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SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Slow Motion

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A SCIENCE SERVICE PUBLICATION

What General Electric people are doing . . .

BRAINY PUNCH PRESS

The increasing need for electronic equipment of all kinds in today's economic system has made it necessary to focus more and more attention on the problem of finding manufacturing equipment and techniques for making such electronic equipment automatically. But, while much effort has been applied to the automatic production of such equipment in quantities in the hundreds or thousands, very little has been done to increase the productivity of the job shops which turn out such equipment in small quantities—lots of from 10 to 50. Any improvements in this field would make their greatest contribution in improved automation of the small-quantity production typical of many military products and specialized commercial lines, such as radio and television transmitters and studio equipment, and microwave communication equipment.

Engineers in our Electronics Laboratory at Syracuse have been working on this problem for the Signal Corps, which wants to develop a system of automatic machinery to assemble and test electronic circuit sub-assemblies for various types of military electronic equipment. One of the results of this work is an automatic punchpress with an electronic "brain," which may well be another step toward the automatic factory of the future.

Directions are fed to the new punchpress by an electronic digital computer. The computer "reads" a perforated card for information on size, number, and location of holes to be punched. The press automatically positions the material to be perforated and performs its punching operations within an accuracy of a few thousandths of an inch. The techniques involved could well be applied to other industrial operations such as drilling, riveting, stapling, electrical testing, etc. The sub-assembly being produced can be changed simply by punching new directions on a new program card, with no time lost for retooling or training operators.

X-RAY MICROSCOPE

For many years laboratories both in this country and abroad have tried to develop an X-ray microscope that could be produced in quantity. Our General Engineering Laboratory at Schenectady has now succeeded in developing such a device, capable of wide use in medical science, biology, and industry.

The new instrument, magnifying up to 1500 diameters, is expected to aid in the development of new alloys and in studies of such things as corrosion and welding of metals; to help researchers learn more about tooth decay, diseases of the bones, and other such human ailments as mineral deficiencies and hardening of the arteries; to assist in the study of such things as the covering or bonding quality of paints, adhesives and finishes; and in some cases to provide a speedy substitute for chemical analysis.

In the new microscope the X-ray source is only one 100,000th of an inch. This tiny size is achieved by focusing the electrons through two electrostatic lenses, which are essentially doughnut-shaped metal rings to which voltage is applied. The magnified X-ray image thus obtained can be seen by the eye or photographed for permanent record. While the idea of the electrostatic lenses was not new, our laboratory's contribution lay in finding a practical way to use them. The instrument provides great stability for the longer exposures needed for high-quality pictures, and it is the first to use a built-in camera that provides developed photographs immediately after a subject is exposed. It is not affected by magnetic materials and therefore can be used in the study of steel and alloys.

Our X-ray Department in Milwaukee will take over production of the device, after further refinements in design at Schenectady.

CLEANER ALLOYS

One of the important facets of the modern industrial picture is the significant part which is played by metallic alloys. And the prospects for the future indicate that this part can become even more significant as better alloys are developed.

A stumbling block in the path of this progress has been mechanical impurities which find their way into the alloys during the melting process. The major source of such impurities is the atmosphere, which forms oxides and nitrides with the various alloying elements. The result is a distinct weakening of mechanical properties in fabricated products, and this weakening is accentuated in the case of high-temperature alloys, in which the materials produced are subjected to extremes of stress and temperature.

Our Research Laboratory has been studying these effects and their causes for several years. It found that cleaner alloys could be produced in large-size induction furnaces at high vacuum. As a result, American engineers can now expect to have some of the "impossible" alloys and other metallurgical materials they need to accomplish dream-world feats.

Such vacuum-melted, high-temperature alloys are now being produced by our Carboly Department in Detroit, for use in turbine-wheel buckets of jet engines and other applications. Heading the list is a new alloy capable of withstanding higher temperatures than any wrought alloy now in production. This new alloy has stress-rupture properties superior to those exhibited by conventional wrought turbine bucket alloys such as M-252 and S-816.

Progress Is Our Most Important Product

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