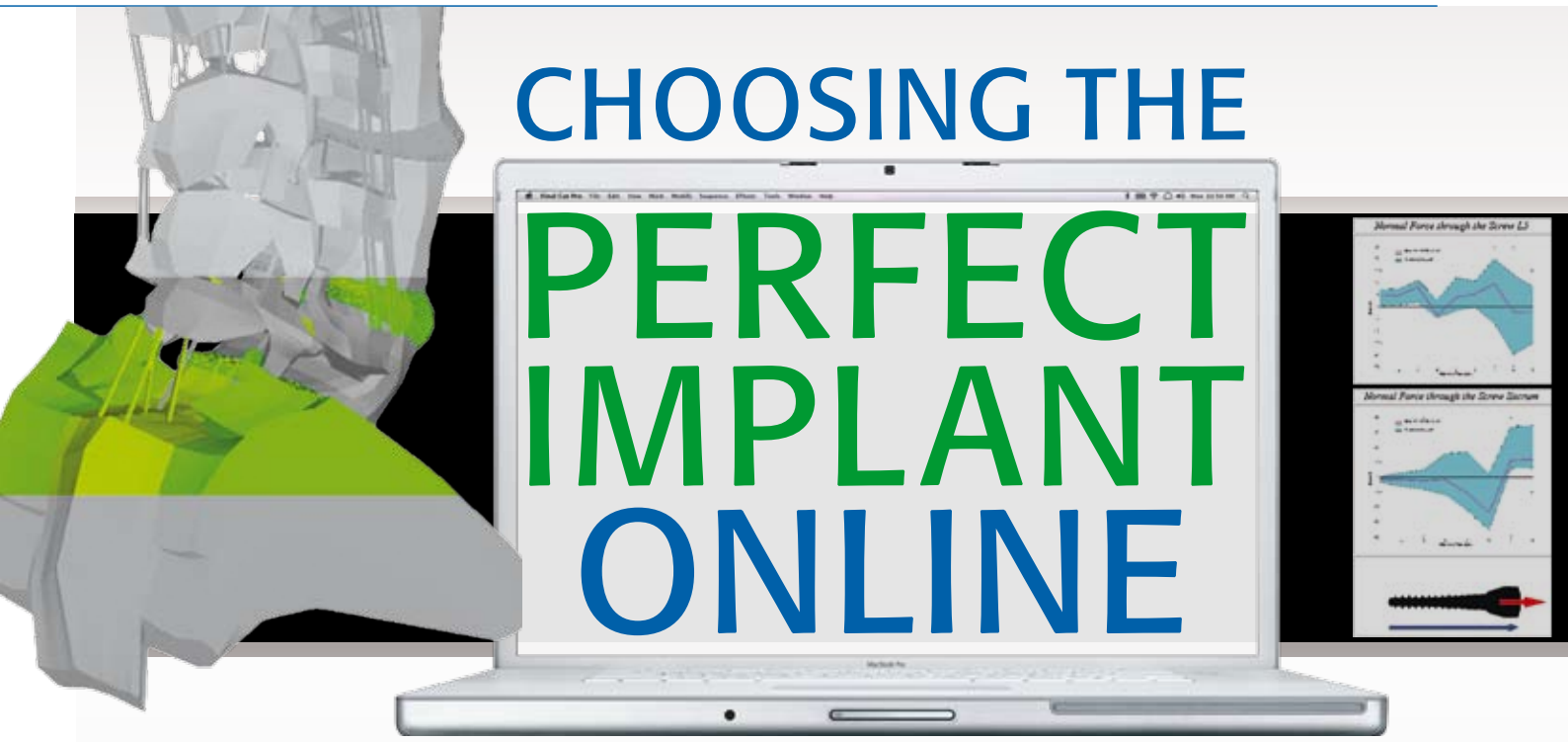
CHOOSING THE PERFECT IMPLANT ONLINE



A new online service allows spine surgeons to select the most appropriate implant by simulating patient-specific forces on a case-by-case basis. Covering a vital aspect of preoperative planning, the service is expected to drastically reduce uncertainty and decrease the number of implant failures.

