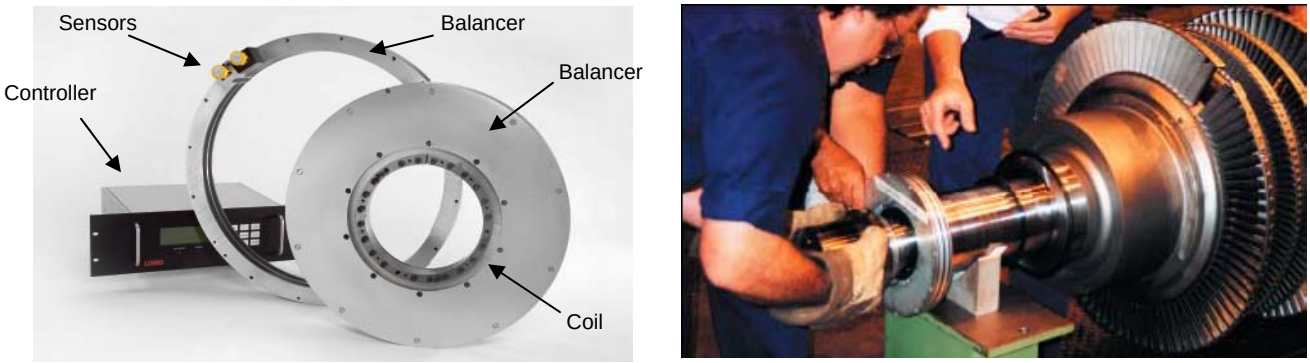
Superior, Real-Time Balancing System for Machining

BalaDyne, LORD Corporation achieve advances in the high-speed, in-motion balancing of machine tool spindles



The New balancer system (left) and application of a balancer to a spindle (right).

The Challenge—By the 1990s, real-time (in-motion), high-speed balancers for machine tool spindles were limited to speeds of less than 12,000 rpms (industry production standard of 5,000 rpms). The available sensors attached to the spindles could not analyze the level of vibration and the balancers could not correct imbalances during higher speed spindle acceleration. As a result, poor cutting produced parts out of specification and production lines would be shut down for laborious off-line balancing adjustments. In 1995, BalaDyne Corporation proposed to ATP advances in vibration control technology to enable balancing of active, high-speed machine tool spindles. The company worked with the University of Michigan to develop models to calculate new balancing requirements for high-speed machinery then assembled variations of these new balancing systems.

The Outcome—BalaDyne successfully developed innovative balancing methods and devices. New sensors were used to better monitor vibration levels and a superior counterweight system corrected imbalances in one second or less. The technology corrects an imbalance while the machinery is in operation, eliminating costly downtime related to manual balancing. Overall, the company produced technology that increased spindle cutting precision by reducing high-speed vibration and demonstrated active balancing of 40,000 to 50,000 rpms in a laboratory environment.

In 2001, a year after completion of the ATP project, BalaDyne was acquired by LORD Corporation of Cary, North Carolina. LORD continued technology development and invested considerable resources in the new balancer system. In 2003, the company introduced three innovative high-speed, real-time balancing systems on the commercial market. These systems were the LORD Balancing System (for turning Center and high-speed grinders), the LORD Turbomachinery Balancing System (for turbines, compressors, pumps, generators, and motors), and the LORD Fan Balancing System (for centrifugal induced draft/forced draft and axial-vane fans). These systems benefited from accomplishments made during the ATP-funded BalaDyne project.

As of 2007, the three LORD balancing systems improved the quality of products requiring high-speed and precision turning. These products have applications that range from automobile transmissions to industrial fans to aircraft engines and propellers to machined human joint implants that are lighter in weight, have improved surface finish, and increased life. Overall, the technology represents potential savings for U.S. industry in reduced operational downtown, extended bearings and machinery life, and increased quality and precision of machined parts, leading to more efficient and less costly manufacturing operations for American businesses.

Partnering Organization:	LORD Corporation, Cary, NC
Project Duration:	10/1/1997 – 9/30/2000
Project Cost:	$2 million ATP cost-share; $1 million industry cost-share
Project Brief:	http://jazz.nist.gov/atpcf/prjbriefs/prjbrief.cfm?ProjectNumber=97-02-0053
Project Status Report:	http://statusreports.atp.nist.gov/reports/97-02-0053.htm Research conducted February 2006