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RESEARCH AND DEVELOPMENT - FIREARMS
THIRD QUARTER PROGRESS REPORT - 1983
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Remington Arms Company, Inc.

HIGHLIGHTS

STATUS - NEW PRODUCT DEVELOPMENT (J. S. Martin)

Model 1100 Special Field Shotgun (D. S. Findlay, T. P. Powers)

The Model 1100 Special Field was developed to offer the shooter a lighter weight (7½ lb.), faster pointing Model 1100, with a significant change in appearance to supplement the 1100 line. Features include a 21" barrel, a slimmed down and shortened fore-end, English stock, cut checkering, medium gloss finish, and no roll marking.

Research effort on prevention of cracking in the 12 Gauge Special fore-ends had been concentrated on two primary designs; a magazine cap extension and an elastomer buffer design. Based on data from both designs, Research has selected the elastomer buffer for transmittal. A five gun test sample having the highest strain levels of the 40 gun sample were selected for endurance and are in test. Transmittal of the elastomer buffer design is expected by October 1, 1983.

Model 870 Special Field (D. S. Findlay, F. H. Smith)

The Model 870 Special Field for introduction in 1984 is being developed to compliment the Model 1100 Special with the same appearance and performance features (i.e., 21" barrel, slimmed down and shortened fore-end, straight English stock, and cut checkering).

Design acceptance testing has been completed and all drawings have been transmitted to the Plant. Parts for five 12 Gauge Special and five LTWT-20's have been started for Marketing samples and catalog pictures and are complete except for barrel assemblies.

Model 870 Restyle - 12 Gauge (D. S. Findlay, K. L. Calkins)

The Model 870 Restyle is being developed to replace the current Model 870 in 1985. Specifications include a 3" chamber, new fore-end design, matted top receiver radius, and medium gloss wood finish with cut checkering.

A complete drawing package and parts list has been sent to Process to start work on the cost and capital estimates. Marketing samples and test guns have been completed and endurance testing has been started in the Test Lab.

New Shotgun Family (D. S. Findlay, J. L. Kast)

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

Design specifications are being reviewed to ensure compatability with our long range product development strategy.

Model 870/1100 Deer Gun - 12 Gauge (D. S. Findlay, F. H. Smith)

Introduction in 1985 of a new deer gun to replace the current offering has been initiated. This gun features a redesigned barrel in both models with a 21" barrel length and a rear sight base capable of mounting a long eye relief scope. The gun will also be parkerized with birch, oil finish wood, and a new camouflaged sling assembly. Drawings have been completed and will be turned over to Production for estimating by October 1, 1983. Samples for test and evaluation are to be completed by October 15.

Parker Double Barrel Shotgun (D. S. Findlay)

Reintroduction of the classic Parker side-by-side double barrel shotgun is being considered. One VH Grade 12 Gauge Parker has been completed.

A partial set of drawings from Jesse Briley on a 20 Gauge Parker has been received. These drawings are undergoing engineering evaluation. Once the remaining drawings of the package have been received, they will be sent to Process Engineering for cost estimating.

Model 870P Riot Shotgun (A. A. Hugick)

Two Model 870P 12 Gauge Shotguns have been fired to 20,000 high base rounds and one Model 870 12 Gauge 3" Shotgun was fired to 20,000 rounds of 3" magnums. This completes the endurance of the altered carrier-slide latch anti-jam design. No apparent problems with the anti-jam components were encountered.

F.B.I. Academy objections to the disassembly/assembly with the slide latch design initiated a double step-feed latch investigation. Prototype latches and action bars will be available from H&P in about four to five weeks.

Bolt Action Rifle Development (F. E. Martin)

Model 700 Lightweight drawing and parts list transmittal will be completed by October 1, 1983. Work on this model is expected to be complete by October 20.

Work on the Model 700 BDL Replacement will resume to meet the scheduled 1986 introduction. The new BDL will include the following functional improvements: a rotary box magazine for feeding reliability, a new fully enclosed claw extractor for added strength, a no-bind easy lift bolt for a smoother action, a receiver with a heavier integral recoil bracket for stability, and a fully adjustable fire control with redundant safety switches.

