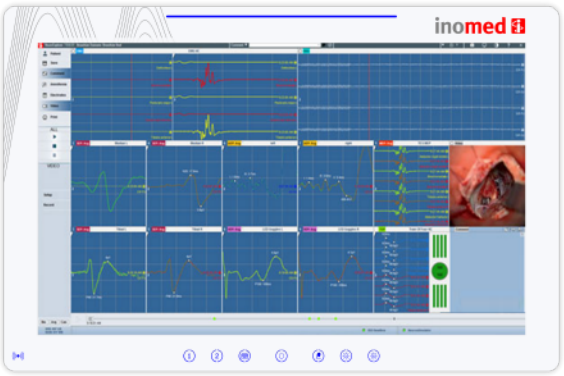
MEDICAL COMPUTER HELPS TO PROTECT NERVES

High processor performance for better neuromonitoring in the operating theatre



Use Case

For a long time, certain procedures have been associated with the risk of post-operative nerve damage. This risk can be effectively reduced through intraoperative neuromonitoring. The procedure uses electrical impulses in the nerve tracts to make tiny, hidden structures visible. The latest generation of ISIS Xpert systems from inomed takes this patient-friendly technology to an unprecedented level. The processor performance of the ADLINK MLC 8 medical computer plays a central role.



A magnetic resonance imaging (MRI) scan shows a walnut-sized lump in the middle of a five-year-old girl's brainstem. Doctors at a specialist clinic in Switzerland are looking for a safe way to access the tumour. Under no circumstances do they want to damage the cranial nerves converging at this point. With the help of neuromonitoring, the neurophysiologist explores the surface of the brainstem and shows the surgeon a safe way to access the tumour. After the procedure, the MRI scan shows that the tumour has been successfully removed without damaging the girl's cranial nerves.[1]

[1]Case study from https://neurochirurgie.insel.ch/erkrankungen-spezialgebiete/funktionsueberwachung-sicherheit/hirnstamm-schaedelbasis

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Electrical stimuli act as orientation markers

During operations like this one, space is very limited and important functional centres and cranial nerves are almost always in the way. Intraoperative neuromonitoring (IONM) measures the natural action currents of the muscles supplied by the cranial nerves. Simultaneously, artificial electrical stimuli can be introduced into specific nerves and muscles. During the operation, for example, the motor cranial nerves of the eye muscles are stimulated with small electrical impulses and their reaction is monitored. The various electrophysiological measurements then produce a detailed picture of the structures in the operating area.

inomed specialises in such systems for the protection and treatment of neurological functions. The company, which is headquartered in Emmendingen in southern Baden, has established intraoperative neuromonitoring as its core competence. Its range of ISIS Xpert products is used by specialist clinics around the world. “We have set ourselves the goal of offering our customers today what they will need in the future. We want our devices to be characterised by their innovation and unique quality”, explains Dr. Tomasz Moszkowski, Product Manager at inomed. “Through our latest generation of products, we want to offer users a significant increase in performance, with the option to display complex scenarios in real time as far as possible. We developed the software ourselves and needed hardware that was powerful enough to run it.”

Hardware requirements for complex scenarios

inomed's systems are designed in such a way that each important process is based on a single processor core. More complex scenarios require more capacity for parallel processes on multiple cores. In the environment of an operating theatre, however, the power consumption of processors is limited because they have to function without fans: microbes can lodge themselves in fan vents; plus the fans themselves would disrupt the smooth, laminar air flow which ensures sterile ventilation in operating theatres.

In addition, inomed’s systems must be approved as medical products. The EU has recently raised the bar again with its new Medical Device Regulation (MDR). The approval process is extremely complex, especially when the product consists of several components. In such cases, it is a decisive advantage if important components have already been certified as medical products by the suppliers.

"We also need a guarantee that the hardware will remain available over the product’s entire life cycle”, explains Dr. Tomasz Moszkowski. “Our cycles are significantly longer than in the 'normal' IT world, not least because of the high requirements in the area of security and certification. We bank on five to ten years for a product generation.”

