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RESEARCH DEPARTMENT

HIGHLIGHTS REPORT

NOVEMBER 1982

**REMINGTON ARMS CO.
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FIREARMS RESEARCH DIVISION

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FIREARMS

Model 870/1100 Special Shotguns

Four (4) samples of the Model 1100 Special, 12 gauge, Field Grade shotgun have been completed. Model Drawings have been provided to Process Engineering for evaluation. Parts for 35 guns have been ordered and are scheduled to be assembled starting in January. One (1) Model 1100, 20 gauge, Special will be completed by December 1, 1982 for display at the NSGA Show.

Shotgun Development

A sample of the second generation rocker arm locking system failed after 5,000 Magnum rounds. A revised block will be completed in December.

Four autoloading prototype styling samples are scheduled to be completed in January. One potential delay is in fabrication of the new barrel contour. A styling sample of the new pump gun will also be completed in December.

Parker Shotgun

Three (3) frame and barrel sets are in the Model Shop for assembly. Arrangements are proceeding to complete one (1) VH Grade, 12 gauge Parker in the 1st Quarter of 1983.

Model 7400/7600 Center Fire Rifles

Priority has been placed on completion of the Model 7400 .223 Caliber for mid-1983 announcement. New follower and magazine spring designs have reduced the malfunction rate to an acceptable level (0.5%). Three design options will be ready for review with Marketing by mid-December. Drawings have been released to Process Engineering for economic evaluation, including the optional designs.

Model Seven Lightweight

The premature opening of the floor plate cover was eliminated by a change in the latch design. New production trigger guards, latches, and floor plate covers with an overall dimensional change are being assembled.

Research samples of the .223 caliber actions are complete except for stocks. Testing will begin when production stocks are available.

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Model 700 ADL in .222 Caliber

Prototype magazine springs have been received and testing will start next week. Complete testing will be finalized in January.

Model 700 BDL Short Action Left Hand

Prototype rifles in .243 and .22-250 are assembled ready to test.

Model 700 Classic in .300 H&H Magnum Caliber

Production sample rifles have performed satisfactorily in trial and pilot testing.

Model 700 BDL in .223 Caliber

Sample rifles are being assembled in production for trial and pilot testing.

Model 870 Police Shotguns

Model 870, 12 gauge, 18" full choke plain barrels with a new sight base to correct the point of impact have been tested. Initial results confirm that the sight base is correct.

Injection Molding Metal and Ceramic Components

Renovations to the Alcet Building blend room are complete and the mixing equipment has been put in place. Wiring and piping should be complete by mid-December.

A comparison of Witec and Parmatech stainless materials has been made with the conclusion that Parmatech is superior in all significant properties.

Cryogenic Processing of Powder Metal Parts

A fourth set of samples have been tested and verify earlier results. The high nickel alloys showed increases in hardness and tensile strength. The elongation was similar to 2108 material.

Corrosion Reduction of Monel and Stainless Steel Powder Metal Parts

Stainless steel samples coated with Sermetal and nickel have endured several weeks in a salt solution with minimal rusting, indicating good corrosion resistance.

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FIREARMS MODERNIZATION

Receiver Flexible Manufacturing System

A cost review of the three most attractive quotes for twelve production machines indicate Heian to be the lowest at \$5.7MM with Snyder and Producto 39% and 86% higher respectively. Preliminary project economics based on the Heian proposal for a complete system to manufacture 600M receivers annually indicate a 26% ROI and a 38% IRR on a \$13MM capital investment in 1987. This information will be presented to Management in December to aid them in determining future project direction.

Representatives from Remington and EDL visited several manufacturing plants in Europe to observe examples of automated tool preparation and handling systems. The concepts and procedures observed will be utilized to aid development of the receiver tool handling system.

Shotgun Breech Bolt Machining System

Hitachi Seiki has been contacted to review the breech bolt application and consider the feasibility of using their standard system components in a breech bolt FMS. Their proposal will be complete in approximately six weeks.

