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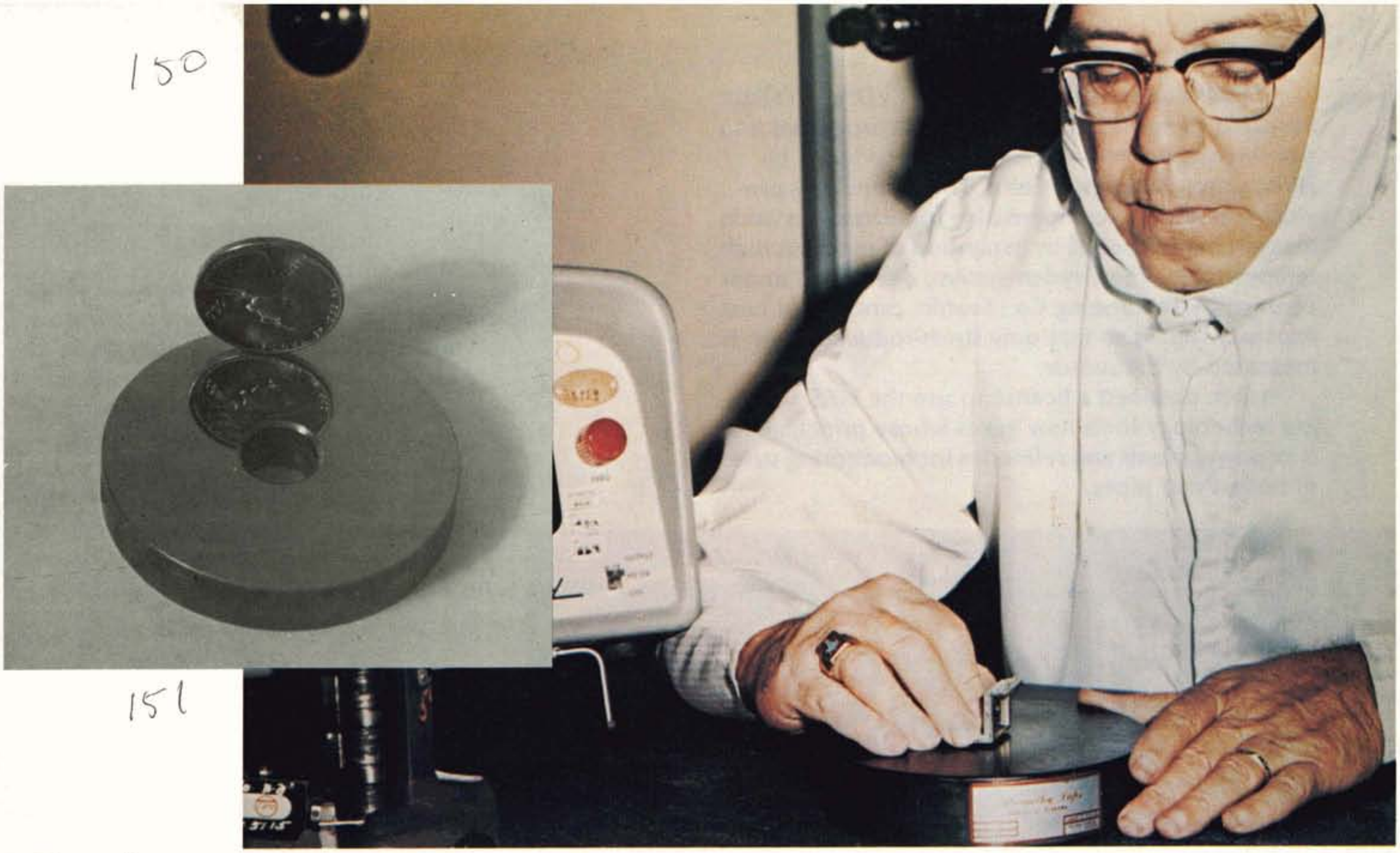


151

A Bell Aerospace Textron technician is "lapping"—fine polishing—a delicate space instrument part to get precise tolerance. The polishing device, first developed for precision grinding needs of the Saturn V moonbooster's guidance system, is the Abernathy lap, which allows extremely accurate finish polishing in a fraction of the time required by earlier methods. In photo at left a penny is balanced on a lapped copper disk.