Computers are medical devices

For many years, inomed has therefore been relying on ADLINK’s MLC range of panel PCs, which are designed for medical use. In the latest generation of the ISIS Xpert range, the MLC 5 used up to this point has been replaced by the new MLC 8.

“We have increased the new computer’s performance considerably compared to the previous model”, explains Andre Fortdran. The Product Marketing Manager Medical at ADLINK in Germany lists the most important cornerstones of the new computer: “The PC works with an 8th-generation 6-core Intel processor, a 1 TB SSD hard drive and 8 GB DDR4 RAM. The microelectronic components are housed in a sealed, screwless aluminium housing in accordance with the IP54 standard, meaning that it is resistant to the somewhat aggressive cleaning agents and disinfectants used in clinics. At the same time, the metal ensures efficient heat dissipation from the CPU without the need for a fan.”

Every detail of ADLINK’s panel PCs is optimised for use in clinics and operating theatres. The PC screen can be used horizontally or vertically, while optical bonding ensures that its solid glass surface is seamlessly attached to the display panel. This cuts down on reflections, prevents condensation between the layers and extends the computer’s service life. With regard to electrical safety and electromagnetic compatibility (EMC), ADLINK’s panel PCs meet the particularly high requirements for use in operating theatres. Numerous ports for peripheral devices enable users to adapt the PC’s configuration to their environment, for example by adding WiFi/BT modules or additional screens.

ADLINK is listed as a premium partner by Intel, thus guaranteeing that all of the critical hardware, including the processors, will remain available for more than ten years. As the final touch, the panel PC for the ISIS Xpert systems has been designed to be consistent with inomed’s corporate branding.

No waiting times, increased security

Thanks to the MLC 8’s impressive CPU power, the new ISIS Xpert systems have significantly increased their access and evaluation speed, while the latency in data processing and visual representation has been significantly reduced. The graphical performance, which has a direct effect on the display of physiological curves in real time, has been increased by 160 percent. A 60 percent boost to the multi-core performance enables the PC to handle complex, multimodal application scenarios. The single-core performance, used to simultaneously record and process physiological signals from numerous recording channels, has been increased by 58 percent.

“Our new systems allow us to derive electrophysiological signals from several muscle structures simultaneously and combine them with visual information from the surgical microscope in real time. The delay caused by the computing process is no longer noticeable”, explains Dr. Moszkowski.

An additional navigation system is often used for operations on the central nervous system. Data from the navigation system can now also be integrated into the display, thus enabling the mapping of much more complex scenarios than was previously possible.

This allows the neurophysiologist to convey much more precise, detailed information to the surgeon, meaning that they can work much more quickly and efficiently while simultaneously offering the patient significantly improved safety. “Thanks to our harnessing of the highest computing power available on the market, we have reached a whole new level in protecting neuromuscular structures during operations," says the product manager happily.

The panel PC for the ISIS Xpert systems

- 8th-generation 6-core Intel processor
- 1 TB SSD hard drive
- 8 GB DDR4 RAM
- Fully sealed, screwless aluminium housing
- Designed to be consistent with inomed’s corporate branding



Andre Fortdran points out that as a customer of ADLINK, inomed also receives additional security: “Panel PCs from the MLC 8 range are certified and registered as MDR Class I medical products, above and beyond the standard conformity in accordance with IEC/EN 60601. This means that we relieve our customers of the burden of getting the necessary approval and product documentation for this important component, as well as guaranteeing the required traceability. So we also take over responsibility for any risks in the area of computer hardware.”

Dr. Tomasz Moszkowski confirms: “We can place full reliance on our suppliers in this area. ADLINK was and is the only provider able to meet all of our requirements and wishes. We are extremely satisfied, both with the collaboration in product development and jointly developed solutions, as well as the dedicated service and tailored support. We will certainly continue to expand this successful collaboration.”

> “Our new systems allow us to derive electrophysiological signals from several muscle structures simultaneously and combine them with visual information and data from the navigation system.”
>
> **Dr. Tomasz Moszkowski.**
> Product Manager at inomed

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