It is estimated that of the 35,000 spinal surgeries per year in Europe, 15% of revisions result from implants that were poorly matched to the patients' needs. Up to the present, a spine surgeon's experience would literally make or break an implant's success. He or she would choose an implant according to its behavior in previous cases with similar pathologies and patient-dependent parameters. However, as busy surgeons will attest, there is little time to compare implants by different manufacturers and insufficiently objective biomechanical information about the behavior of assembly joint implants.

With no basis for precise calculation of the type and strength of an implant required, the risk for surgeons is that they may select a less than perfectly suited implant. An implant may be incompatible with the patient with regard to its size, weight, or shape, thus causing the implant or the bone to deform or, in the worst case, to break. Costly revision operations are required to make repairs.

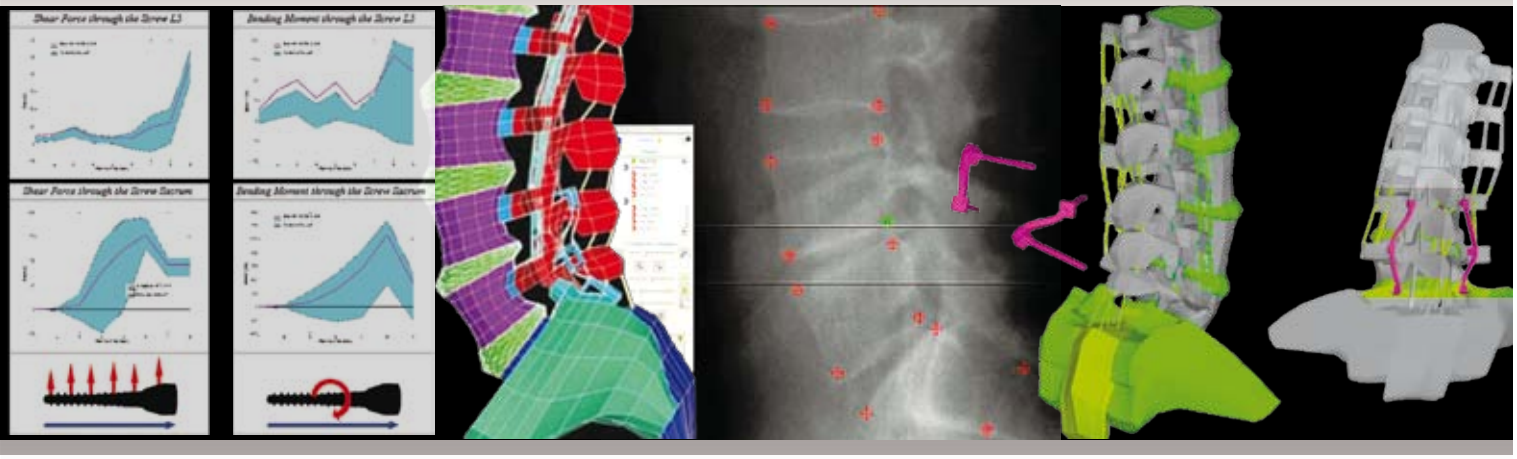
A new resource

OrthoSIM, a simulation service provider for orthopedic surgery, based in Valencia, Spain, is set to commercially release MyWebSpine, a service platform for spine surgeons and designers of spine implants. Its aim is to make preoperative planning safer by giving surgeons the opportunity to virtually test implants with regard to the forces acting on them, as well as enable designers to optimize their products.

MyWebSpine is based on a highly sophisticated Finite Element Method (FEM) model of the lumbar spine, which is provided by ENSAM-LBM Laboratoire de Biomécanique, Paris and the Instituto de Biomecánica de Valencia (IBV). The FEM is a numerical technique for finding approximate solutions of partial differential and integral equations. It allows detailed visualization of where structures bend or twist and indicates the distribution of stress and displacement. The program enables a model of the lumbar spine to be adapted to specific clinical cases and predicts implant behavior within a patient.

