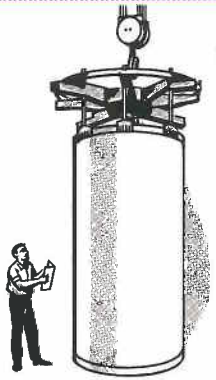
HEAT TREATING MISSILES

STEP BY STEP TECHNIQUES

reflect the thorough scientific Rex approach to the heat-treating process

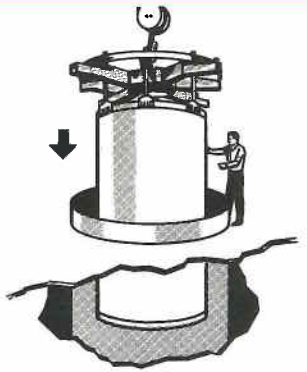
1

RECEIVING INSPECTION. Components—such as the missile engine case illustrated—are carefully checked and inspected when received. Defects or damage sustained in transit are reported to the customer before processing.



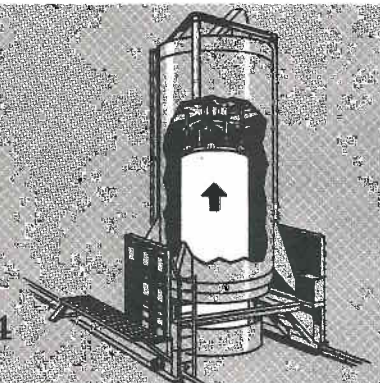
2

FIXTURING. Accurate fixturing is a prerequisite to proper heat treating. At Rex, large components are individually fixtured, not only to hold and transport them throughout the process, but also to assure adherence to dimensional specifications.



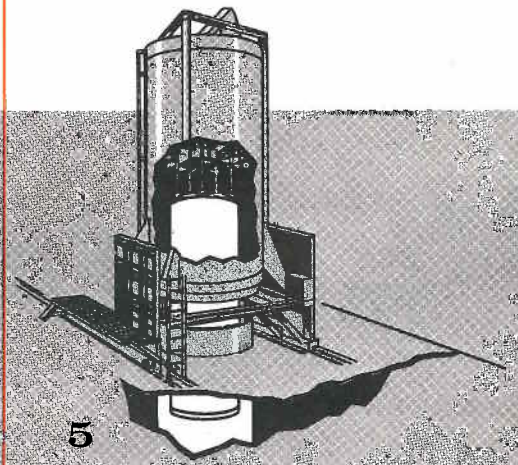
3

PREHEATING. This missile case is now ready to go "down-the-line." First step is to preheat the body uniformly in a temper furnace. Frequently, where alloy steels such as 4340, 4130 and D6ac steel are used, preliminary stress relief is provided.



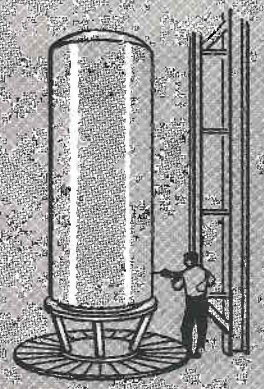
4

HEAT TREATING. Now ready for heat treating, the case is lifted into the bottom-opening gantry furnace for controlled atmosphere high-temperature heat treatment.



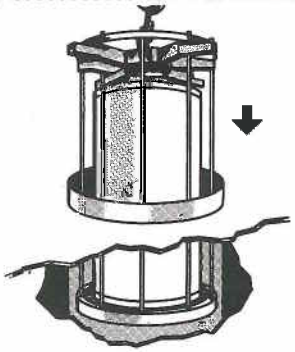
5

QUENCHING. After treating for a precise time period, the case is lowered from the gantry furnace directly into a huge marquench salt tank. The case remains here until the temperature of the part is stabilized.



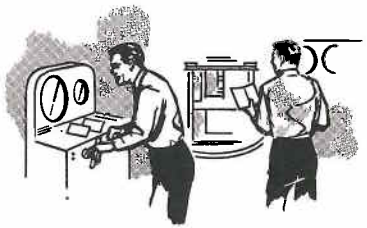
6

IN-PROCESS INSPECTION. Since total permissible variations are usually thousandths of an inch, frequent dimensional and in-process quality checks are necessary. One such inspection follows removal from the quench tank.