Testing has begun on our ASEA robot to develop an efficient and effective method of deburring breech bolts. Filing and abrasive belt deburring techniques will be investigated. Burr-free parts are required for the proposed automatic parts handling systems in the current breech bolt FMS plans.

Wood Finishing Automation

We are investigating the feasibility of utilizing ultraviolet finishing of wood products. This is a process in which a high solids finish is sprayed on the wood and cures completely in approximately 30 seconds when exposed to ultraviolet light. Since no hazardous solvents are required, this special finish can be applied much thicker (up to 3X) than our current finishes. This process has been successfully utilized in Europe in the furniture industry for several years but has only recently been introduced in the U.S.

Recent tests conducted at the vendor's facility were favorable utilizing both urethane and polyester finishes. Additional testing is being schedule.

Potential production applications for the process include; automating the current manual stock fill and pad area by spraying high solids urethanes, one coat spraying of press form stocks,

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Wood Finishing Automation - Cont'd

streamlining the current stock repair process for open grain and pit problems and finally base and top coating of all wood products.

GFM Automation

The \$570M Appropriation Request to automate two shotgun GFM groups has been approved.

Detailed design work has begun on the control system and site preparation requirements.. The hardware required to convert the first GFM group will be ordered by 1st Quarter 83.

CNC Secondary Wood Machining

Construction of the Heian Router has been completed and is ready for acceptance testing.

Remington has recently generated and forwarded digitized stock information and the machine moves required for Heian to generate a NC tape to test the router. The Remington acceptance test is tentatively scheduled for early December.

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AMMUNITION

New Unibody Shotshell Process

The experimental run of 50,000 12 gauge high volume bodies in semiworks has been completed. AH&P tooling for plant equipment has been demonstrated and the experimental run of 20,000 is completed. Loading of 00BK-15 pellet load in the high volume shell will be expedited.

Body development for 28 gauge is complete. The semiworks experimental run has been delayed pending correction of some transfer problems on the semiworks machine. We anticipate the run will be made in December with capping scheduled for January. A plant AH&P run of 16 gauge experimental bodies is scheduled for late November. Body development for 10 gauge and .410 bore product is continuing.

Twenty thousand 12 gauge target loads were assembled and loaded at Lonoke using smooth bodies from the Bridgeport production machine. Preliminary tests at Lonoke showed a superior product to the present PETERS target load in high pressure reloading tests.

Polymer Support Program

Experiments with a gear pump extruder at Lonoke, equipped with a gamma gauge at the take-off end, resulted in poor wall thickness control apparently due to calibration drift. This essentially eliminates further consideration of the gamma control system concept. Arrangements are being made to run an extended test with ultrasonic control.

"Premier" Shotshell

Lonoke has successfully completed experimental runs using copper plated, hard shot in the high and low base loads. Pressures and velocities were equivalent to control and patterns were significantly improved.

A trial and pilot run of PR12-4 began 11/12/82 at Lonoke. No problems were experienced. They anticipate running all five loads in November. ARD will conduct lot acceptance testing as product is received.

12 Gauge - 1 Ounce Target Load

A trial and pilot run of the 1 ounce Target Load is now underway at Lonoke. This run is being made based on positive product evaluation results obtained by Bridgeport and Ilion Research with the experimental run sample. Product acceptance testing of the trial and pilot sample will begin shortly.

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Primer Improvement Program

Fuelless mixture, containing only Polinol, Sensol, and barium nitrate, continues to show promise as a solution to the nitrocellulose procurement problem. Ignition performance has been evaluated in 12, 20 and 28 gauge target, SP12H mag, DP16 and 20, SP16 C mag and 10 gauge loads. The primer was also tested with Hercules Red Dot 15 powder (a reloading powder) in the 12 gauge Target Loads. Performance is essentially the same as 1024 mixture. A change to either of these mixtures from 5074 will require powder changes in some cases.

Primers have been made with two versions of domed cups to select the optimum cup shape for the best piercing and sensitivity performance and to confirm previous test findings. These primer cups were produced on a production press. Annealed anvils as well as anvils made from quarter-hard and half-hard brass are included in the test which will be completed in two weeks.

