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RESEARCH DEPARTMENT

PROGRESS REPORT

MARCH, 1980

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HIGHLIGHTS

AMMUNITION

New "RXP" Shotshell Body

Laboratory testing of 3"-.410 bodies made on the Semi-works body former continues. The rotary heatset unit is being debugged, and the production prototype equipment design is on schedule.

3" 12 Gauge "RXP" Shell

Approximately 30K standard Peters target load slugs were successfully processed into 3" integral basewad bodies on the production body forming press.

Premier Bullet

Testing of the 30 caliber open nose Premier bullet was completed with excellent ballistics and mush results, but only marginal accuracy. Application of the plating process for "POWER LOCKT" bullets, as a possible solution to the accuracy problem, is being considered.

Integral Anvil Battery Cup

Fabrication and assembly of the Lachaussee press and die set remains on schedule. Product development continues with emphasis on improved sensitivity, priming mixture pellet weight and flash hole covering techniques.

Centerfire Modernization Program

A research project has been approved to fund development of a progressive forming process and equipment to manufacture centerfire ammunition cases without the customary inter-draw anneals.

FIREARMS

Model 870 Competition Trap Gun

The problem of premature receiver failure has been solved. Potential solutions to broken locking blocks are in test. Rib separation remains a problem.

Model 7400 and Model 7600

Preliminary test results from machine trials are encouraging.

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Highlights - (Cont'd.)

Model XSG Shotgun

Endurance tests show action spring and slide block braze joints are still a problem. Alternative design approaches are discussed.

Model 700 Bolt Lock

A new bolt lock design allows independent operation of bolt lock and the safety.

Rivetless Extractors

Basic data for new rivetless, centerfire extractors in regular and magnum sizes have been transmitted to production.

AMMUNITION/FIREARMS

21mm Seismic System

Ammunition production schedules were met with improvements in productivity and quality. Work continues to develop a reliable gun design.

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RESEARCH AND DEVELOPMENT

AMMUNITION

New "RXP" Shotshell Body

The objective of this project is to develop a one-piece plastic shotshell body process capable of producing all seven gauges with a cost reduction objective of \$1,000,000 per year.

The experimental body former/heatset system in the Semi-works is being updated mechanically and electrically to more closely simulate projected production conditions. The body former was designed to operate at 80 ppm goal speed; however, the heatset module is limited to 75 ppm due to product transfer problems. The programmable controller, interfacing both machines, was installed and operates well. Work will continue as necessary to insure that the system meets project requirements.

In preparation for more extensive evaluation of the Semi-works body former/heatset process and product, a run of 150,000 .410 slugs was made on the extruder. Slug wall variation ran .001" average with .0015" maximum. A preliminary sample of bodies made from these slugs was statically heatset in a block and showed an average body bend of .004" versus the .012" specification for current body construction. By comparison, six random lot samples of Winchester product showed an average bend of .006. Bodies processed through the Semi-works heatset unit were not as straight for body bend (.014") as those heatset in the block. A designed experiment is currently being conducted to determine which differences between the two approaches are causing the problem.

Design of the production prototype equipment is progressing on schedule for first quarter 1981 installation and initial startup. All design work is complete on the body former and final quotations have been received from vendors. Fabrication orders will be placed the first and second weeks of April. Based on laboratory experience, some improvements are needed in the heatset unit and are being incorporated in the design. It is planned that orders will be placed for this unit in late May. Design work is essentially complete on the control system, and orders will be placed in early May.

3" 12 Gauge "RXP" Shotshell

The development of a 3" field version of the integral basewad shell is underway with the objective of eliminating the asbestos basewad from our 12 gauge magnum products.

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3" 12 Gauge "RXP" Shotshell (Cont'd.)

In early March, it was demonstrated that with minor tool and press adjustments, standard 2-3/4" slugs could be successfully processed into 3" bodies (previous effort had required special slugs). Using two rows of tooling, a limited press run produced 2,000 2-3/4" shells from one row and a like number of 3" shells from the other row, using standard production slugs. More recently an extended press run was made in which more than 30,000 3" bodies were processed without incident, using standard production slugs.

Because of delays in accessing the plant heading equipment, tooling for the Research Semi-works conventional heading machine is being reworked for compatibility with the 3" bodies. A portion of the product will be headed on this machine for initial product tests. The remainder will be processed on plant equipment at a later date. Completion of this work, including product testing, is expected by April 15.

Premier Bullet

A new line of center fire bullets is being developed to advance Remington bullet technology. The objective is to improve accuracy and downrange ballistic performance.