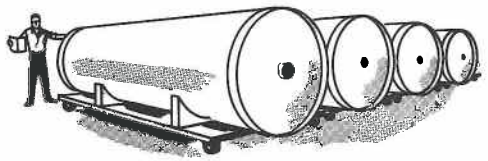
7

TEMPERING. The case is then refixtured and lowered into a tempering furnace where it is heated to and maintained at the required temperature to produce the desired mechanical properties.



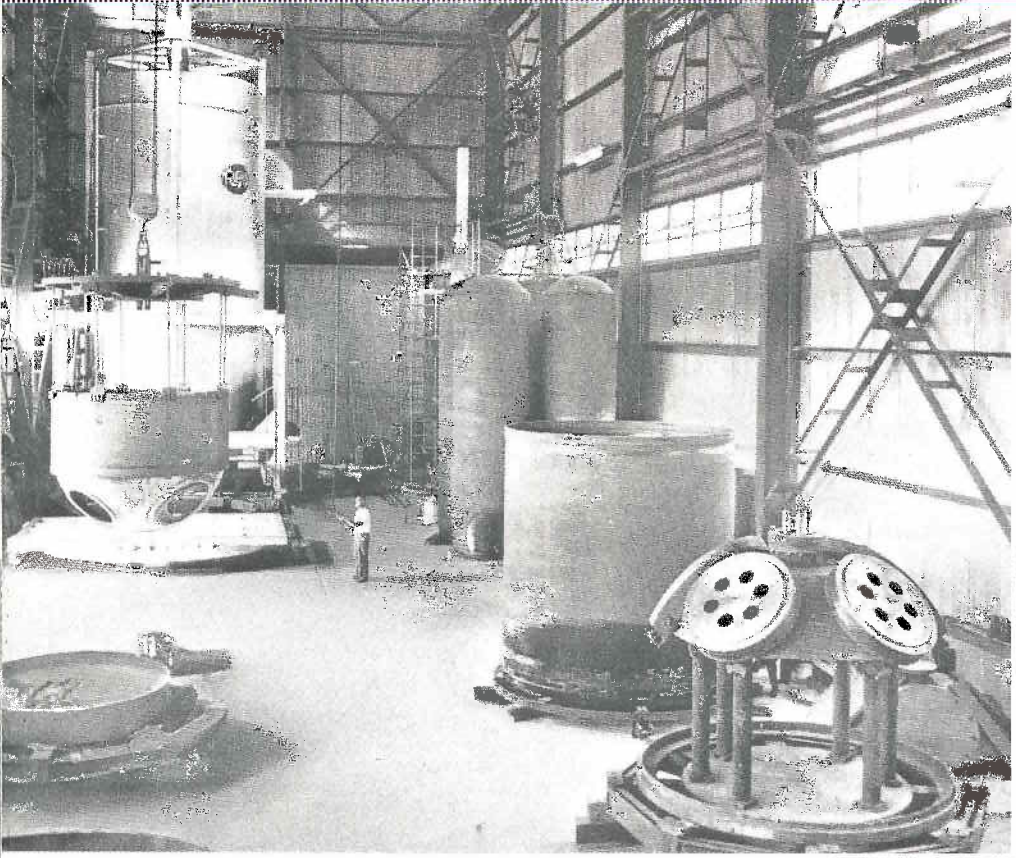
8

TESTING. Several metal specimens, which have accompanied the case throughout the entire process, are tested at each stage to control the process. Detailed laboratory and metallurgical reports are prepared to record tensile strength, yield, hardness, ductility and decarburization data.