It appears that a change in primer cup cupping punches and perhaps some minor changes in primer assembly tooling are the only changes required to effect the improvement in piercing and sensitivity.

Wad Improvement and Cost Reduction

An experimental loading run of 28 gauge field loads assembled with the modified (stiffening struts) "POWER PISTON" wad was completed in early November and evaluation tests are presently being performed.

357 Rem. Max. 158 Grain SJHP

An experimental run of 5000 service and 5000 proof loads was made and tested with good performance exhibited in all test categories. Based on these results, the Technical Data Package was transmitted to Production and their trial and pilot run has been completed. Approximately 220M service rounds and 70M proof loads were produced and Technical Services is currently testing the product. Product specifications were also transmitted to SAAMI, who in turn, has forwarded this information to SAAMI members.

ER&D FIELD GROUP

Shotshell Body Forming Equipment

Repair work on the Bridgeport machine system continues. The new main cam was reinstalled. The bulk of fabrication orders and commercial items have been received and reassembly is underway.

In addition to the repair work, upgrading of the body former and heat set modules was undertaken. This work is also progressing well. We expect to complete all work on schedule and have the equipment back in operating condition on January 7, 1983.

Paper Covered Flash Hole Primer Equipment

Both machine systems, one at each ammunition plant, are in operation. Modifications and debugging are complete. The equipment is operating satisfactorily. Manuals are being issued and the project closing notices are circulating.

Center Fire Modernization - Bullet Assembly

The machine is installed and all modifications have been completed. Debugging is in progress and machine performance looks good. The experimental run has been delayed due to a shortage of bullet jackets. It is expected the machine will be ready for trial and pilot operation 1st week in December.

Jacket Draw

The press is installed and in operation. Essentially all modifications have been completed and equipment performance has been good. The press ran an average overall efficiency of 75% (vs. 65% goal) over the last eight shifts. Documentation for this equipment is about 95% complete. Turnover to Production will be initiated in December.

Header

The machine is installed and being debugged. An experimental run demonstrated the need to improve case insertion in the die block. These changes are in progress. Parts fabrication has delayed completion of modifications to the first week of December. It is estimated that this prototype will be fully operational by mid-December.

Components made from the experimental run were finished as 30-06 Spfd. and 270 Win. cases and tested under severe conditions in ballistics with satisfactory results.

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Turret Trim/Headturn (Pistol)

The equipment is installed and the experimental run is complete. After several eight-hour runs, some debugging was found to be necessary to eliminate periodic jams and product scratches. That work is complete and extended runs are underway. Equipment performance appears good. Trial and pilot will be scheduled by Production upon equipment release by ER&D.

Body Anneal/Taper/Mouth Anneal (Rifle)

The taper press is installed and being tested. Performance is good.

The new gas carburation unit is installed and in routine production use.

The new annealers are about ready for delivery from A&M Tool Company. Minor changes were necessary for equipment acceptance. Delivery date is set for early December.

The automatic lubrication system is still being developed with good progress being made.

Installation of the combined system will be scheduled by Production.

Loader

An acceptance test is scheduled for early December at EDL. If all goes as expected, the equipment will be shipped promptly to Lonoke. Production will schedule installation.

Progressive Shell Draw

Sample lots of 30-06 shells have been sent to Lonoke for production testing. The shells are being processed at this time. To date no problems have been reported.

EDL is currently producing sample lots of .357 magnum shells for testing.

Die set modifications resulted in uniform, high quality 30-06 shells. However, some difficulties are being encountered with .357 shell uniformity. Progress is being made and sample shells should be available the first week in December.

RESEARCH PERSONNEL

Remington Roll

	<u>Actual</u> <u>10-31-82</u>	<u>Actual</u> <u>11-30-82</u>	<u>Forecast</u> <u>12-31-82</u>
Exempt	66	66	62
Nonexempt	23	23	23
Wage Roll	22	22	22
Total	<u>111</u>	<u>111</u>	<u>107</u>

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