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Navy Professor Helps Air Force Contingency Planning

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MONTEREY, Calif. — When the Air Force decided to go with the C-17 cargo plane and the Office of the Secretary of Defense needed to look at base infrastructure in Europe, they turned to a complex computer model designed in part by professors and students of the Naval Postgraduate School here.

Their creation, called a mobility optimization model, contains over 150,000 equations and 200,000 variables, and can compute the best contingency operation plan in 30 minutes to two-and-a-half hours. For instance, it helps the Air Force plan how to get troops and supplies to a designated location.

"In a military contingency, you have cargo and passengers from a variety of places that have to be delivered to the theater of operations," said Professor Richard Rosenthal, operations research department chairman

and one of the model's designers. "You're given a fleet of aircraft and a network of routes and air bases to achieve that mission. You will never have enough resources to do this, so we use modeling techniques to determine the best solution, the most efficient use of available resources to achieve the goal."

Recent graduate Air Force Maj. Steven Baker, worked on his doctorate dissertation with Rosenthal and the optimization model. Baker said the model has opened some important eyes in the transportation community, including Air Force planners in the Pentagon and the commanders of the Air Mobility Command and U.S. Transportation Command.

Baker, who's moving on to the Air Force Academy as an associate professor, recently briefed the Air Mobility Command staff at Scott Air Force Base, Ill., on the use of the latest optimization model. The command is the one most responsible for Air Force contingency planning.

"For quite a while now, AMC has principally been using a simulation to run their highly detailed modeling for things like what kind of plane do we buy to better deploy to a theater, what routes should we fly, or what bases may need more infrastructure?" Baker said. "It has occurred to most people within the [operations research] community that while simulation is an effective tool for this, optimization is also very effective, because what optimization gives is the best possible solution.

"The tradeoff is that while optimization tells you the best way to reach your goal, it cannot be as detailed as a simulation because of its complexity. But the response at AMC was pretty positive overall."

Rosenthal, along with students and other professors, has been working with the Air Force since 1993 and has received accolades for this work. He recently won the Military Operations Research Society Rist Prize for the second time. The award is one of the highest honors in the operations research community, and Rosenthal is the only person to have won it twice. He said he is honored, but credits his environment and colleagues for a lot of his success.

"The Naval Postgraduate School has an outstanding record in the achievement of optimization modeling," he said. "In fact, this is the fourth award we have received for this kind of work. There is a very unique atmosphere here — one that allows civilian professors to work on important military problems. And we have such outstanding students to work with."

While Baker said he is proud to provide a useful and tangible benefit to his Service, he expressed some surprise. "When I came to study here, I thought the principal benefits I would derive were a piece of paper when I graduated and a whole bunch of knowledge. I did not believe that I would become more familiar with my Service's problems and day-to-day operations," Baker said. "I'm coming out of here with a pretty solid knowledge of how airlift works in this country."

Editor's Note: Kuska is a writer with the Naval Postgraduate School, Monterey, Calif. Published as a Special to the American Forces Press Service, this information is in the public domain and may be accessed at **http://www.dtic.mil/afps/news** on the World Wide Web.