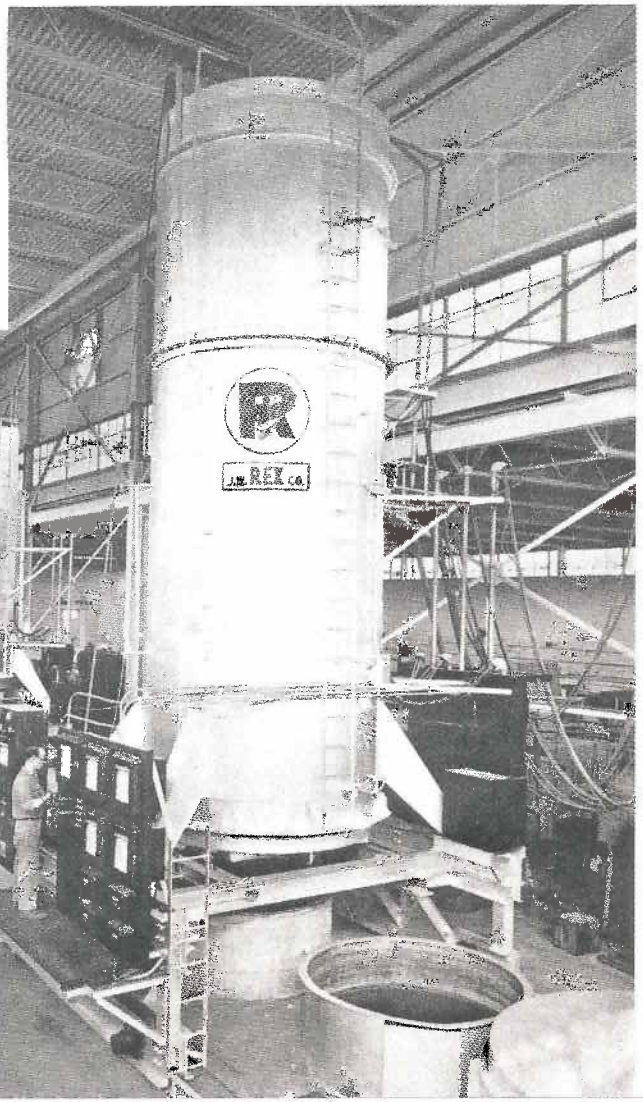


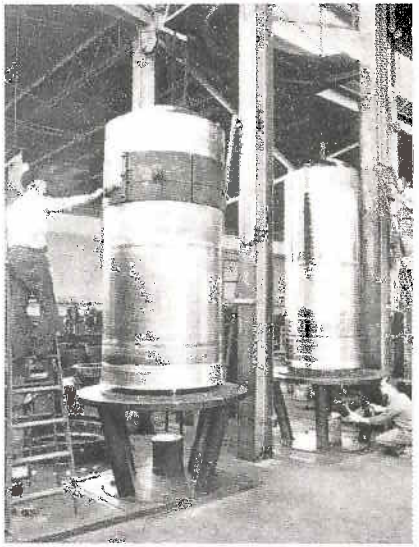
9

FINAL INSPECTION AND SHIPPING. After removal from the tempering furnace, the case is allowed to cool to room temperature. A thorough inspection follows. This inspection is the customer's assurance that every component heat treated by Rex meets dimensional and property specifications at the time of shipment.



← The 32-foot high, 13½-foot diameter (inside dimensions) vertical gantry hardening furnace, left rear, is the largest facility of its type in the United States. Furnace attains temperatures up to 1950°F, by applying 1000 kilowatt power to the Nichrome elements in the furnace wall. Protective endothermic atmosphere is supplied to the furnace by a 6000 cubic foot per hour generator. A separate power system positions the bottom-opening furnace over a 45-foot deep tempering furnace or marquench salt tank. The gantry installation is serviced by a 20-ton overhead crane. Installation was designed, engineered and built by Rex engineers. Its principal use is in heat treating missile cases.

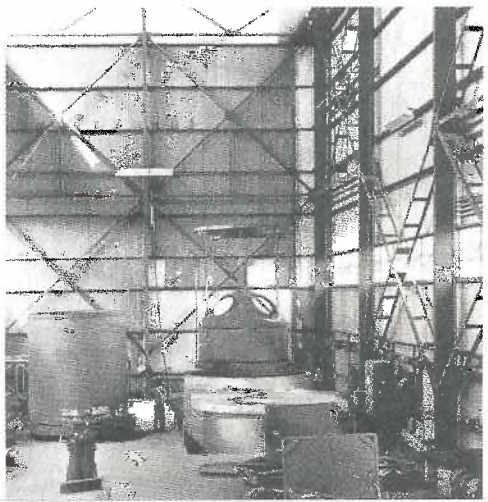




Workmen use rotating tables to ↑ inspect and prepare second-stage MINUTEMAN missile cases for heat treatment. Case on the right has been inspected for dimensional accuracy and fixtures have been expanded into place to assure roundness and straightness. Metal band is being removed from case on left prior to inspection.