The ballistic testing of the open nose 162 grain 30 caliber conical forebody boattail bullet is complete. Results indicate that the new design is clearly superior to comparable Sierra boattail bullets with respect to downrange ballistics. Mush performance also is acceptable, but accuracy did not meet performance goals, with results showing approximately twice the group size as the Sierra product. Two possible sources of inaccuracy are abnormal jacket wall thickness variations and bullet nose deformation during initial acceleration in the barrel.

In an effort to minimize wall thickness variation, the feasibility of incorporating the plating process for "POWER LOKT" bullets to jacket the premier bullet is being investigated. The "POWER LOKT" bullet plating process is expected to give higher strength to the bullet nose, and by taking advantage of an electrical current density plating phenomenon some core locking characteristics may be provided.

Preliminary evaluation of the "POWER LOKT" bullet plating process for application to the conical forebody boattail bullet is expected to be completed by mid-June.

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Integral Anvil Battery Cup

The objective of this program is to develop an integral anvil battery cup to reduce manufacturing costs, improve consistency of primer quality and provide greater opportunity for process automation. Fabrication of the press and die set remain on schedule at Lachaussee with delivery expected in August. Preparation for installation of this equipment, at Lonoke, is underway. Press and die lubricant specifications have been received from Lachaussee along with a press maintenance manual for familiarization of personnel with the system.

Sample integral anvil battery cups supplied by Lachaussee were made into primers using 1024 nitrocellulose priming mixture. These primers were processed through assemble, head, prime and loading to produce three thousand 12 gauge rounds. Five hundred shells were shipped to Bridgeport along with a control sample for off-center sensitivity testing. During function and casualty testing of these shells at -20°F, a wad lodged in the barrel. The test was repeated with identical results. A series of experiments has been designed to determine if increased priming mixture pellet weight will resolve the problem. Previously tested 12 gauge target shells had .82 grains of mixture, with the more recent shells having .86 grains of mixture. Production is scheduled to make primers with .92 grains of 1024 mixture in early April.

Efforts to cover the triple flash holes are focused on use of paper. A die set for performing this operation is being designed based on successful experiments conducted with hand tools. Sample primers with paper discs were inserted into shotshells loaded with a fine grain Olin powder and vibrated for 40 minutes. The foil did not come loose and no powder leaked through.

Center Fire Modernization

A plan is being formulated to modernize center fire ammunition manufacturing facilities. The emerging plan is, in part, based on yet undeveloped new process and equipment which must provide improved product quality, better appearance, and lower manufacturing costs.

One area where development opportunities exist is in case manufacturing. Presently, cases are drawn in several steps, each step requiring a different machine; annealing of the components is necessary between draws. This requires a great deal of parts handling and refeeding, resulting in frequent product mixing, feed jams, and product damage.

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Center Fire Modernization (Cont'd.)

A program to develop progressive case drawing, whereby finished drawn and trimmed cases would be made from cups in one machine equipped with special tooling, was proposed and a project approved. This development, not presently used for commercial ammunition manufacturing, appears to be practical and would provide improvements in operating labor, tooling, scrap, in-process inventories, energy utilization, and product appearance and quality.

FIREARMS

Model 870 Competition Trap Shotgun

The Competition Trap Shotgun is a special, single shot version of the Model 870 with a gas operated recoil reduction system added. It was previewed at the Grand American Handicap Trap Shoot last August and announced in December of 1979.

Production of the model has been delayed pending completion of design modification testing.

The tests on the fore end tube have been completed, confirming a satisfactory design. The design has been transmitted to the Plant.

Effects of a tight or loose magazine cap have been evaluated. Two guns have been tested making sure the caps were tight. The results of this test show that the receivers will have a satisfactory endurance life if the magazine caps are kept tight. However, one locking block failed in a safe manner at 17,700 rounds due to fatigue failure at a sharp radius cut, and ventilated rib posts are still separating from the Barrel.

In an effort to counter crack initiation in the locking block, two blocks have been polished with shot peening and Harperized surfaces. Two guns with these blocks are in test. The guns also have magazine caps and barrel retaining sleeves to model drawing to assure tightness of fit, and have been shot 12,000 and 14,000 rounds with no failures of fore end tubes. However, vent rib posts on both barrels are loosening. Testing of these guns will continue to 25,000 rounds to test endurance of the locking block.

Three more guns have been fired 2,000 rounds. Two have shot peened and Harperized locking blocks, and one has a Model 1100 locking block. They will be tested to a minimum of 25,000 rounds.

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Model 870 Competition Trap Shotgun (Cont'd.)

New barrels are being processed with heavier walls in an attempt to solve the rib separation problem and are scheduled for testing after April 1.

