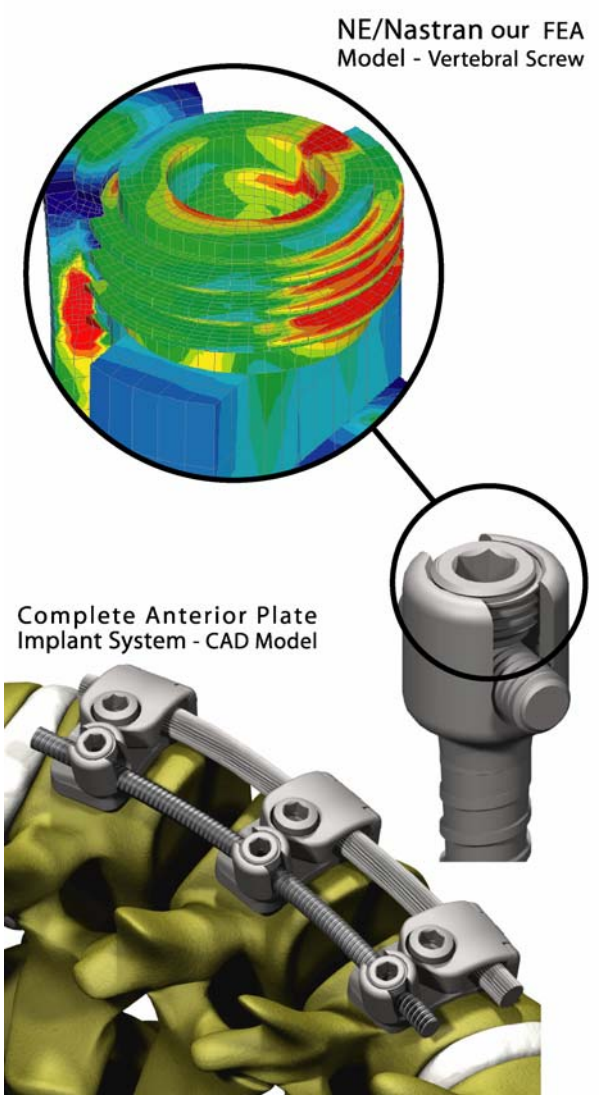
Medical Case Study (ACES Ing.-GmbH, Germany – Human Spinal Implant)



ACES Ing.-GmbH (www.acesgmbh.de) is a contract design and analysis company focused on the orthopedic implant market. The worldwide demand for spinal fixation systems is valued at approximately $1.5 billion U.S. for 2003, with an expected annual growth rate of around 13%. Spinal implants are commonly used to correct deformations of the spine or to treat instabilities resulting from fractures or disease.

The spinal curvature is corrected or stabilized utilizing implants consisting of plates, screws, rods, and disc replacements or fusion cages. ACES Ing.-GmbH (Schoenaich, Germany) was contracted to redesign an existing vertebral screw utilized in an anterior plate implant system. Several critical constraints were involved. The revised size and volume had to be the same or smaller. The new design must remain compatible with current system components and preferably the existing surgical instruments as well. Furthermore, designs from conflicting patents had to be avoided.

To calculate the optimum dimensions necessary to withstand human spinal loads, ACES chose to rely on “virtual prototypes” and Finite Element Analysis. The end goal was to meet or exceed the performance of the existing system on the mandatory FDA mechanical acceptance tests. Using the power of NEi Nastran, ACES was able to analyze not only the complex nonlinear material models, but the complete sliding contact between arbitrary surfaces including friction. Only three design and NEi Nastran analysis iterations were required to obtain a fail-safe screw, with adequate strength to withstand the anticipated spinal loads.

The NEi Nastran surface contact solution made model set up easy and permitted the analysis of very complex assemblies (impossible with standard gap or slide line elements). The end result showed strong correlation between the FEA based predictions and the mandatory FDA mechanical acceptance testing. The use of NEi Nastran also produced a significant increase in overall system performance, and patient safety while saving the customer approximately 6 months and 60,000 dollars worth of unnecessary mechanical testing time.

NEi Software, Inc. is aggressively focused on commitment to the customer. Detailed documentation, customized on-site training, and comprehensive technical support ensures that you will see immediate return on your investment.

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