

Medical devices and pharmaceuticals

Alpha Omega

Improving patient lives through advanced brain surgery technology

Product

Solid Edge

Business challenges

Redesign advanced neurosurgery system

Enhance physician interface

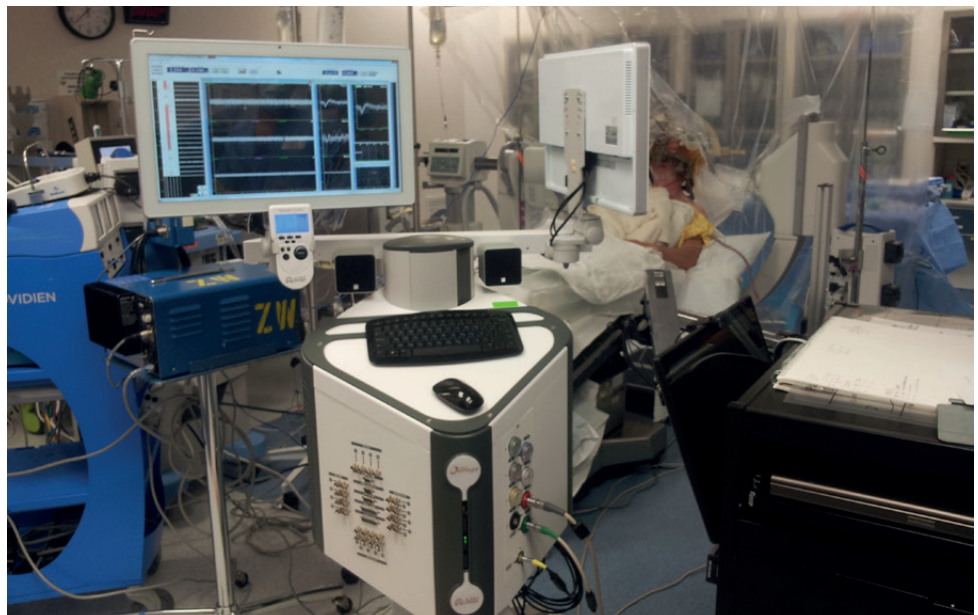
Transform an outdated design with new features

Keys to success

Teaming up with design and engineering specialists

Realizing the old unit was too heavy and bulky to transport

Using Solid Edge as a common “language” for development



Results

Entire project cut from 12 months to five months

Built only one physical prototype

Shrunk size and weight of system, making it easier to transport, including carrying on a plane

Reduced machine’s footprint in the operating room

Solid Edge helps team produce Alpha Omega’s next-generation microelectrode recording (MER) system used in neurosurgery

Revising Alpha Omega’s flagship product was a major design and engineering challenge

Based in Israel, Alpha Omega is in the brain surgery business, developing products such as the Neuro Omega, an advanced microelectrode recording (MER) system used in neurosurgery. The system provides electrophysiological recording and deep brain stimulation (DBS) capabilities to help surgical teams locate precise targets in the brain

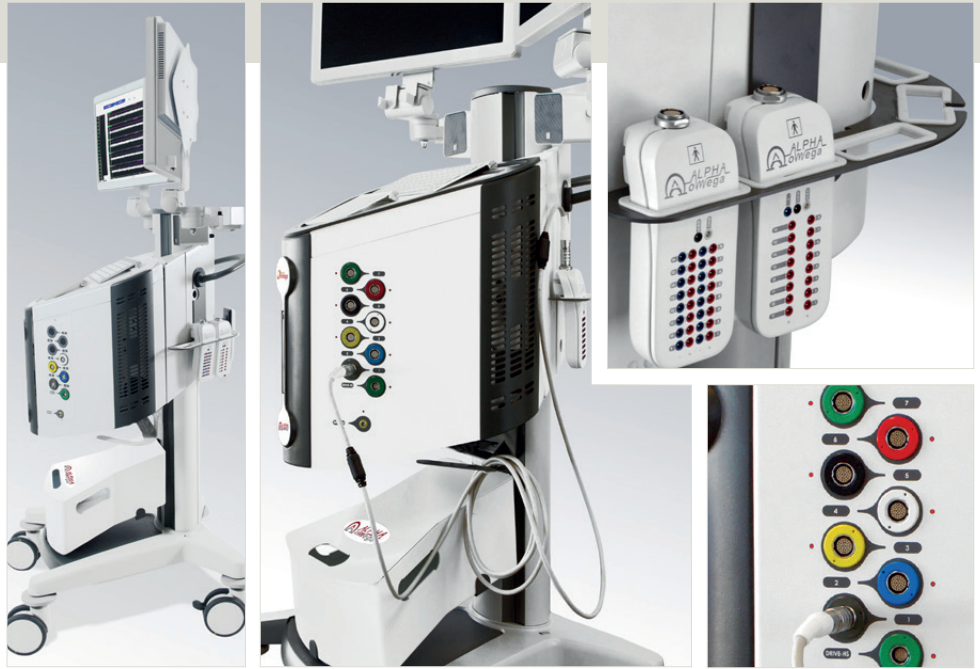
for implanting electrodes that carry small electrical impulses. The pulses help treat movement disorders such as Parkinson’s disease. Alpha Omega’s systems are in use at more than 500 hospitals and research centers throughout the world.