Testing of the new extractor will be starting in September with the completion of prototype assemblies.

STATUS - CURRENT PRODUCT DEVELOPMENT (J. W. Brooks)

Model 870/1100 Waterfowl Shotgun in 12 Gauge (1985 Introduction)
(P. Nasypany)

Marketing has received requests for shotguns that will better withstand the conditions under which they will be used.

The models will feature three inch magnum vent rib barrels with chrome plated bores, rust resistant Parkerized metal finish, and stained birch stock and fore-end with oil finish.

Ten Model 870 prototype shotguns for design verification will be ready by the end of September.

Two Model 1100 prototypes are ready for testing to determine the effect of a Parkerized finish on bolt velocity and gun function. Parts for twenty-five design verification models have been started.

Sportsman 12 Pump Shotgun (1984 Introduction)
(T. J. Plunkett)

Marketing has requested a low cost version of the Model 870 12 Gauge Pump Shotgun for 1984 and will call it the Sportsman 12 Pump. Prototypes have been made and shown to Marketing.

External appearance will remain the same except for the following:

- Reduced receiver finish. No mill and matt on top radii. Roll marking on side panel to be Sportsman 12 Pump.

- Reduced barrel finish. Vent rib with Iron Bead front sight. Gauge roll mark to read "12 Ga. for 2-3/4" or 3" shells."
- Birch stock and fore-end. Walnut color stain and lacquer finish. Press checkering.
- Tumble finish breech bolt to be plated.

Parts list and drawings have been transmitted.

Sportsman 78 Rifle (1984 Introduction) (T. J. Plunkett)

Marketing has requested a low cost version of the Model 700 for 1984 in 270 and 30-06 calibers and will call it the Sportsman 78. The following requirements have been established for this model:

- Reduced barrel finish.
- M/788 rear sight and M/700 front sight.
- Reduced receiver finish.
- Receiver roll marking to read "Sportsman 78".
- Bolt body plain. Polished only.
- Classic style birch stock. No checkering. Walnut color stain and lacquer finish.
- Plastic butt plate.
- No floor plate.
- Stamped, no-bind follower.

Prototypes have been made in Production and shown to Marketing. Parts list and drawings are being completed. Production will furnish guns the first part of October in each caliber for point of impact testing using the Model 788 rear sight and the Model 700 front sight. Drawings and parts list will be given to the Plant for cost estimates by October 1.

Model Seven Lightweight (D. E. Bullis)

The Model Seven is a short, lightweight, bolt action, centerfire rifle developed to replace the Model 600 which was discontinued in 1969.

Testing of the .308 and 7mm-08 calibers were not completely satisfactory with the steel trigger guard assembly. A decision was

made to use the back up aluminum trigger guard and floor plate cover system.

Initial samples have been built and preliminary testing was satisfactory. Modifications were made and ten new prototypes, made in the N/C Shop, have been delivered to the Test Lab. Sensitivity tests will be completed in October.

Drawings have been discussed with a casting vendor and are being modified. They will be completed by October 1st. The tentative schedule is to have sample Production parts by February 1984.

STATUS - MATERIALS AND PROCESS DEVELOPMENT (J. W. Bower)

Injection Molding - Firearms Components (J. A. Lawrence, B. Panagian, K. C. Rowlands, M. J. Topolski)

Injection molding is a technique for making small, complex, three-dimensional components to near-net shape. The use of injection molding to make firearms components for internal use opens up the potential for significant cost savings. Six firearm parts are currently in development.

Sample Model 700 magazine followers are being prepared for review with Marketing. These samples will show the types of surface treatments that can be applied to the injection molded part.

Molds for the common centerfire rear sight slide and rear sight base will be sent out by September 23 for alterations to compensate for shrinkage.

Injection Molding - Commercial Applications - Metals

(J. A. Lawrence, B. Panagian, K. C. Rowlands, M. Tasovac)

Injection molding is a natural extension of the existing Specialty Metal Products business. While it does not compete economically in those applications where powder metal is satisfactory, it does provide the enhancements of improved properties, and the ability to produce more complex three-dimensional shapes.

A slower debinderizing sequence has improved the quality of West Company lyophilization stoppers. A metallurgical and dimensional review will be completed by September 23.