Abernathy's Lap

You probably have never heard of Abernathy's Lap. It's an interesting story of how small business, as well as big industry, benefits from aerospace spinoff. In this case the business is very small in terms of personnel—one person—but substantial in output.

A lap in this instance is not a midriff but a tool for precision polishing and grinding. During the Saturn V moonbooster program, Marshall Space Flight Center found a need for a better lap. The need arose from the exquisitely precise tolerances required for parts of the launch vehicle's guidance and control system. So William J. Abernathy, a former Marshall employee, built a better lap; he invented a method for charging aluminum lap plates with diamond powder, then hard-anodizing them. The resulting lap produces a high polish on materials ranging from the softest aluminum to the hardest ceramics. It operates faster, wears longer and requires less reworking.

Abernathy got NASA's permission to obtain a personal patent and he formed the one-man Abernathy Laps Co. in Huntsville, which produces a variety of laps. One of Abernathy's customers is Bell Aerospace Textron, Buffalo, which uses the laps to finish polish delicate instrument parts produced for NASA's Viking and other space programs. Says a Bell official: "Time needed (with the Abernathy lap) is a fraction of that required by conventional methods. The result is extremely accurate flatness and surface finish."

Abernathy is providing laps for other manufacturing applications and for preparation of metallurgical specimens. The business is small but steady, and Abernathy plans expansion into other markets.

Other Industrial Aids

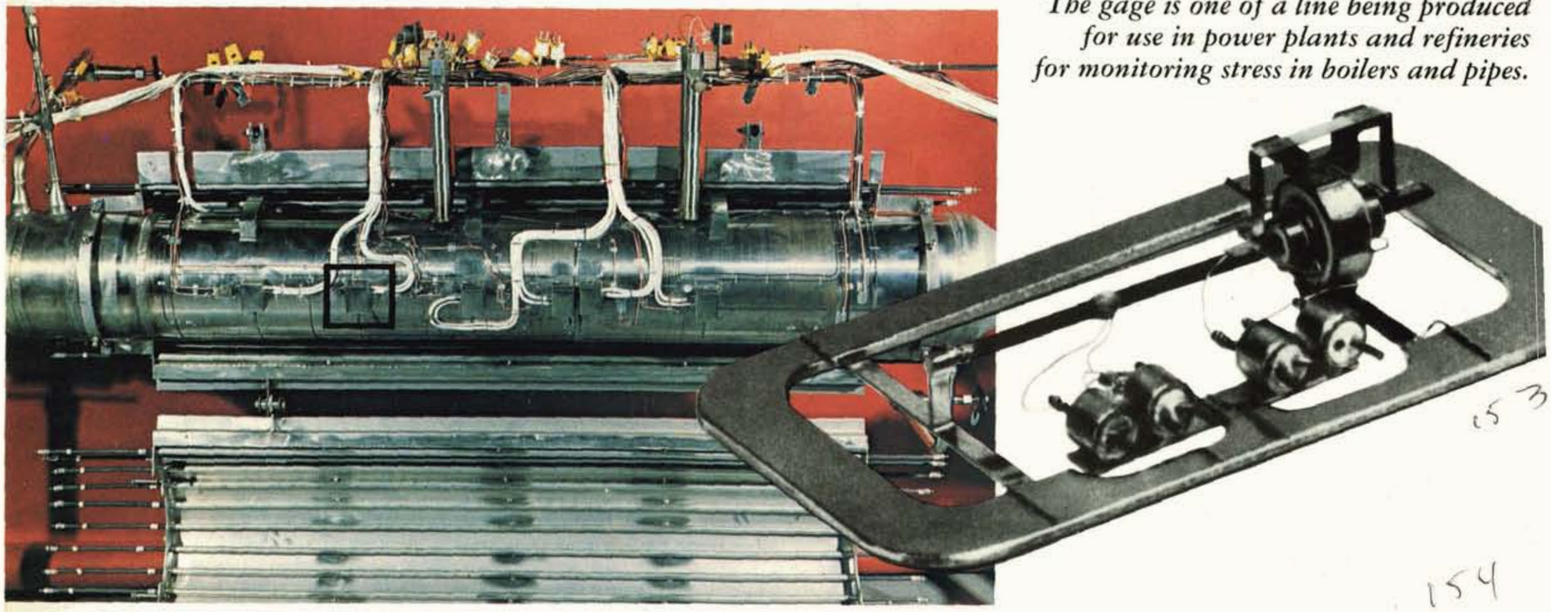
In another industrial spinoff, O. Z. Gedney Co., Terryville, Conn., found the answer to a problem in a NASA Tech Brief describing research in adhesive bonding for the Space Shuttle. Gedney, which makes electrical fittings for industrial plants, was developing a new "fire stop," a device that prevents the spread of fire through holes where cables and pipes penetrate fire barriers in buildings.

