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Report

REMINGTON ARMS COMPANY, INC.

RESEARCH DEPARTMENT

FOURTH QUARTER PROGRESS REPORT - 1984

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Highlights

Firearms Product Research

Page No.

New Shotgun Products

- A self-compensating gas system concept for the Model 1100 has been demonstrated. Improved functioning over the total range of shotshell loads was achieved. Improved carrier reliability has also been demonstrated. 3
- Specifications for the Model 1100 Restyle have been provided to Production. 3
- Model 870 Riot guns with the flexi-tab carrier to prevent jams are in production. 3
- All Model 870 Restyle (12 gauge) drawings have been transmitted to Production. Information on other gauges has been submitted for estimating. 4

New Rifle Products

- Six prototypes of a new bolt action rifle will be completed in January. 4

Firearms Process Research

Receiver/Small Parts Flexible Manufacturing System

- The R&D project to develop a 4-spindle machining system has been abandoned and will be written off in 1984. A P&E was approved to proceed with a commercial single spindle system from Cincinnati Milacron. Work is progressing towards submitting an Appropriation Request in 2Q '85. 5

Flexible Small Parts Assembly System

- Work continues on the robot assembly work stations for triggers and trigger housings. 5

Research Department

-1-

December 1984

Ammunition Research

Page No.

Shotshell Products

- Handloads have been identified for 12 gauge 3" 1-7/8 oz. for rotary cam and SP bodies; and 20 gauge 3" 1-1/4 oz. products. Loading machine confirmation is scheduled. 6
- Unibody product implementation plans have been developed with Lonoke. All development is expected to be completed by year end. 6

Centerfire Products

- A "bright dip" process for chemically polishing centerfire rifle cases was successfully demonstrated at Lonoke. 7

Research Department

-2-

December 1984

FIREARMS RESEARCH

• Model 1100 Functional Improvements

The introduction of magnum ammunition, plus the continuing improvement of competitive offerings, requires functional improvements to the Model 1100. Efforts are concentrated on a compensating gas system to handle all ammunition loads, improved action smoothness, a new carrier, and improved endurance life. This program, in conjunction with the Model 1100 Restyle program, will enhance our market position.

A self-compensating gas system is being developed which utilizes two relief vents in the gas cylinder wall. The vents are closed with valves retained by a circumferential spring held in a slot around the outside perimeter of the gas cylinder. The valves remain closed on light loads, but will vent excessive pressure with heavy loads. Terminal bolt velocity differences between 3" 1-7/8 oz. loads and 2-3/4" 1 oz. loads are well within the goal of 200 in./sec. System testing is continuing.

Five guns with redesigned carriers have been tested. The malfunction rate for carrier related problems dropped to 0.7%, compared with 2.3% with standard Model 1100 carriers.

• Model 1100 Restyle Program - 12 Gauge

This program will provide cosmetic and functional changes to the Model 1100 for mid-1986 introduction. Specifications include cut checkering, 30-gloss wood finish, two-piece butt plate, screw machine magazine cap, choke tubes, stainless steel magazine tube, and the new self-compensating gas system. Testing of a 30 gun sample without the gas system will begin in January. Specifications, drawings, and parts lists have been given to Production to develop economics.

• Model 870 Anti-Jam Carrier

The Model 870's position in the law enforcement market is threatened by a competitor's sales approach, which emphasizes a deficiency in the feeding cycle of the 870. If, when loading the magazine, the shell is not inserted far enough to engage the feed latch, the shell can slip back and become wedged between the bottom of the slide assembly and the carrier.

To overcome this, we have redesigned portions of the feeding system. A flexible tab was formed in the carrier along the shell feeding path. This tab stops, positions, and restricts the slipped shell travel while providing additional clearance between the slide and carrier due to the downward flexibility of the tab, thereby allowing normal action operation. Minor changes were also made to the breech bolt and slide to complete this redesign.

Following extensive testing at Ilion, seventeen modified 870's were tested at the Federal Law Enforcement Training Center under every conceivable training situation. Not one malfunction occurred. The new components have been assembled in production Model 870 Riot guns for several weeks and will be placed in all Model 870's in the near future.

- Model 870 Restyle

This program, aimed at late 1985 introduction, will improve the perceived price/value relationship of the Model 870. Specifications include 30-gloss wood finish, cut checkering, new recoil pad, and choke tubes.

All 12 gauge drawings have been transmitted to Production. Trial and pilot testing is underway.

A partial drawing package for the 20, 28, and .410 gauges has been sent to Process Engineering for estimating. 20 gauge choke tube samples will be ready for test by the end of January.

- New Bolt Action Rifle

A new bolt action rifle is being developed as a potential replacement for the Model 700. Technical improvements include enhanced safety, a detachable magazine, a claw-type extractor, an independent bolt lock, and integral scope mounts.

Completion of six prototype rifles for design evaluation is now expected in January. Bolt assemblies and magazine followers are the critical path components. Bolts have been sent to Production for final machining and then to the Custom Shop for heading with the barrel assemblies. Magazine followers are in process in the N/C Shop.