Developing the new version of the Neuro Omega was the collaborative effort of an interdisciplinary team comprised of product experts and designers from Alpha Omega, designers from Alon Razgour Design Studio and mechanical engineers from GEOMATRIX smart engineering solutions. The entire project was led by Luai Asfour, development manager at Alpha Omega. The “common language” used by all three

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"The customer's requirements meant thinking 'outside the box' and, by brainstorming, our team of engineers...went above and beyond to solve every problem. Using various capabilities of Solid Edge software, especially synchronous technology, allowed us to work much faster than ever before."

Aviv Antebi
Chief Executive Officer
GEOMATRIX



companies throughout the development process was Solid Edge® software – the most complete hybrid 2D/3D CAD system that uses synchronous technology for accelerated design, faster change, and improved imported re-use – from product lifecycle management (PLM) specialist Siemens PLM Software.

"We wanted to transform a somewhat dated design to a new system with new features; creating an advanced medical look, with excellent fit, form and function to outpace our competitors in the micro recording business," says Imad Younis, Alpha Omega's president.

"Initially, the focus was on achieving a useful, basic design, enabling doctors to easily use the technology in hospital operating rooms," says Alon Razgour, president of Alon Razgour Design Studio. "The design had to accommodate the routing of the system's many cable inputs and outputs, as well as ease of use for the doctors using it. Yet, during our research, something gave us the haunting feeling that there was something we were missing."

Shipping the existing system caused a bottleneck

That "something" was that the existing product was somewhat unwieldy from a

demonstration and marketing standpoint. Conducting product demonstrations was time-consuming because the system contained so many bulky components that all had to be shipped, which could take up to four days. The sales representative had to supervise the loading, receiving, pickup and transport of the system to the demonstration location for assembly, which took even more time. "It was clear that the time it took to transport the Neuro Omega system for demonstration purposes was obstructing the product's success," says Oren Gargir, Neuro Omega product manager.

Razgour points out, "This realization led us to redesign the product from its core, even before we made any design changes with regard to the product's usability and functionality."

The development team's vision was to recreate the Neuro Omega as a system that can be used in the operating room (OR) on a designated cart, as well as taken onto a plane by a sales representative, thereby eliminating shipping of separate components and reducing the available time between demos. "Keeping in mind that our goal is to have the same product serve both as the demonstration machine and as the final product to be sold to the hospital,

we stripped the system from its monitors, speakers and computers and extracted the product's main core," says Razgour. "We proceeded by placing all the internal electronics and connectors in the Solid Edge virtual space, crowding them together without a defined boundary. Then we experimented with positioning the components in search of the optimal configuration."

A stand-alone unit design soon emerged; ready to be connected to generic computers, monitors and speakers for use, either during sales demonstrations or in the OR. The system is mounted onto a cart and includes all the components necessary for operational use.

Satisfying four different users

In designing the system's fully assembled state, the main focus was the multiple probes connecting the patient to the machine, as well as the probes connecting the machine to other instruments that process information arriving from the Neuro Omega. The design addresses these needs with the machine's diamond-like shape, giving it two front facets, both with screens and plug-in hubs. Each surface faces the area in the OR relevant to its role; one faces the patient's bed and the other away from it.

The GEOMATRIX, Razgour and Alpha Omega team designed the Neuro Omega

not only for Alpha Omega, but for use by four different types of users including the assembler of the machine, the person who demonstrates the machine to prospective customers, the physician in the OR, as well as the person who maintains it. "We achieved all of it, without having to compromise the design in any way," says Razgour.

He feels that Solid Edge is ideal for industrial design. "Designers need to experiment or 'play' with things like composition, morphology, shaping, styling, lines and patterns," Razgour says. "We need to explore various aesthetic options that convey different emotional experiences. The great advantage of using Solid Edge is in the possibilities you can try out, by changing and rearranging aspects of the design. You can make swift adjustments in surfaces and volumes, with an ease that resembles playing with modeling clay – giving you immediate feedback to assist in decision-making. This freedom makes Solid Edge especially designer-friendly."

"Solid Edge gives you a lot of flexibility," says Aviv Antebi, CEO of GEOMATRIX. "In the past, with other systems, the bottleneck was the software. Just to make a simple change required us to think about using the software instead of just making the change. Using Solid Edge, you don't have to think about how to use the software to make a change; you just do it."

"After we found a manufacturer who could handle the work, we had to make additional adjustments and changes. Here, too, the ability to use Solid Edge to make quick changes with no damage or impact on the hierarchy of parts and other features helped significantly shorten the development process."

Alon Razgour
Industrial Designer
President
Alon Razgour Design Studio



"One of the things that made our job together easier was working with Solid Edge."

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"What truly enabled us to succeed is the joint work of all members of the development team using Solid Edge. At each crucial point, Solid Edge allowed us to make changes without compromising existing data and without impairing the hierarchy of the system's parts and features."

