Machine Monitor

Industrial Productivity and Manufacturing Technology

NASA Tech Briefs is a monthly publication that advises its 200,000 industry/government subscribers of recent technological advances and technologies available for transfer (see page 129). The publication has been the source of a great many technology transfers; often it serves as a problem-solving tool, sometimes as a technological lead or inspiration that sparks development of a new product or process.

An instance where *Tech Briefs* information triggered both a problem solution and a new system is the experience of *Tech Briefs* subscriber G. W. Shelton, a design engineer with Logical Control Systems (LCS), Toledo, Ohio. Shelton was assigned the task of solving a problem for James River Corporation, Perrysburg, Ohio. James River is an international leader in the food packaging industry and also a major producer of paper; the company prints and die-cuts paperboard packaging products for the food processing industry.

James River had a problem involving jamming of the printing presses used for manufacturing packaging products. Jamming was a relatively rare occurrence but one of great concern because of the extensive damage to the machinery caused by jamming; repairs can be very costly and down time/loss of production adds considerably to the cost. The company wanted to know if there was a way to detect the onset of machine jam and automatically shut down the press faster than an operator could to limit or eliminate damage to the machine; avoidance of one serious jam could easily pay for the investment in special monitoring equipment.

While considering possible solutions, Shelton chanced upon a *Tech Briefs* article that described a system of motors, pulleys and belts developed by Goddard Space Flight Center to rotate a large space radiometer for measuring cosmic background radiation. The article included a diagram of the pulley and belt drives that started Shelton thinking of a new line of approach: a system that monitors the drive components for subtle changes in relative speed that would indicate belt slippage and the probability of a machine jam.

Using this approach, Shelton and LCS developed a prototype machine monitor and tested it at the James River plant. A year of testing and refinement of the design led to development of a second generation LCS-1010 System Monitor, which monitors a variety of variables such as speed, motor current, motor voltage and assorted digital inputs. When the proper combination of variables is not met, the system sends an emergency "Stop" signal to the press and simultaneously triggers an alarm. The LCS-1010 was successfully field tested in 1992 and ordered into production; first production units were delivered at yearend 1993. In the accompanying **photo**, a James River engineer is reviewing a printout of the system's data, an aid to preventive maintenance; in right foreground is the LCS-1010 control box with its monitoring displays.