Model 7400 Autoloading and Model 7600 Slide Action Centerfire Rifles

These rifles have been developed as replacements for the current Model 742 and Model 760 and are scheduled for announcement in December 1980.

Forty rifles of each caliber, 30-06, 270, 7mm Exp.Rem. and 6mm, were selected from Production samples for design verification measurements, field function cycles, and endurance tests. Test results to date indicate no serious problems.

The location of Model 4 and Model 6 roll mark designations has been approved. Production has three different renderings of the Model 4 roll marking on a single roll. Samples will be rolled the week of March 24.

The grip cap spacer 16 cavity mold has been reviewed and satisfactory samples have been molded. An optional pewter grip cap design by Sid Bell has been completed and approval has been given by Marketing for this final version.

Model XSG Shotgun

New autoloading and slide action shotguns are being developed for introduction in the 1984 Model Year. The objective of the program is to replace the Model 1100 autoloading shotgun and the Model 870 slide action shotguns with improved versions which will be lighter in weight. The guns are being designed simultaneously to take advantage of common parts for reduced manufacturing costs.

A prototype autoloader is in test and has been fired over 6000 rounds using 2-3/4" Magnum loads. Braze joint failure of the action bar-slide block assembly is the most prevalent problem. Mechanical joint designs utilizing welding and swaging processes are being fabricated to improve the joint's strength.

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Model XSG Shotgun (Cont'd.)

The existing spring design has set 2.28 inches. This is unsatisfactory. Testing is continuing on this gun with a new spring of the same design.

A redesign of the action bar assembly was necessary to utilize a Model 1100 type gas system. This provides more room for the design of a lower stressed action spring. The design of a square wire action spring to reduce spring stress loads and setting is complete, with prototype parts currently on order from Connecticut Spring.

Two different locking systems with better mass distribution are being detailed.

A gas cut-off system has been designed to fit into an XSG or Model 1100 gas system. Component parts are being made for tests to verify function and reduced bolt velocities for Magnum loads.

Model 700 Bolt Lock

The objective of this development is to give the shooter the ability to open and unload his firearm without placing the safety in the Off position. In order to do this, the operation of the bolt lock and the safety have been designed to operate independently of each other.

Revisions to improve appearance have been made to several of the prototypes. Assembly of the modified system will be completed the week of March 24. Samples will be available for review by mid-April.

Rivetless Extractors

These new centerfire extractors in small, regular and magnum sizes will replace the troublesome riveted types. Part cost will be reduced, a number of bolt head operations eliminated, and gun reliability and ease of replacement will be improved.

Basic data for regular and magnum sizes have been transmitted to Production. Testing has now been completed on the small size with satisfactory results. Drawings are being prepared for transmittal.

Five thousand bolt heads originally intended for Model 700 7mm Mauser will now be used for Model 700 7mm-08 caliber and Model XP-100 7mm BR caliber.

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AMMUNITION/FIREARMS

21mm Seismic System

A 21mm (8 gauge) cartridge and gun system is being developed for MAPCO which is to be used for seismic exploration of oil and gas. An electric primer is being developed at Bridgeport and the firing system is being developed by Ilion.

The ammunition production schedule (25,000 rounds) for March was met with all product shipped to Ilion for gun testing. In the course of this work, occasional misfires were experienced due both to gun malfunction and primer defects. The primer problem was traced to mixing of defective and good work in the manufacturing operation. Appropriate measures have been taken to ensure this does not happen in the future. Productivity for the month was improved by forming insulators in a pneumatic press. Improvements were also made, and are continuing to be made, to the primer cup and support cup operations to increase the reliability of the operations and improve part quality.

In gun development, fifteen guns have been through an interchangeability test and preliminary results indicate that breech blocks can be made completely interchangeable. Presently the gun is being redesigned to eliminate the malfunctions encountered in the interchangeability test. In light of this, the shooting test program has been suspended until the redesign is complete. Mechanical dry cycle testing will continue to determine the endurance of the present design with completion expected by April 15, 1980.

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STATUS - PRODUCT DEVELOPMENT

AMMUNITION

7mm-08 140 Gr. PSP Bullet

A Remington designed 7mm 140 grain bullet is being developed to replace the Hornady bullet currently being used in production with the objective of offering improved down range ballistics performance through a secant ogive profile.

Two jacket samples for this bullet have been made; one consists of a straight wall .030 inches thick and the second has a .030 inch wall thickness in the bearing, but is tapered to .020 inches thick along the ogive. Both samples process satisfactorily through first forming. Second forming through finishing will be tested upon receipt of the tools, scheduled for early April.

Development efforts on tangent ogive 140 and 160 grain PSP bullets have been discontinued because of inadequate down range ballistics. The final samples were tested for accuracy and both shot 0.9 inches extreme spread at 100 yards when loaded for 7mm-08.

