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REMINGTON ARMS COMPANY, INC.

RESEARCH AND DEVELOPMENT - FIREARMS

FIRST QUARTER PROGRESS REPORT - 1982

March 24, 1982

HIGHLIGHTS

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New Product Development	
• Six different XSG prototype shotguns are scheduled for completion by July 1, 1982 for Marketing review and selection of product specifications.	3
• Model 7400 centerfire rifles in the 7mm Express Remington caliber have been approved for shipment.	3
• A third Model Seven prototype new generation bolt action rifle is being fabricated for Marketing review.	4
• Two custom stocks prepared by Bob Emmons for potential use in the new generation bolt action rifle have been completed and reviewed by Marketing.	4
Current Product Development	
• Model 870 Competition Trap Shotguns are being produced with a tighter bolt-receiver clearance and bolts with increased overall height to reduce receiver stress levels.	4
• A walnut master stock for the Bolt Action Carbine has been completed. Initial test results of some calibers with the no-bind stamped follower have been satisfactory.	5
• Revised etched plates of the receiver artwork for the Model 870 Limited Edition are due the end of March.	6

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• Work is progressing on a new stock former for the Model 700 ADL Upgrade. Scope mounts will be tested by the end of March. No-bind followers will be tested by April 7.	6
• 1982 Ducks Unlimited receivers have been completed and endurance tested with no problems.	7
• The .257 Roberts caliber has been added to the Model 700 Classic as a special run for 1982.	7
Materials and Process Development	
• The pilot run of form-rolled M/1100 and M/870 front trigger plate pins is expected by the end of March.	8
• One side of a M/Four stock has been cut checkered by the CO.RE.MA. machine with a new pattern which requires minimal touch up.	8
• Amoco will supply 200 diaphragm gated Torlon piston seals by June 1.	9
• The next production part scheduled for the four-slide machine is the M/7400 fore-end reinforcement support. Costs have been estimated for XSG components.	9
• The balance of seismic guns to fulfill Mapco's order are available for shipment.	10
• Installation of the pilot-line for injection molding metals is proceeding on schedule.	10

STATUS - NEW PRODUCT DEVELOPMENT

XSG/XPG Shotguns

New autoloading (XSG) and slide action (XPG) shotguns are being developed as potential replacements for the M/1100's and M/870's,respectively. Objectives include decreased weight, increased reliability, and reduced manufacturing costs.

Review of project economics and performance specifications for the XSG and XPG shotguns has resulted in increased emphasis on contingency designs. Contingencies being considered include the following:

- For improved economics; feed latch system, rear lock system, carrier - carrier latch system, and action spring.
- For improved performance; gas system control and reduced gun weight using aluminum receiver designs.

Six new prototypes featuring the above items are on schedule for completion by July 1, 1982. These prototypes will be reviewed with Marketing for selection of design specifications.

Model 7400 and M/7600 Centerfire Rifles

The Model 7400 and 7600 were developed as replacements for the Model 742 and 760, respectively, and were introduced into the product line in 1981. The Plant experienced a variety of start-up problems which have required continuing Research support. Furthermore, new calibers are being developed for future introduction.

Model 7400 -7mm Exp. Rem. caliber rifles required an additional clearance modification for proper feeding of the 165 grain bullet ammunition. Other current

production calibers and proposed new calibers are being fabricated with the same modification for evaluation prior to final model drawing revisions. Evaluation will be completed by May 1, 1982.

Bolt Action Rifles

The objective of the Model 7 program is to design a bolt action rifle to replace the Model 700 family. Major features incorporated into the Model 7 design include an octagonal receiver, "diamond finish" barrel, and a restyled stock.

A second Model 7 prototype bolt action rifle was completed in January 1982. A third prototype will be fabricated and will incorporate a new fire control, integral scope mounts, and a tang safety switch. Other features to enhance the rifle design will be used as they are completed.

