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REMINGTON ARMS COMPANY, INC.

RESEARCH DEPARTMENT

HIGHLIGHTS

JULY 1983

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FIREARMS

Model 1100 Special Shotgun

Research effort on prevention of cracking in the Model 1100 Special fore-ends has been concentrated on two primary designs that utilize a new detent system retained in the magazine tube.

The first design is a buffered fore-end having an elastomer sleeve retained in the fore-end. Five sample guns are in test at this time with good results.

The second contingency design utilizes an extension on the magazine cap which separates the fore-end from the internal loads caused by the barrel. Five test samples have been shot 5,000 rounds utilizing 10% Mag. 20% Light Field and 70% Express loads. All fore-ends passed this test with no cracks. The test is being continued with 100% Magnums. Three broken action bars have occurred. Components for a fifty (50) sample test of this design have been started.

Model 870/1100 Deer Gun

Introduction in 1985 of a new deer barrel to replace the current offering has been initiated. This redesigned barrel in both 12 and 20 gauge will feature a 21" length and a rear sight base capable of mounting a long eye relief scope with a variety of mounts. Drawings have been started for estimating by Production and samples will be completed by August 15th.

Model 870P Riot Shotgun

The three anti-jam design endurance test shotguns are at the 12,400, 13,300, and 13,600 round levels and continuing. Design investigation is continuing regarding shotgun disassembly without the additional tool now required. A meeting with the F.B.I. is planned to firm up requirements to meet their standards.

Model Seven Lightweight Rifles

Preliminary testing of ten prototypes with the cast aluminum floor plate and trigger guard assembly to over 2,000 rounds was satisfactory. Some dimensional changes were required and new prototypes are being built. They will be complete by September. A sensitivity and function test of the modified design will be run at that time.

Model 1100/870 Waterfowl

Five models will be completed by September for function testing.

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Model XP-100 in .223 Caliber

Prototypes will be completed in September for testing.

Injection Molding Firearms Components

Pilot quantities of Model 700 magazine followers are complete through sinter and are ready for coining. Followers should be ready for finish and endurance testing the first half of August.

Injection Molding Commercial Applications

The mold for the West Company part has been returned to the mold vendor to correct the shrinkage and gating.

An order has been received from AMP, Inc. for 10,000 injection molded crimping anvils. Delivery is anticipated in January.

With the assistance of CRD and EDL, we have agreed to supply injection molded PZT (lead zirconia titanate) to Sandia National Laboratories. Sandia will supply the powder.

Cut Checkering Machine Development

The Bostomatic CNC Machine for checkering pressed wood was successfully run off at the vendor and has been installed in building 72-1.

Purchasing is finalizing the details of the order for a CO.RE.MA. machine for checkering sanded wood.

CO.RE.MA. has also supplied samples of cut checkered Model 581 stocks showing a slightly different machine. This may open up alternatives to the present N/C machines for long stocks.

AMMUNITION

New Unibody Shotshell Process

The Research experimental run of the 3" large volume 12 gauge body has been successfully completed, and Production has started trial and pilot. Experimental run bodies were assembled and loaded on Plant equipment, and have passed all Research tests.

Both the experimental run and Production trial and pilot on 20 ga. 2-11/16" product have been successfully completed. ARD plans to trim in the 2-7/8" tooling in July.

Approximately 30,000 28 ga. brass cups were successfully half-headed and the experimental Simplex AH&P run will begin after shut-down.

ARD is reviewing the deep skive and crimping tools as a result of crimping difficulties experienced by Production.

Steel Shot Shotshell Loads

With the availability of 3" 12 ga. large volume bodies, load confirmation at process limits has begun.

Although acceptable hand load ballistics were obtained with the 20 ga. 3" 1 oz. steel load, load fit has been unacceptably tight. It may be necessary to back off to 7/8 oz.

12 Ga. 1 oz. Target Dove/Quail Load

Evaluation of this product has been completed with satisfactory results. It has been approved for production.

12 and 20 Ga. Rifled Slugs

The proposed 20 ga. 3/4 oz. rifled slug has been hand loaded in standard plant bodies and rotary cam bodies and fired for ballistics (R.T., -20 and +150°F) and accuracy. All samples were within specification.

Testing has also been completed on the 12 ga. 1-1/4 oz. slug. The proposed slug passed all tests. Accuracy was within Remington specifications. The 1-1/4 oz. slug had far better mush results than control. Penetration was 50% greater and shock cavity length was 40% greater than control when shot into gelatin at 50 yards. Experimental runs of both slugs are being planned.

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Shotshell Primer Basics

Experimental run Peters Target loads using domed cup, fuelless mixture primers have successfully passed all laboratory and field tests.

Approximately 12,000 rounds were fired in field tests at the Ohio and Michigan State Shoots without any failures and with good shooter response. According to questionnaires returned, shooters feel the fuelless primed product is slightly better than 1024 primed product.