Five rifles are ready for focus panel reviews of several cosmetic features, including receiver, bolt handle, bolt plug, and stock styling.

FIREARMS PROCESS RESEARCH

• Receiver/Small Parts Flexible Manufacturing System

The R&D project to develop a 4-spindle machining system has been discontinued due to excessive cost estimates for software and the machine vendors inability to demonstrate specifications. It is estimated that \$1.4MM will be transferred from the project into research expense during 1984.

A P&E has been authorized to develop a project for a Cincinnati Milacron single spindle machine. This will be a three part project to provide a 29 machine system for manufacturing shotgun and centerfire receivers and selected small parts. Project authorization for the first phase is scheduled for 2Q '85.

M1100 receiver machining tests at Cincinnati, using the same type of machine as the FMS, are scheduled for late January, 1985. Tooling necessary for these tests is now being readied for shipment to Cincinnati. Ilion QC has been asked to provide a gaging procedure that can be used to determine process controllability during these tests.

Shotgun breech bolt fixture designs for both A and B loadings are complete. Lightweight locking block fixture designs for the A loading are complete. These designs are based on an 8-sided tombstone concept with 32 parts per fixture.

Fixture concepts are being developed for the locking block B loading, the action bar sleeve, and the rifle barrel extension A and B loadings. Six machining centers are currently estimated to produce 1990 volumes of these parts.

• Flexible Small Parts Assembly System

Work continues at EDL on fabrication of the trigger and trigger housing workstations. Construction of the breech bolt workstation is to begin soon. Communications have been established between the workstation programmable logic controllers and the micro-VAX. Work is currently underway to interface the PUMA 760 robot with the trigger workstation. Startup and evaluation should begin early in the first quarter.

AMMUNITION RESEARCH

Shotshell Products

• 12 Gauge 3" 1-7/8 Oz. Rotary Cam Large Volume Body

Extensive handload development has identified three (3) powder candidates that perform acceptably at test temperature extremes. They are Expro 8662 and two 30% NG Hercules samples. The Expro powder requires the use of a low-dense USI "Microthene" polyethylene shot buffer. At present, this buffer will not feed satisfactorily on our loading equipment.

One hundred pound samples of the Hercules powders have been made and shipped to Lonoke. A 35 lb. sample of the Expro powder is at Lonoke. Primed bodies are expected to be available for loading in early January.

• 12 Gauge 3" 1-7/8 oz. SP (Two-Piece) Large Volume Body

As a contingency to the rotary cam body, we are developing a load in the two-piece body. Preliminary handloads have yielded acceptable ballistics. However, larger -20F pressure deviations are present due to wad breakup. Approximately 30M bodies have been successfully headed and primed at Lonoke on a simplex AH&P machine. An experimental loading run will be made in January

• Unibody Product Implementation Plan

Research and Production have detailed a plan to complete the new unibody shotshell and "Premier," steel shot and buck load developments. This effort is being done concurrently with commitments to shotshell consolidation at Lonoke and an increase in production schedules.

To accommodate inventory, we are currently estimating products to be complete through trial and pilot evaluation as follows:

8 Gauge	2/85
12 Gauge TGT	5/85 (R209 primer)
12 Gauge 3" LV	5/85 ("Premier")
	6/85 (Steel)
	7/85 (Buck)
20 Gauge	5/85 ("Premier")
20 Gauge 3"	6/85 ("Premier")
28 Gauge	3Q '85'
.410 bore	3Q '85
16 Gauge	4Q '85
10 Gauge	4Q '85

Centerfire Products

• Case Polishing

A demonstration run of a chemical case polishing process was completed at Lonoke, where 20,000 .30-06 cases were used to test three different bright dip solutions. The overall test objectives included case finish, process economics, and waste treatment costs. Initial observations are favorable, but we have not yet completed evaluation of all data. Cartridge geometry and weight loss analysis, process economics, chemical consumption, ballistic performance, and waste treatment procedures remain to be completed.

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Research Department

-7-

December 1984

RESEARCH PERSONNEL

Remington Roll

	<u>Actual</u> <u>11/30/84</u>	<u>Actual</u> <u>12/31/84</u>	<u>Fcst.</u> <u>12/31/84</u>
<u>Exempt</u>			
Ammunition Research	8	8	7
Firearms Research	26	26	29
Firearms Modernization	9	9	9
Administration	<u>1</u>	<u>1</u>	<u>1</u>
Total Exempt	44	44	46
<u>Non-Exempt</u>			
Ammunition Research	4	4	4
Firearms Research	11	11	12
Firearms Modernization	1	1	1
ER&DD	1	1	0
Administration	<u>1</u>	<u>1</u>	<u>1</u>
Total Non-Exempt	18	18	18
<u>Wage Roll</u>			
Ammunition Research	2	2	2
Firearms Research	17	17	16
Firearms Modernization	<u>1</u>	<u>1</u>	<u>1</u>
Total Wage Roll	20	20	19
Total Research Dept.	82	82	83