Two custom stocks prepared by Bob Emmons for potential use in the new generation rifle have been completed and reviewed by Marketing. A third sample is in progress to incorporate modifications which will facilitate high volume production. The third sample will also include revisions to the receiver and barrel.

STATUS - CURRENT PRODUCT DEVELOPMENT

Model 870 Competition Trap Shotgun

The Competition Trap Shotgun is a version of the standard Model 870 that has been modified to include a gas operated recoil mechanism.

At the 1981 Grand American Trap Shoot small cracks were discovered on some receivers. During subsequent testing it was found that close control of bolt-receiver dimensions and increasing the bolt height eliminated this condition. Two guns (with these modifications) being endurance tested have reached over 32,000 rounds with no problems. Production is continuing to use the revised specifications and an approved process deviation. A permanent revision to the model drawings will be made pending endurance test results and machine studies of Production equipment.

Bolt Action Carbine

The Bolt Action Carbine is a short, lightweight centerfire rifle developed to replace the Model 600 which was discontinued in 1979. It will be strategically placed within the Model 700 product line.

An aluminum stock former is scheduled to be completed by duPont, EDL on March 26. A contingency plan consisting of a walnut master stock has been completed and delivered to the Plant. This will allow them to proceed with their stock manufacture program.

Prototype stamped no-bind followers have been function tested in 308, 243, and 6mm rifles. Testing is satisfactory. Caliber 7mm-08 rifles are ready for testing with these followers. Prototype stamped no-bind followers for the 222 Caliber rifles are due from the vendor the end of March.

Accuracy of the 7mm-08 Caliber has not been resolved. The required accuracy specification is 2.7 inches center to center.

- To date both handloads and factory loads have been tested in ten guns with equal results. Three 5-shot groups have given averages of 3 inches. A "bull" or "accuracy" rifle shot 1.7 to 1.3 inches.
- No discrepancy with the SAAMI chamber drawing has been found so far. However, throating angle has not been checked. -

Tests are continuing in an effort to resolve this problem.

Model 870 Limited Edition

A special high grade Model 870 shotgun has been proposed to commemorate the 75th anniversary of Remington's first slide action shotgun, the Model 10, introduced in 1907.

A revised etched sample plate illustrating the proposed receiver artwork is due the end of March from the vendor (Newcut). When artwork is acceptable, receivers will be finished. The remaining parts to assemble a prototype are available.

Model 700 Upgrade

Remington's Model 700 centerfire rifles are offered in two versions, ADL and BDL. The primary competitor, the Ruger Model 77, is positioned between our models in perceived value and price. The upgraded Remington Model 700 for 1983 introduction will be equivalent to the Ruger in both respects and will feature improved wood and metal finishes.

Changes made to the stock will require a new former. Research, Process Engineering and the Plant are working together with EDL to have a new computerized

and machined former by September. A contingency plan calls for the present master stock to be copied and finished by hand into a new master stock for making a former.

A large sample of no-bind followers will be completed and tested by April 7.

Remington scope mounts will be tested by the end of March.

Model 870 Ducks Unlimited Shotguns

1982 will be the second year of a four year program to furnish special shotguns to the Ducks Unlimited Organization. The following list of guns will be produced this year.

- Model 870 - 12 Ga. 3" Magnum — Commemorative Dinner Gun
- Model 870 - 20 Ga. Lightweight — Special Dinner Gun
- Model 870 - 12 Ga. 3" Magnum (32" Barrel) — Trade Gun

Five Commemorative models have been received from Production for endurance testing of the receivers with new rollmark and the attachment of the emblem to the side of the receiver.

Warehousing of the Commemorative and Special Dinner Guns is scheduled for July. The Trade model will be warehoused in the fourth quarter.

Model 700 Classic in .257 Roberts Caliber

Marketing plans include non-catalog sales of Model 700 Classics in certain nostalgic calibers on a special order, one time basis for 1982 and 1983. Last year the 7mm-Mauser (7x57) Caliber was offered. This year the .257 Roberts will be run, with warehousing to start in June.