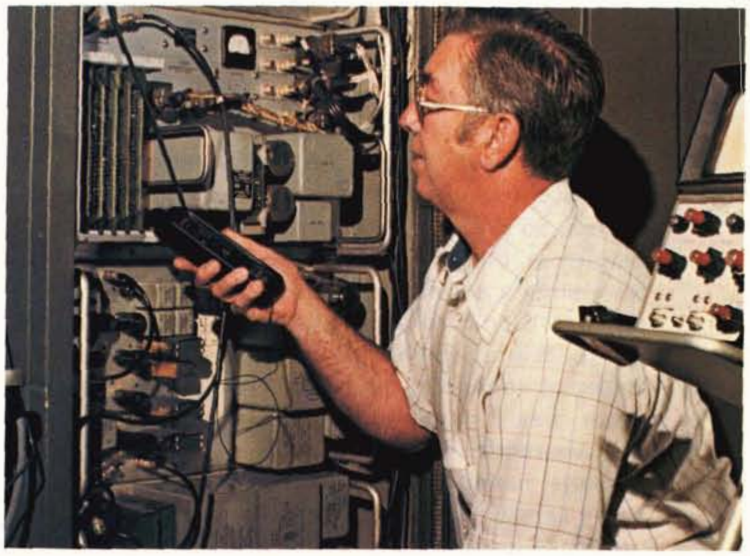
The company wanted to bond a metal disc on the fire stop to a layer of "instumescent" material—material that swells under heat and fills the gap caused by melted cable insulation, thus blocking passage of fire and smoke. At the company's request, NASA supplied a technical information package which identified the best adhesive and the proper bonding technique. The fire-stop fitting is now in production.

Technology developed by NASA's Dryden Flight Research Center in California, was incorporated into new high-temperature strain gages produced by Hitec Corp., Westford, Conn. The technology provides a method of compensating for erroneous strain measurements caused by expansion of metals at high temperatures. The Dryden system, developed under contract by The Boeing Co., Seattle, cancels out heat expansion strain so that only stress-induced strain is measured by the sensor.

Hitec obtained a license to use the NASA/Boeing technology in its new gages whose principal use is in power plants and refineries for monitoring stress in boilers and pipes.

This test specimen in a liquid-sodium facility at Oak Ridge National Laboratory uses special gages to measure strain at 1100° F. Metal expansion at high temperatures can cause erroneous strain measurements, but this gage automatically cancels out heat expansion strain to provide totally accurate readings. The gage is one of a line being produced for use in power plants and refineries for monitoring stress in boilers and pipes.





Multimeters are devices in wide use for routine testing of industrial electronic equipment. Generally, these instruments provide digital readouts of voltage and resistance measurements to insure that the equipment is performing properly. There is also a need for measuring surface temperature of the equipment; many failures can be predicted and avoided by periodically monitoring temperature. Until recently, precise temperature measuring devices were unwieldy and posed operating problems. The instrument pictured represents a unique solution. It is a Model 12T Temperature/Digital Multimeter, produced by Logical Technical Services Corp., N.Y., which combines in a single small instrument the ability to measure temperature as well as voltage and resistance. Key to its development was a NASA Tech Brief describing new diode sensor technology. Use of the diode sensor, tiny in comparison with other temperature sensors, enabled Logical Technical Services to design a compact, hand-held instrument that instantly shows temperature readings in a readout window like the face of a digital watch. The low cost device has many uses, ranging from quick temperature monitoring of hot components in electronic systems to checking temperature of such food processing equipment as grills, ovens and refrigerators.