308 Win. 55 Gr. PSP "ACCELERATOR"

The production run for 1980 introduction of this cartridge was completed. Velocity and accuracy were well within specification.

357 Super Magnum 158 Gr. SJHP

Development of this cartridge is based on a cooperative effort with Ruger. Initial test results have been completed and further efforts will be defined following a meeting between Ruger and Remington Research and Marketing personnel.

FIREARMS

Bolt Action Carbine

The carbine is a short barreled, bolt action, centerfire rifle that is under development as a replacement for the discontinued Model 600.

Five barreled actions in each of four calibers have been assembled and shot for accuracy. Results were satisfactory. Additional function testing will be conducted. The redesigned latch

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Bolt Action Carbine (Cont'd.)

system on the floor plate performed satisfactorily during firing. However, because it does not operate the same as conventional systems and costs are questionable, we are developing a simpler design. A prototype is being made.

Work is progressing on schedule for 25 models in 7mm-08 caliber for a Marketing field test.

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STATUS - PROCESS DEVELOPMENT

AMMUNITION

Primer Improvement

A number of product and process design changes were developed to address performance deficiencies with current shotshell primers. These changes will be phased into production at Bridgeport and Lonokey during 1980.

During March the Bridgeport Plant assembled 750,000 new design anvils to battery cups using the new anvil transfer plates and the new anvil seating punches. Quality with the new tools continues to be excellent and production rates are improving.

In March, 100,000 covered flash hole battery cups were produced to support immediate requirements. ERD completed. fabrication of new punches and a redesigned die set. This change is expected to improve quality with regard to missing and misplaced foils.

A single set of tools for a proposed in-line system of making covered flash hole primers in the 735 hole plates has been completed and will be tested in the plant to determine the feasibility of the system.

Plastic Basewad

As part of the asbestos elimination program, design of 8, 16 and 20 ga. plastic basewad shells is underway.

In February, approximately 25,000 16 ga. plastic basewad shells were produced using special profile heading pins on the assembly equipment. Approximately 2,000 of the experimental shells were loaded and are presently undergoing product testing. This work will be completed by mid-April.

The 8 and 20 gauge heading tools have been designed, and tools to extrude and cut off the required slugs are being prepared. A firm date for heading the 8 gauge industrial and the 20 gauge shells is now being determined based on research extruder and production schedules.

FIREARMS

Integral Ejectors

Currently the ejectors in the Model 1100 12 gauge and 20 gauge shotguns are spot welded to the barrel extension and

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Integral Ejectors (Cont'd.)

machined to size. A process has been developed to form the ejector as an integral part of the barrel extension. Savings of over \$60,000 per year can be realized by this procedure.

Three operations will be eliminated as well as the ejector pin and result in a more durable ejection system. Tooling to coin ejection surfaces into 12 gauge, 16 gauge and std. 20 gauge barrels has been developed and transmitted to Production.

Marketing requested that the "bulge" in the area of the LT-20 ejector be reduced. Tooling modifications have been made to support the outside of the barrel in the area of the ejector. This produced satisfactory results. Four prototype barrels have been sent to the Test Lab.

12 gauge pilot run production barrels should be available for confirmation testing in April.

JRA:mf
Attach.

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GENERAL

Personnel

	<u>3/31/80</u>	<u>2/29/80</u>	<u>3/31/79</u>
Exempt	56	56	73
Nonexempt	22	23	29
Wage	<u>20</u>	<u>20</u>	<u>39</u>
Total	98	99	141

Agreements

None

Reports

None

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P A T E N T S

Summary of Activity

MARCH 1980

Applications Filed

EXTRACTOR ARRANGEMENT FOR FIREARMS
(Rowlands)

D-228 CIP

ABSTRACT: A cartridge extractor, developed for Models 7400 and 7600, is assembled in a shrouded bolt face simply by snapping it in place. No rivet is required, which will greatly facilitate replacement in the field.

AUSTRIA
AUSTRALIA
BELGIUM
CANADA
FINLAND
FRANCE
GERMANY
ITALY
NORWAY
SPAIN
SWEDEN
SWITZERLAND
UNITED KINGDOM

Patents Received

TLX PRIMING
(Kenney)

D-161 CIP

ITALY

Patent Issued 7-17-1975; Patent Rec'd. 3-27-1980

ADJUSTABLE MEANS TO VARY POINT OF IMPACT OF
OVER-AND-UNDER FIREARMS
(Bullis)

D-162

ITALY

Patent Issued 7-7-1975; Patent Rec'd. 3-27-1980

Inventions Reports

N O N E

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