How it works

To access MyWebSpine, surgeons and designers must first register and purchase credit packages. This allows them to select the most suitable simulation services from the different models available. The user enters appropriate input data (information about the patient and the surgical technique) and initiates computation.



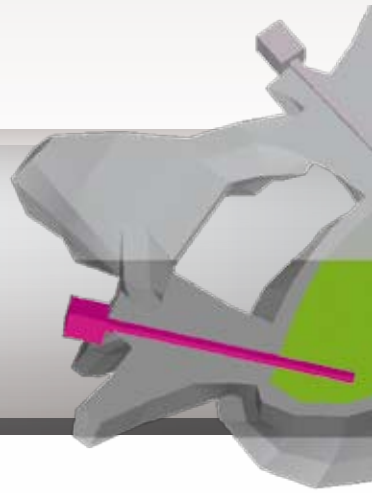
Depending on the model server conditions and the input configuration chosen, it takes between 30 and 60 minutes after having launched the simulation for the user to receive an email indicating that the process is complete. The resulting report is uploaded to the website.
For the surgeon, the output indicates whether the suggested technique and instrumentation are likely to be effective and suggests whether and how improvements can be made. For the implant designer, the simulation shows what would otherwise be the result of a time-consuming laboratory experiment requiring preparation and testing of real implant models.
Payment is per use, that is pay-per-simulation, with the price being around 50€ (66 USD) per clinical simulation, depending on the size of package acquired. Credits can either be bought online by any user or "sponsored" into a user's account by a registered company ("point injection").
Users have credit accounts where all credit transfers are registered. Similarly, sponsors have their own administration panel, in which all credit transfers and reports of activity are displayed.
Depending on who pays for the simulation, a surgeon may only be able to choose and test the products of a specific sponsor or company. However, a surgeon is, of course, able to compare implants from different manufacturers.
The application is expected to be commercially released in 2010. A limited scale version is now online and accessible by surgeons and designers (see p 11).

ORTHOSIM

ORTHOSIM, a government sponsored simulation service provider for orthopedic surgery, provides biomechanical insight into the complexity of orthopedic-related problems through computer simulation. It is presently operating with a clinically validated lumbar spine model based on finite elements.
ORTHOSIM offers orthopedic surgeons scientifically validated models for clinical simulation of customized cases. Implant manufacturers can access a validated tool to evaluate new product concepts without costly procedures. Researchers, surgeons, and students are able to use it as a tool for investigating and learning about orthopedics.
ORTHOSIM aims to consolidate its position as the leading European simulation service provider for implant-related orthopedic surgery. *www.orthosim.com*

INTERVIEW WITH STEFANO DEOTTI

InSpine spoke with Stefano Deotti, researcher at the Instituto de Biomecánica de Valencia (IBV), about the challenges and applications of the simulation service MyWebSpine, developed by the research centers IBV and ENSAM-LBM and the enterprise Adapting S.A.



MyWebSpine aims at revolutionizing preoperative planning. How can surgeons benefit from it?
Let's look at an example. A patient suffers from disc degeneration in the lumbar spine. A surgeon chooses to solve the problem by inserting a screw and bar system to fuse the vertebrae. There may be different types of screws with varying thicknesses that come into consideration. He or she enters the relevant patient data such as body weight, x-ray films, or CT scans, and selects the type of screws they think best fit. MyWebSpine does the computation and determines that the type of screw is not strong enough for the patient (results are also presented graphically). This allows the surgeon to consider other options, perhaps choosing more resistant screws and then checking them again with regard to their suitability in the patient. The main factors taken into account by the program are the length, thickness, and number of the screws and the number of levels in which they can be placed. It's all a process of finding the best-matched implant.