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Special engineering challenges

The Neuro Omega development team also had to make sure the system could comply with electromagnetic compatibility (EMC) testing requirements. "Reducing the size of the electronic cards system and components required us to conduct thermal testing to ensure the unit won't overheat," says Gargir.

Antebi adds, "Working closely with the development team, our engineers mapped the system properties and specifications, which allowed us to analyze the technological challenges we faced in-depth."

The next phase was the most critical: understanding the engineering needs and design requirements. "Without this step, we were like a marathon runner who does not know the race track," says Antebi.

"This step drew upon our development engineers' experience and analytical ability. We worked on each assemblage separately and built a number of concepts schematically, each of which had to correspond to the design while also remaining fully functional and usable.

"One of the things that made our job easier in working with Solid Edge was the ability to change parts quickly in the assembly environment, which enabled us to see the results of product changes easily without the need for complicated, time-consuming editing," says Antebi. "The design challenges required pushed us to stretch the Solid Edge sheet metal environment almost to the limit, in order to build unique forms. This was an extraordinary achievement."

Using Solid Edge, the Neuro Omega project was cut from 12 months to five months.

Designing the system's inner functionality required innovative thinking as well, including managing large circuits, power supplies, complex wiring and radio frequency interference (RFI) shielding. Alpha Omega's requirement for easy maintenance, including disassembly and assembly of two internal circuits, was another unique engineering challenge. Antebi notes, "The customer's requirements meant thinking 'outside the box' and, by brainstorming, led by development manager Luai Asfour, went above and beyond to solve every problem. Using various capabilities of Solid Edge software, especially synchronous technology, allowed us to work much faster than ever before."

"Another significant issue that Solid Edge helped us with was the ability to plan and adjust the design for manufacturing," says Razgour. "After we found a manufacturer who could handle the work, we had to make additional adjustments and changes. Here, too, the ability to use Solid Edge to make quick changes with no damage or impact on the hierarchy of parts and other features helped significantly shorten the development process."

Entire project completed in just five months

Today, sales representatives can bring the Neuro Omega system with them on an airplane as checked luggage instead of having to ship it separately. The system is now 17X17X15 inches in size, and weighs a little over 25 kilograms (55 pounds). The entire system, including generic computers, monitors and speakers, are placed on a cart and then used in the OR.

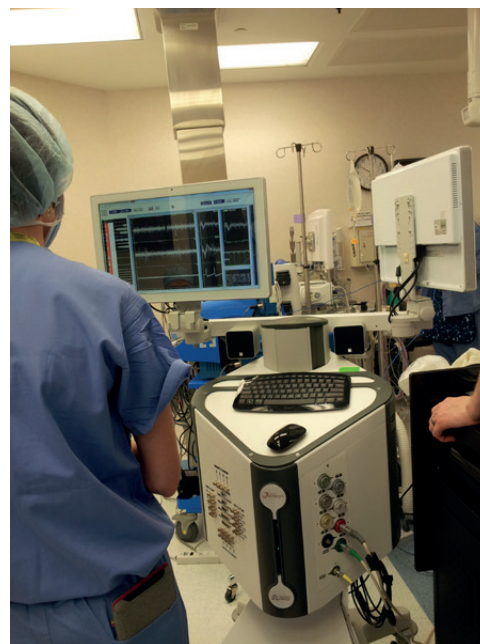
"What truly enabled us to succeed is the joint work of all members of the development team using Solid Edge," says Razgour. "At each crucial point, Solid Edge allowed us to make changes without compromising existing data and without impairing the hierarchy of the system's parts and features. This not only protected, but actively supported, the transfer of the design into its realization phase and even significantly shortened the process."

"Alpha Omega built only one physical prototype and used Solid Edge to make quick changes to parts in the assembly. Solid Edge helped us easily see, without the need for tedious and time-consuming editing of the project's history tree, how these changes would affect the final product."

"Our client's standards were extremely high, as were our own. The solution needed to align with numerous requirements. Solid Edge with synchronous technology enabled us to work at a pace much faster than ever before, aiding us throughout the process in piecing together all elements and assisting us in adapting the planning and design to meet intricate manufacturing requirements. After we

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Solutions/Services

Solid Edge

www.siemens.com/solidedge

Customer's primary business

Alpha Omega develops technological solutions designed to improve the quality of patient care in the areas of neurology and neurosurgery, by providing state-of-the-art tools for those who work to reveal the mystery of the brain and find treatments for neurological disorders.

www.alphaomega-eng.com

Customer location

Nazareth
Israel

Partner

Mckit Systems Ltd.
www.mckit.co.il



started getting ready for the production stage, Alpha Omega asked us to make a few adjustments. In the not-too-distant past, this would have meant the re-opening of the design, with all changes affecting the whole system and creating new problems to solve," says Razgour.

Research is currently underway to explore the use of the Neuro Omega machine in handling other conditions that may benefit from DBS treatment, including obsessive compulsive disorder, depression, Alzheimer's and epilepsy.

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Alon Razgour
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