These two bottom-opening gantry furnaces can be fired to a maximum temperature of 1950°F. Furnace in the foreground is 24-feet high, 75-inches in diameter inside; furnace in the background is 15-feet high, 60-inches in diameter inside. ←

In this new section of the Rex plant, a component is being lowered into a pit furnace 12-feet in diameter by 22-feet deep. A huge water quench tank 12-feet in diameter by 24-feet deep is embedded in the floor immediately in front of the pit furnace. ↓



Miniature Bearings to Missiles

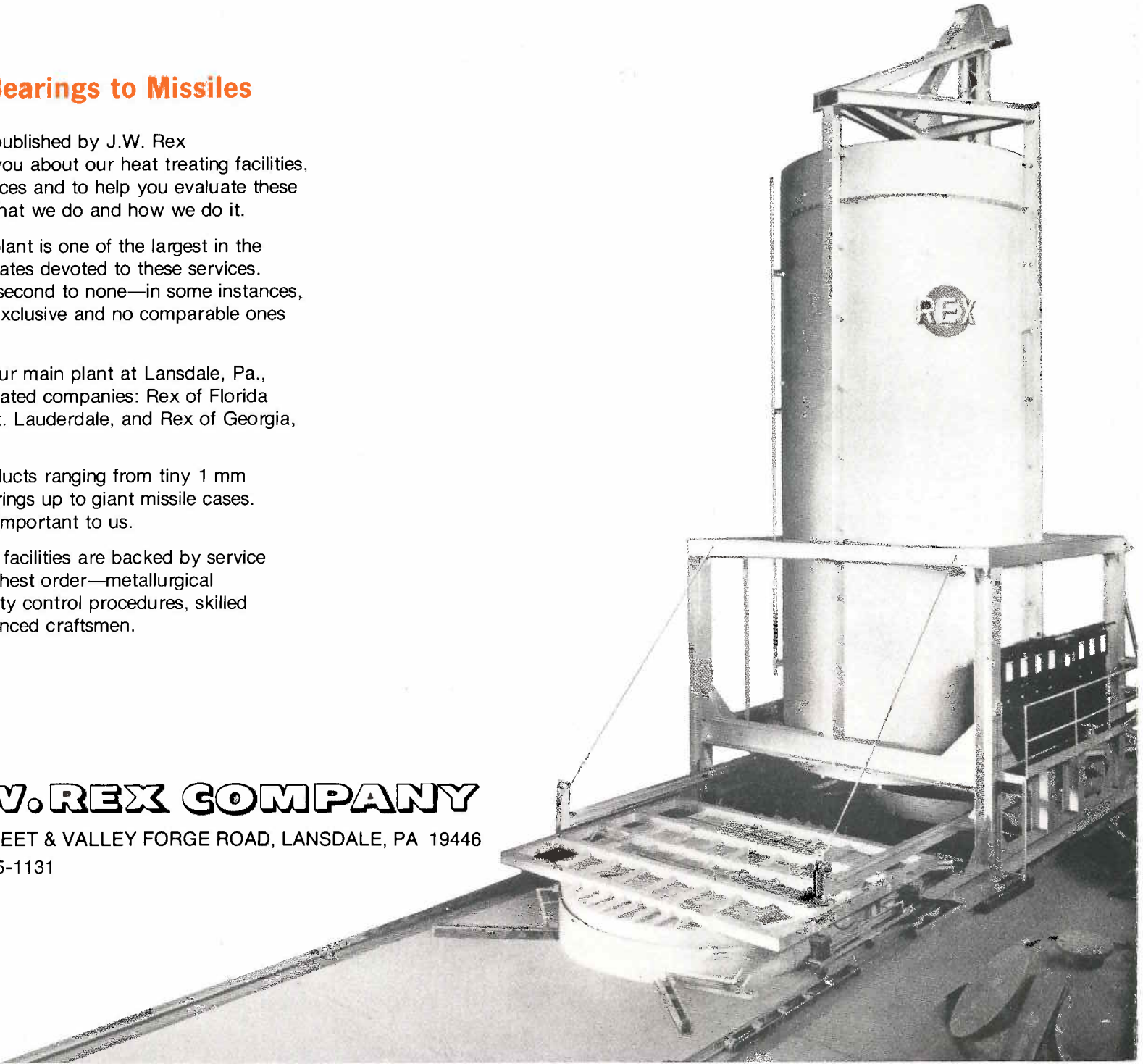
This brochure is published by J.W. Rex Company to tell you about our heat treating facilities, abilities, and services and to help you evaluate these by defining just what we do and how we do it.

Our Lansdale plant is one of the largest in the eastern United States devoted to these services. Our facilities are second to none—in some instances, our services are exclusive and no comparable ones exist elsewhere.

In addition to our main plant at Lansdale, Pa., we also have affiliated companies: Rex of Florida in Orlando and Ft. Lauderdale, and Rex of Georgia, at Atlanta.

We handle products ranging from tiny 1 mm diameter ball bearings up to giant missile cases. Both are equally important to us.

Our production facilities are backed by service facilities of the highest order—metallurgical laboratories, quality control procedures, skilled engineers, experienced craftsmen.



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