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RESEARCH DEPARTMENT

FOURTH QUARTER PROGRESS REPORT - 1980

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RESEARCH AND DEVELOPMENT

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HIGHLIGHTS

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• Testing of new unibody shotshell process 12 gauge field and target loads was completed with several problem areas identified.	1
• Extensive testing indicates a polymer change alone cannot practically guarantee a significant improvement in body quality. Other process and product changes are being investigated to supplement the polymer program.	1
• Process and product problems continue to be encountered with the 8 gauge conversion to plastic basewads.	2
• A new process to manufacture center fire ammunition cases and bullet jackets is under development.	2
• The improved target load primer has shown sensitivity equal or superior to competition under all test conditions.	3
• Four coils of copper plated steel and two coils of bare steel have been run through the Lachaussee anvil battery cup press to produce 1.5 million parts. Product tests were conducted to confirm the basic product design concept.	3
• Test results with TLX in rim fire primers continue to show encouraging results.	3

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AMMUNITION

New Unibody Shotshell Process

The improved one-piece plastic shotshell body process being developed will be capable of producing the complete range of shotshell specifications and is expected to result in an annual cost reduction of about one million dollars.

Testing of the 12 gauge product in high base, low base and target cap configurations was completed. Areas which will require product or process modification include cracked basewads which were traced to faulty heading pins, primer backouts which are correctable through a reduction in primer bore diameter, and cap deformation under high pressure conditions which will be eliminated by reducing the gap between the metal cap and plastic base of the body. The .410 bore bodies loaded in both body lengths, are currently being tested. The evaluation program is nearly three-quarters completed, with the experimental bodies being equal to or superior to the control in all respects tested to date.

Development of the full-scale prototype production equipment system, capable of producing shotshell bodies at a rate of 960 parts per minute, continues. Fabrication of the body forming machine is in progress at the vendors, and is scheduled for delivery in February, 1981. The heat set modules are on order with delivery expected in April, 1981, for the first module and May, 1981, for the remaining three modules. The control system is complete and hardware has been delivered. Start-up of the equipment at Bridgeport is scheduled for third quarter, 1981.

Polymer Improvement

After evaluating several dozen polymers, it was concluded that a trade-off will be required between processability and product quality. Polymers which significantly improve product quality do not process well and polymers which process most readily do not provide the desired product quality. Therefore, product and process modifications are being evaluated to supplement any proposed polymer change. Possible product changes include a thicker wall for added strength and modified skive for a controlled failure mode. Process changes under evaluation include a higher work ratio for increased longitudinal tensile

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Polymer Improvement (Cont'd.)

strength, and a lower transverse work ratio to induce body splits as a controlled failure mode. A final recommendation will be made by mid-January.

Asbestos Basewad Elimination

The objective of this program is to eliminate the dry molded asbestos basewad from Remington's shotshell products by conversion to high density polyethylene.

At the Bridgeport Plant, all gauges with the exception of 8 and 10 have been converted and are in production. Development of the 8 gauge plastic basewad is underway, but both process and product difficulties are being encountered. Tooling modifications at the extruder corrected unacceptable wall thickness variation, however, changes to the tube puller and slug cutter were not successful in improving slug length stability and skewness. It now appears that this problem cannot be corrected without significant engineering effort on slug cut-off techniques. Results of 8 gauge plastic basewad product tests showed a high incidence of gas leakage between the body and cap, and basewad movement. Heading pin modifications eliminated the leaks, but basewad movement continued due to poor basewad-to-cap retainment. This deficiency can be attributed to the double cap which takes up all available free volume in the rim and thus, prevents basewad swaging into this section during the heading operation. As a result, acceptable product performance for current design 8 gauge product with a plastic basewad does not appear achievable. Therefore, two product design changes will be investigated to resolve the problem. These are to add primer bore prongs to the inner cap, and substitution of a single piece cap with increased metal thickness to provide additional free volume in the rim. Both options are currently being investigated.

Center Fire Ammunition - Progressive Shell Draw Development

Development of an improved process for manufacturing center fire ammunition cases and bullet jackets is in progress at the EDL location. The process is based on progressive drawing of components without the customary interdraw anneals. This development is expected to greatly simplify manufacturing operations.

The press to be used with this process was delivered to Wilmington in November. The die set and tooling are in the design stage. The plan is to have all hardware ready for initial testing during the second quarter, 1981.

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117X Primer

The objective of this effort is to develop a target load primer with sensitivity equal or superior to that of competition.

The objective has been achieved through a series of design changes including a soft (.035-.070 grain size), straight wall primer cup with .019" metal thickness; a .005" increase in the minor width of the anvil; a paper covered flash hole; and use of 1024 (8% nitrocellulose) priming mix.

To confirm both laboratory and limited field test results, the Lonoke and Bridgeport plants are manufacturing approximately 500,000 rounds each of 12 and 20 gauge target loads using the improved 117X primer. The field test on the 12 gauge will be conducted in mid-January. Pending positive test results, conversion to the 117X primer on a production basis can begin immediately for both 12 and 20 gauge target loads. Across-the-board conversion of field loads can proceed concurrently with the required load development work.

Integral Anvil Battery Cup.

The objective of this program is to develop an integral anvil battery cup to reduce primer manufacturing costs, improve consistency of primer quality and provide greater opportunity for process automation.

Four coils of copper plated steel and two coils of bare steel have been run through the press to produce 1.5 million parts. Three small anvil support punches were broken, one on the last coil of copper plated steel and two with the bare steel which is harder. Otherwise, the die performed well. Documentation, consisting of process records, material, and lubricant specifications, spare parts descriptions, drawing lists, and operating instructions, has been forwarded to PE&C and Production for review.

Loaded product development work is continuing with emphasis on sensitivity. Thirty-three thousand 12 gauge shells containing primers with integral anvil battery cups were loaded and used in a test conducted with guns fired from the shoulder. Misfire performance of the integral anvil primer exceeded standard Remington product, Remington Grand American product, Winchester plastic and Federal Champion paper shells.

TLX Priming Mixture

The purpose of this program is to improve primer manufacturing safety by developing a priming mixture which is significantly less sensitive to detonation during manufacture.

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TLX Priming Mixture (Cont'd.)

A successful plant run of 200,000 primed 22 caliber shells was made with the candidate rim fire mixture. The product was found to be equivalent to control samples for accuracy, ballistics, sensitivity, and compatability with the automatic inspection system. Approximately 35,000 rounds containing this mixture were tested in pistols and rifles without a misfire or gun malfunction. Additional quantities of product are being sent to Ilion for gallery evaluation.

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