Development of field loads and other target loads is being undertaken with the objective of using this primer for all shotshell loads. A heavier primer pellet weight will be required for magnum loads.

Center Fire Modernization

The consolidated efforts and recommendations culminating the Center Fire Modernization Committee's activities over the last five months were reviewed with the Operations Committee on July 13. The review included a brief summary of prior objectives and business goals, and a review of the "best case" economic studies made since the April review. The following Committee recommendations were communicated:

- Fund and support the consolidated bullet assembly/jacket draw/chemical polish activities as a 1983 authorized construction project.
- Continue analysis of load/pack to identify high return elements for short term implementation and savings realization.

The Lonoke plant also recommended continued operations support of all plant prototype areas except heading. The Center Fire Modernization Committee suggested that funding of this work be limited to the \$100M estimated for completion and that the Plant would accept this equipment in the state-of-the-art condition after this expenditure.

These recommendations support our ammunition business objectives and can provide an improved product, plus increased sales. Expenditious support on all elements of the BAM/JD/CP program is required to meet the 1983 authorization proposal.

Operations requested stand-alone analysis of jacket draw, bullet assembly and case polish individually along with further details on elements within the load/pack area for presentation at the September Operations Meeting. Confirmation of boattail bullet assembly on the modernized machines was also requested.

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FIREARMS MODERNIZATION

Receiver Flexible Manufacturing System

The Automation Review Committee recently completed the study of additional automation options that could be included in the Receiver FMS project scope. The following items were recommended at the July 25 Firearms Modernization Operations Meeting:

- Automatic Material Handling
- Automatic Production Scheduling
- MRP Interfacing
- Automatic Production Reporting
- Adaptive Machine Control

High spot economics indicate these items are justified on a stand alone basis and will increase the total project economics approximately 2% on a \$850M additional capital investment.

The Automation Review Committee also recommended that the Receiver FMS computer control software and hardware design be altered to be more "transportable" to other proposed modernization systems, such as small parts manufacturing. The cost for the "transportability" option is estimated to be \$500M additional capital investment. This expenditure is easily justified due to the significant capital and software development costs that will be avoided in future modernization projects.

A maximum 10 month implementation delay of the total ten machine system will be experienced if all the above recommendations are included in the Receiver FMS project.

The Firearms Modernization Operations Committee agreed to expand the project scope to include all the above automation options.

Flexible Assembly System for Small Components

Basic project data has been recently developed by Remington and EDL personnel for the automatic assembly of the following parts.

- Shotgun Breech Bolts
- Common Triggers
- M/700-7 Trigger Housings
- Shotgun Carriers

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Flexible Assembly System for Small Components - Cont'd

Upon plant acceptance of the data, the design of the system can be finalized and the Construction Cost Estimate completed.

Initial project submission is scheduled for September with authorization anticipated by year-end.

Firearms Design has indicated that of the four components which may need to be changed to facilitate automatic assembly, only two require testing. Research has recently tested the modified extractor plungers and found them to operate satisfactorily. The proposed extractor spring modification will be tested in August.

Manufacturing System - Small Metal Components

Remington and Engineering Department personnel has determined that by modifying the Small Metal Components FMS slightly, a major portion of the computer control system designed for the Receiver FMS can be utilized in this system for a substantial savings. Development is continuing utilizing this strategy.

Testing of the tooling, fixturing, and material handling concepts for breech bolts is scheduled for August and September.

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RESEARCH PERSONNEL

REMINGTON ROLL

	<u>Actual</u> <u>6-30-83</u>	<u>Actual</u> <u>7-31-83</u>	<u>Forecast</u> <u>12-31-83</u>
<u>Exempt</u>			
Ammunition Research	17	17	14
Firearms Research	39	38	36
Firearms Modernization	7	7	9
Other	<u>1</u>	<u>1</u>	<u>1</u>
<u>Total Exempt</u>	64	63	60
 <u>Nonexempt</u>			
Ammunition Research	12	12	12
Firearms Research	12	12	12
Firearms Modernization	1	1	1
ER&DD	1	1	1
Other	<u>1</u>	<u>1</u>	<u>1</u>
<u>Total Nonexempt</u>	27	27	27
 <u>Wage Roll</u>			
Firearms Research	19	18	19
Firearms Modernization	<u>1</u>	<u>1</u>	<u>2</u>
<u>Total Wage Roll</u>	20	19	21
 <u>Total Research Department</u>	111	109	108

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PATENTS & TRADEMARKS

Summary of Activity

July 1983

Patent Applications Filed

Bolt Latch for Bolt-Action Firearm
(Martin)

RA-0247A CON
(Continuation)

ABSTRACT: A bolt latch, operable independently of the safety mechanism, pivotally mounted in the bolt plug and engageable with a notch formed in the bolt. The latch is automatically engaged by cocking the firing pin, and disengaged by firing the rifle.

Trademark Applications Filed

N O N E

Patents Received

N O N E

Trademarks Received

N O N E

Inventions Reports

N O N E

July, 1983