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[Home](#) » [Summer 2008](#) » [Alumni Profiles](#) » Spinal solution

Alumni Profile

Spinal solution

Ferris Pfeiffer uses a computer to help spinal patients achieve better surgical outcomes.

“The human body is really just a machine,” says Pfeiffer, BS ME’03, MS ’04, PhD ’07. Pfeiffer has partnered with Dr. Dennis Abernathie of the Columbia Orthopaedic Group to evaluate options for spinal surgeries with computer techniques he developed during his doctoral studies in mechanical engineering.

Up to 20 percent of patients who undergo surgery for back pain do not find relief, Pfeiffer says. That’s partially because diagnostic tools such as CT scans can’t predict whether a surgery will succeed. But Pfeiffer’s technology creates virtual bodies to help doctors test medical devices, such as replacement discs.

Pfeiffer converts CT scans into three-dimensional models. Then he transports the models into a computer program that allows him to mimic a patient’s body weight and movements to see if the surgical devices will hold up. Pfeiffer can test several options to help doctors choose the best one.

Working from a machine shop in his Boonville, Mo., garage, Pfeiffer also has helped develop a prototype of a shim-like device for spinal fusion surgery. Because the device is expandable, Pfeiffer says, it requires a much smaller incision to implant than other options.






Ferris Pfeiffer analyzes spines on a computer screen, but he can also *make* them using a 3-D printer that sprays hundreds of layers of a special powder. It took two hours to print a model of two of his own vertebrae. Photo by Nicholas Benner

In addition to his work with Abernathie, Pfeiffer collaborates with James “Jimi” Cook, director of MU’s Comparative Orthopaedic Laboratory, and William Carson, professor emeritus of mechanical engineering, to test the strength of actual prototypes. Such tests involve attaching a prototype to bone and using a machine to load it to failure.

— Lisa Groshong

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