The model will have a standard SAAMI .257 Roberts chamber and will be made in the long action to accommodate the longer cartridge lengths used by handloaders.

A pre-pilot quantity of actions has been assembled and gallery tested with satisfactory results.

Transmittal of drawings and parts lists has been completed.

STATUS - MATERIALS AND PROCESS DEVELOPMENT

Form-Rolling

Form-Rolling is a deformation process, similar to thread rolling, which may be applicable to manufacturing symmetrical, basically cylindrical parts such as firing pins. A preliminary evaluation of five parts, presently produced by other processes, shows a $280M annual savings and a 46% ROI. Initial development work is being done jointly with Rol-Flo Engineering, Inc., West Kingston, Rhode Island.

Rol-Flo Engineering has completed the form-rolling die for the M/1100 and 870 front trigger plate pin. A quantity of 200 blanks have been made here and shipped to Rol-Flo. The pilot run, at Rol-Flo, is expected by the end of March.

Cut Checkering

Remington currently cut checkers only its higher grade guns, using press checkering, or no checkering, for field grade. In contrast to that, most competitive guns, of all grades, are now cut checkered. While Remington's is the highest quality cut checkering available, we are constrained from applying it across the board because of the high cost of our checkering machines.

The goal of this program is to develop a cut checkering machine capable of producing acceptable quality at a lower cost.

Modifications to the M/Four stock checkering pattern have been made to accommodate the limitations of the CO.RE.MA. machine. A stock has been checkered on one side with very little touch up required. Various redesign options are now being reviewed to improve the reliability of the machine.

Torlon Piston Seal

Stainless steel stamped pistons and high temperature plastic piston seals are being investigated for autoloading shotguns. Implementation of this design into the M/1100 will result in a significant cost advantage, and a reduction in gas system corrosion. Testing of injection molded parts has consistantly resulted in premature failure of the seal at the weld line.

Amoco, manufacturer of Torlon, feels that stronger seals can be molded by using a disc or diaphragm gating system. They will supply 200 parts by June 1.

Four-Slide Machine

A four-slide, or multi-slide machine is an advanced type of stamping press. Project TI-121 was approved in April, 1980, to purchase a machine for the manufacture of prototype parts and, dependent on contracts with outside vendors, production parts. The machine was installed in Ilion Research in December, 1981, and production of M/7400 and M/7600 long action magazine followers has started.

The next production part scheduled for the four-slide is the M/7400 fore-end reinforcement support. Tool design should be complete by June, with production scheduled for December.

A report was issued to the New Products Design group estimating four-slide costs for 18 XSG parts.

M/979 Seismic Gun

The seismic gun is an adaptation of the Remington kiln gun. Development of the gun, which is used in geological studies, has been a joint venture by Firearms Research, Ammunition Research, and Mapco. All guns produced to date have been converted kiln guns, with Ilion replacing the conventional breech block with an electrically actuated design for simultaneous firing of multiple guns.

The balance of guns required to fulfill Mapco's order are ready for shipment. They are being held pending release by Marketing.

Injection Molding of Metal and Ceramic Components

Manufacturing parts from near net-shape blanks can provide a significant savings in material and labor cost. Processes such as forgings and investment castings produce blanks that are fairly expensive and still require secondary operations. Conventional powder metallurgy will provide blanks of near net-shape at a reasonable cost, but at a sacrifice in physical properties and surface appearance. Parmatech Corp. has developed a process for injection molding

very fine powders to produce close tolerance parts with near wrought material properties, at a cost between conventional powder metallurgy and investment casting. Remington has obtained a non-exclusive license to use the process to make parts for commercial markets.

Installation of the pilot-line is proceeding on schedule, with completion of the molding machine and Witec system expected by April 9. This will be followed by the Parmatech extraction system in June, and blending capabilities in August.

Compilation of the materials properties book has started with parts molded here and processed at Witec.