.

Full waterproofing as used in machines that can operate underwater is the most comprehensive protection, but prohibitively expensive and excessive for most indoor installations. At a minimum the computer should be able to be wiped down with a wet cloth without incident.

## Isolated COM ports

*To protect serial devices from damage and premature failure.*



Serial devices are sensitive to the current and voltage provided over the serial wires. Incorrect setup that puts too much power over the lines might not be detected for weeks before the ICs burn up from the excessive power.

Power spikes can also destroy the serial receivers on expensive, specialized equipment, rendering it useless and entailing costly repairs or replacement.

Isolated COM ports give another layer of protection against the unexpected.

Isolated COM ports



## Covered Cables

*Cater for users and technicians.*

Technicians need to access cables for installation and to make sure that connections are snug. Having cables in easy reach is the efficient solution. If cables are covered by any permanent fixture then that item will have to be removed and replaced for even a minor repair, upgrade or check.

reset button and USB ports. The other connections are typically fixed.

Cleaning staff need to be able to easily clean the computer without knocking any cables out of place.

Users, in the simplest case, won't need to touch the computer at all. In a more general case, they could possibly need to access the power button,

A removable cover is best practice for all these scenarios as it allows ease of cleaning while allowing relatively easy access when needed.

Waterproof Top Cover

Covered Cables



## PCIe x16 Expansion

### Essential for HD video recording

Day to day use doesn't require extra graphics cards. The built-in capabilities suffice for most operations. This is a change from older chipsets that couldn't handle graphics well. There's no need for an additional card most of the time.

### Except for HD video imaging

For reliable HD quality video imaging much more processing power is required than provided by any

onboard graphics processor. When installed, all of the heavy processing gets offloaded to the graphics card where a dedicated graphics chip processes the data with much higher speed and efficiency.

The current minimum standard interface for a high-quality graphics card is the PCIe x16 expansion slot. This slot should be easily accessible so the card can be installed quickly and the video ports are in an easy-to-reach position.

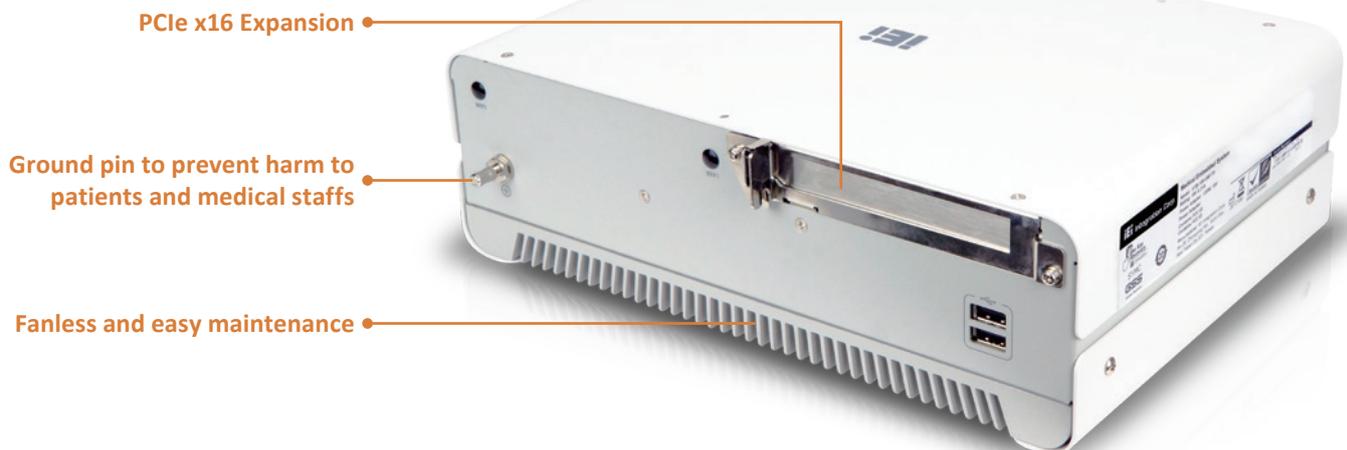
## Grounding *Essential for equipment used directly in patient care.*

No electrical system is perfect and slight leaks in current inevitably occur. Providing clean power is a first step. Small leaks in current that will produce a tingle in the fingers in a home can trigger life-threatening situations when that equipment is connected to the patient.

When medical equipment is connected directly to a patient the resistance is much less and can flow without much impedance to critical organs.

Static charges can build in up in non-current carrying conductive parts such as the case. If the buildup is large enough it can produce the same dangerous effects as the main power source.

An extra ground from the case gives any static electricity a safe route away from the patient.



## Flexible Mounting *For installation in the ideal location.*

Desktop computers are usually set up in a dedicated spot around a desk. Once installed, they don't tend to get moved around much, if at all. A computer to be used for patient care needs flexibility to be installed in a medical cart or a place that's most convenient.

There may be storage space in a patient care area, but usually the computer is not used as it is at a workstation.

Flexible Mounting



## So what's next?

That's a brief introduction that should provide you with the essentials when choosing new hardware.

There are other considerations that are beyond the scope of this document, but which IEI bakes into the creation of all medical computing hardware.

If you have any questions just ask via email at [sales@ieiworld.com](mailto:sales@ieiworld.com), and we'll help you.

You can also see the IEI's [HTB-100-HM170](#) medical computer that meets all the requirements laid out in this articles.

