

# FINITE ELEMENT ANALYSIS



## ANSOL LEVERAGES OSC RESOURCES TO BALANCE THE PLAYING FIELD

Since 1988, Advanced Numerical Solutions has levered the power of high performance computing through the Ohio Supercomputer Center. But recently ANSOL has amped up its usage as it gets pushed by its clients to make sure it's using the fastest computers possible.

A small consulting software company located in Hilliard, Ohio, just outside of Columbus, ANSOL is a company that writes special software for finite element analysis (FEA) of gear boxes and transmissions for large automotive and aircraft companies, such as Boeing, GM and Ford, to name a few.

"There's no way we could compete with bigger companies if it weren't for OSC," said Sandeep Vijayakar, Ph.D. president at ANSOL. "Having a cluster of our own is not in the realm of possibility for us. A large company can afford that."

## VIRTUAL DESIGNS. REAL BENEFITS.

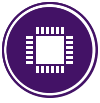
"All the mathematics are implemented by us but we do need the compilers, debuggers, profiling tools, etc., so there's a bunch of tools at OSC we use to speed up the program."

*"There's no way we could compete with bigger companies if it weren't for OSC."*

— Sandeep Vijayakar, Ph.D. president at ANSOL



INFORMATION  
TECHNOLOGY



## THE CHALLENGE

As companies continue to want more components analyzed, ANSOL's models have become significantly bigger, causing challenges that need to be addressed now rather than later.

"People have been throwing everything into the computer models, and we've reached the point we can't do some of these models in single computers anymore; that's why we've been trying to get our software to work on clusters," Vijayakar said. "A lot of our customers have supercomputers of their own, but it takes a lot of work to convert a standalone computer program to a parallel one."

## THE APPROACH

To help with scaling up to meet the needs of customers, ANSOL recently received a grant from NASA to start a feasibility study to move the company's software into a cluster environment. That started recently with small examples run on OSC's Oakley Cluster.

At the moment, the most advanced computational model of gear boxes and transmissions with surface and crack damage can only be deployed on stand-alone computers. The existing contact algorithm relies on shared memory between CPUs and quickly saturates memory bandwidth.

## THE SOLUTION

ANSOL's proposal to NASA was to create a new computational method for generating the data needed to create decision-making strategies for condition-based monitoring algorithms that can differentiate between a healthy system or a defective or damaged system. The only means available for this currently are physical testing, which is expensive and time-consuming.

"It's going to allow us to do things that were simply not possible before," Vijayakar said. "Once this works out, there will be a lot of projects coming from our existing customers."