Can MyWebSpine make predictions about the time when an implant may break?
No, the model only predicts what will surely happen after implantation, not when. The moment in which the breakage will happen depends on many factors that cannot be implemented into the model. However, it's no little thing to know an implant will break!

What is new about MyWebSpine?
So far, the simulation models in the orthopedic or biomechanic sector have been limited to scientific research and demonstrations for students or junior surgeons at universities. None has yet been open to the health community as a consultation system for surgeons or manufacturers. Also, the models that are currently available need to be adapted to every single case by deeply modifying the mathematical structure, which has made them unsuited for reliable and rapid routine use in hospitals, etc. This is where MyWebSpine comes in. It's easy to use, quick and open to anyone and, most of all, it is parametric, that means it can simulate an individual case just by entering a few numerical parameters.

What sort of implants do the models of MyWebSpine include?
MyWebSpine currently includes screws, bars, and cages by LAFITT and SCIENT'X. The service is also in contact with other enterprises to define the incorporation of their products in the model. In the future OrthoSIM would like to include more spine implants available on the market. This would provide surgeons with the best overview of their options.

How do you ensure both the manufacturer data and the models of MyWebSpine are accurate?
Before we include an implant in the application, we conduct a validation process. This is done by comparing the results of mechanical tests of the implant with the numerical model of the implant. All the results of these tests are housed in a database, directly related to the model. We are also working with German, French, and Spanish surgeons who give feedback about the functioning of the simulation service of MyWebSpine by evaluating its functionality, manageability, and usefulness. They also provide information about clinical results with specific implants and give details about surgical techniques and tendencies.

What are your biggest challenges?
Biological entities, for example, soft tissues and bones, have a very complex structure. If you want to model a human body part, you need a large number of equations until it works—thousands for a spine. And you need powerful computers and time to make a simulation. Also, the geometry of bones and articulations is difficult and complex. It would be a lot easier if we could model a vertebra as a cube, but in that case, the results wouldn't be reliable. But of course, the more similar the model is to reality, the better the result.

HOW TO TEST MY WEB SPINE

In order to test MyWebSpine, go to htpp://lumbar.orthosim.com.
For free registration, which allows you to practice with standard implants, follow the link "Free registration!" and you will receive a password by email that allows you to use the simulator. To ask for specific simulations with the commercial implants that have already been implemented into the model, follow the link "Premium subscription" and from there the link for the registration and contact form, which will get you in touch with the administrators of the tool. The premium subscription is a trial version of the commercially available tool, in terms of length of the subscription, number of credits, etc, and doesn't have a fixed price yet. Once the model incorporates more implants, users will be able to buy subscription and credits through an internet service.

Link:
MyWebSpine: *http://lumbar.orthosim.com*

NEW PRODUCTS

OR table accommodates a multitude of positions

Outfitted with silent precision motors and capable of safely maneuvering a 793 lb (360 kg) patient, the TruSystem 7500 OR table from Trumpf Medical Systems is touted as a multi-functional surgical platform. The table is segmented to follow human anatomy, allowing unlimited configuration and extreme adjustment angles. It can accommodate a Wilson Frame for back surgery and has the option of integrating a spine positioning unit for dorsal procedures. An intuitive remote control and programmable touch screen can save and recall table positions and access other devices in the OR. Patients are transferred and positioned quickly and easily—an advantage that contributes to cost-effectiveness of the hospital.
www.trumpf-med.com

Accessing patient data faster

The Motion C5 Mobile Clinical Assistant from Motion Computing now offers optional upgrades that improve performance and accessibility. A solid state drive (SSD) is offered, which eliminates moving parts within and protects data from bumps and jolts inevitable with a portable tablet. The SSD gives 10% longer battery life and significantly faster start-up and data access. Embedded mobile broadband means you don't need to seek out wireless hot spots to connect to the internet. The lightweight (3 lb/1.3 kg), hospital-grade device boasts a range of other options, such as a camera, bar code, and smart card reader. The easily disinfected tablet lets health care providers bring data management right to the point of care.
www.motioncomputing.com