An order has been placed for a mold for AMP, Inc. crimping anvils. Delivery is expected by mid-November.

A development mold is being built to supply interruptor distributors to Chrysler. The potential business is for 200,000 parts annually at approximately $2.00 per part.

Injection Molding - Ceramics Pilot Line (K. C. Rowlands, M. Tasovac)

In June, 1983, Management approved an Appropriation Request to extend the injection molding effort into ceramics. The installation of a research pilot-line facility was called for.

A Sweco Mill, for preparing the raw material, has been transferred from DuPont to Remington. Initially, the mill will be installed at EDL.

A granulator has been ordered.

Specifications for a mixer, and for a molding machine have been sent to Purchasing. Quotes will be requested.

Injection Molding - Commercial Applications - Ceramics

(B. Panagian, K. C. Rowlands, M. Tasovac)

Injection molding of ceramic powders offers a promising compliment to the powder metallurgy process used by the Specialty Metal Products Division. New markets where the thermal stability, corrosion resistance, and hardness of these materials are important should be opened up.

PZT (lead zirconia titanate) samples will be molded for Sandia National Laboratories during the week of September 19. Sandia will be responsible for final firing and evaluation.

Cut Checkering Machine Development (R. J. Balaska, D. J. Finfrock, A. M. Makowski, E. R. Owens)

Cut checkering is being called for on a rapidly increasing percentage of product. The 3-spindle machines presently being used are very flexible in the type of wood that can be checkered, and produce very good quality. However, the present machines cost $180M per spindle, making it very expensive to add cut checkering

capacity. The goal of this program is to develop a cut checkering system that costs no more than $50M per spindle.

A five hundred piece pilot run is in progress to verify the Bostomatic machine for pressed wood. The first one hundred stocks have been checkered, and the results are being analyzed.

Production is witnessing the pilot run. Discussions are being held regularly in anticipation of Production's October 15 deadline for purchasing additional cut checkering equipment.

Automatic Sanding (D. J. Finfrock, E. R. Owens)

This program was implemented to research the feasibility of sanding wood components to a controlled tolerance, contour, and finish. In addition to our estimated $400M annual savings in reduced sanding labor, the successful adoption of this technology would provide repeatable stock and fore-end dimensions, thus eliminating the need for sophisticated feedback controls on future cut checkering machines.

The prototype five-axis computer controlled sanding machine, built by the ESD Instrumentation and Process Control Group, has been set up in the Process Research Lab. A redesign of the sanding spindle drive is being reviewed.

Form-Rolling (E. R. Owens)

Form-rolling is a deformation process, similar to thread-rolling, which is an effective technique for manufacturing small, solid, cylindrical parts. The production of trigger plate pins and the burnishing of shotgun firing pins have already been demonstrated. In lieu of purchasing the necessary equipment to continue development in-house, it was agreed to contract with Rol-Flo Engineering, Inc. for the development of future parts.

All non-disclosure agreements are now in place. Rol-Flo Engineering is preparing development costs.

Testing and Inspection (J. A. Lawrence, B. Panagian, A. M. Makowski)

The inspection of work in progress and finished products is

highly labor intensive, and, especially in the case of visual inspections, largely subjective. Further, the flexible machining systems and automatic assembly planned for the future demand a means for determining dimensional acceptance. This Research program will provide systems to economically inspect critical components, and automate the gallery and final inspection functions.

EPL has reviewed a cross section of firearms parts and they believe that only two types of inspection machines would be required to inspect all of the parts. A work request from EPL is circulating.

A 22-caliber shooting butt will be moved into the Process Research Lab to continue development of the automated gallery.

Coatings (J. A. Lawrence)

New coatings are being investigated to improve the appearance, endurance, and/or wear resistance of firearms. In a related program, various coatings are being researched which will increase the life of cutting tools, which last year cost $4MM.

Chrome plated shotgun barrels have been endurance tested to 5,000 rounds (50% lead, 50% steel) with no excessive wear. Chrome plated bores have been specified for the Waterfowl guns to be introduced in 1985.

A promising single step powder coating system has been identified. A major savings ($150M) is projected for the use of this powder coat on aluminum trigger plates.