Of Air Bearings and Atom Bombs

While theirs is not an enviable task, the people who build A-bombs are as interested in efficient production as those who build airplanes, autos and household appliances.

Case in point: Engineers at the AEC's Oak Ridge, Tenn. facility have been looking for ways to do rough machining and precision finishing on the same machine.

Some three years ago, a hemisphere-turning machine with two oil-hydrostatic spindles was tried. Not only would the pressurized oil hold the spindles firm for heavy cuts; it would also provide nearly frictionless response for fine work.

Highly touted in the trade press at the time, the machine has since been relegated "to the back room."

More recently, a lathe designed from the ground up for hydrostatics underwent testing. Its carriage and cross-slides as well as it spindle float on oil-hydrostatic bearings.

Shortly, it will be shipped to Franklin Institute's Research Laboratories, Philadelphia, for "remedial action."

The main problem, it seems, is heat generated by oil shear in the bearings at high speeds. This causes spindle growth and swelling of adjacent metal parts.

What's the answer? Air-hydrostatic bearings, say Oak Ridge engineers.

Two years ago, the first air bearing was retrofitted on a boring machine spindle. Since then, four more air-bearing spindles have been put into actual production use—with excellent results.

These bearings differ from the ones now available on some high-speed grinders in that they have porous carbon shoes to distribute the air pressure more evenly. Reportedly, they offer the same feather-light response and vice-like stiffness as oil-hydrostatic bearings, but produce negligible heat.

Oak Ridge is now actively promoting use of a spherical air spindle of its own design. Machine tool builders who are working on the new spindles say that, eventually, they could be constructed at a savings over anti-friction bearing spindles.

And with further development they might—as the atom bomb builders hope—provide general industry with economical machines capable of both roughing and finishing. ■

A Newcomer in High Frequency Welding

On October 5th in Houston, a veteran electrical engineer named W. C. Rudd will deliver a paper (at the AWS National Fall Meeting) describing a new welding process which he has invented. The last time that Mr. Rudd did something like this, he described the now famous Thermatool or high-frequency resistance welding process. The effects of that process are still reverberating throughout the metalworking industry. It's probably the fastest welding process in existence and, according to several experts, its quality is on a par with the best.

The effect of this second process will be very interesting to watch. Mr. Rudd, vice president of AMF Thermatool Corp., New Rochelle, N.Y., has high hopes that the newer process—current penetration welding—has a good chance of surpassing its predecessor in terms of actual usage.

Current penetration welding can be described as a distant cousin to the original Thermatool process. It operates in a wider range of high frequency current, from 10 to 450 kc. The Thermatool process normally runs at 450 kc. But, like the Thermatool method, it also employs a pair of contact electrodes to deliver the energy to the workpiece. It differs, however, in that the current penetration process is designed to dig deeper and make seam welds in two or more layers of metal. And, this it will do at speeds of 25 to 150 fpm. A possible future application might be the joining of halves of gas tanks for automobiles.

According to Mr. Rudd, conventional low-frequency resistance seam welding is slow by comparison, and the seams are actually overlapping spot welds. The current penetration method, on the other hand, produces a narrow weld (continuous or interrupted) and it can be applied to curved shapes. ■

IC for N/C: Shape of the Battle

The battle for the N/C control systems market is building at a rapid pace. And the integrated