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REMINGTON ARMS COMPANY, INC.
FIREARMS MODERNIZATION DIVISION
QUARTERLY PROGRESS REPORT
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FIREARMS MODERNIZATION

- Receiver Flexible Manufacturing System

The Engineering Department has recently completed the CCE & VGA estimates for the prototype and production projects and presented the results for Remington review. Project economics will now be generated and presented to Remington management along with the current plans for prototype and production facility projects.

- Wood Shop Flexible Manufacturing System

1. CNC Long Stock Inletter

The Heian machine has been recently delivered and installed at Ilion. Two Heian technicians are currently assisting Remington with machine set-up and check-out. Machine accuracy will be confirmed before Trial and Pilot operations begin. Production is scheduled to begin on the M/7 stock in May.

2. Rotary Bell Atomizers

Quality problems discovered in the initial Trial & Pilot testing of the DeVilbiss atomizers have forced production to continue using the old Graco guns. G. E. Mulhern and J. G. Kreuer, Du Pont Service Representatives, were on plant 3/8-9 to assist in implementing a testing program. A possible cause for the quality problems was discovered and additional testing has been planned in April to confirm the results.

- GFM Automation

Detailed design work is progressing on schedule on the control system and site preparation requirements. The hardware required to convert the first GFM group is being ordered and installation is scheduled in the 3Q'83.

- Flexible Manufacturing System - Miscellaneous Small Metal Components

Preliminary machining tests are scheduled for the R & D NC Shop to develop cycle time and tool life data. EDL is designing and fabricating prototype breech bolt fixturing for additional testing scheduled in June.

- Automatic Breech Bolt and Fire Control Assembly

The following assemblies have been selected for inclusion in the initial system; shotgun breech bolt, common trigger, M/700-7 trigger housing, and shotgun carrier.

EDL is currently fabricating prototype assembly stations for economic and technical evaluation. Preliminary testing is scheduled to begin in April.

- Ultraviolet Wood Finishing

Recent tests conducted by Remington personnel at the vendor's facility were favorable utilizing both urethane and polyester finishes. Additional testing is being scheduled in May to continue process development, determine the economic potential, and address the toxicity question.

Dr. Vest of Marshall Laboratory, has been contacted for assistance in improving Remington's wood finishing processes. He reminded us that Du Pont had gone out of the wood finishing business several years ago but he agreed to canvass Marshall Lab for any wood experience and review the possibilities of providing assistance.

- Office Computer System

The desk top computer system proposed for the Firearms Modernization offices has been approved and ordered.

The system is scheduled for installation in the second quarter of 1983.

- Serial Number Recording System - Phase I

The SNRS - Phase II project was approved in January. Detailed system performance specifications are currently being prepared with plant assistance to insure optimum production compatibility. Upon completion, Purchasing will request a quote from the SNRS vendor, Computer Identics Corporation.

Receiver Flexible Manufacturing System

Remington and EDL personnel have developed a conceptual FMS system for manufacturing rectangular and bolt action receivers. The main machining component, a four spindle CNC machining center, will be custom built to meet Remington's requirements.

To insure the rapid development of this manufacturing technology, management has approved Preliminary Design and Estimate (P&E) funding of \$600M. The P&E scope includes the design and construction cost estimate for a prototype system project and authorizes the Engineering Department to order limiting hardware.

The prototype project scope will include a demonstration of all critical system technology including, the machine and fixturing, tooling and tool support, the inspection and material handling concepts and the computer communication system required to tie these components together. The prototype project is scheduled to be ready for authorization in April.

A revised quote for the four spindle CNC machine was presented to Du Pont and Remington by Snyder in Wilmington on March 17th. This quote reflects their December 21, 1982 price plus additions for items requested by EDL.

Du Pont Purchasing and Snyder are currently working on a equitable method of price escalation beyond 1983 to be agreed upon before a formal purchase order is released.

The Engineering Department has recently completed the CCE & VGA estimates for the prototype and production projects and presented the results for Remington review. Project economics will now be generated and presented to Remington management along with the current plans for prototype and production facility projects.

Wood Shop Flexible Manufacturing System

Conceptual long range modernization plans for the Wood Shop include a flexible machining system (FMS) for machining and sanding. Engineering work has been initiated (but temporarily delayed) to develop a CNC work station capable of carving stocks to closer tolerances. With closer carving tolerances it is anticipated stock sanding, which is presently done by hand, can also be performed on a CNC station. These CNC work stations would become the basis for an FMS in the wood machining area.

The modernization study of the Wood Shop brought to light two cost reduction proposals that have been spun off into separate projects to provide earlier benefits.

1. CNC Long Stock Inletter

The Heian machine has been recently delivered and installed at Ilion. Two Heian technicians are currently assisting Remington with machine set-up and check-out. Machine accuracy will be confirmed before Trial and Pilot operations begin. Production is scheduled to begin on the M/7 stock in May.

2. Rotary Bell Atomizers

Review of the wood finishing area indicated that an improvement would result by replacing the present Graco electrostatic spray system with one of the recently developed spray systems. Trials indicate that DeVilbiss rotary bell atomizers for electrostatic spraying would reduce material usage over 40% and increase the finish quality.

Quality problems discovered in the initial Trial & Pilot testing of the DeVilbiss atomizers have forced production to continue using the old Graco guns. G. E. Mulhern and J. G. Kreuer, Du Pont Service Representatives, were on plant 3/8-9 to assist in implementing a testing program. A possible cause for the quality problems was discovered and additional testing has been planned in April to confirm the results. In addition, DeVilbiss Engineers and Service Representatives have been contacted to correct minor problems discovered in the atomizer controls.

GFM Automation

Remington and EDL personnel have developed a robot system designed to automate the shotgun GFM machines. The total system will be capable of loading and unloading the GFM machines, stripping the finished barrel from the mandrel, reassembling the barrel blank and the mandrel, and loading and unloading the automatic cutoff machine. The automated system will require purchase of a hydraulic operated robot and construction of a new designed mandrel assembly/stripping machine.

The new mandrel assembly/stripping machine will be grouped with the GFM and cut-off machine such that all can be operated by the robot. The cut-off machine will be equipped with automatic clamping to accommodate robot loading.

An Appropriation Request for \$570M to automate two shotgun GFM groups has been authorized.

Detailed design work is progressing on schedule on the control system and site preparation requirements. The hardware required to convert the first GFM group is being ordered and installation is scheduled in the 3Q'83.

Flexible Manufacturing System - Miscellaneous Small Metal Components

The Firearms Modernization group has initiated development of an FMS system for machining smaller metal firearms components. Shotgun breech bolts have been selected for initial development due to the high volume requirements and a large savings potential.

The initial conceptual design has been completed. The system will utilize CNC multi-spindle machining centers in combination with existing machines. Material handling and machine loading will be handled by a combination of operators, conveyors, and robots.

To determine the economic and technical feasibility of the conceptual design, machining tests will be required for breech bolts and other components.

Current plans include preliminary testing to be conducted in the R & D NC Shop to develop cycle time and tool life data. Concurrently, EDL is continuing to design and fabricate prototype breech bolt fixturing with completion scheduled for May.

Hitachi Seiki, a builder of CNC machine tools and designer of manufacturing systems, has been contacted to review the application and consider the feasibility of using their standard system components. Their proposal, to be completed in 2Q'83, could provide additional system concepts which may be valuable in developing the final FMS.

Automatic Breech Bolt And Fire Control Assembly

The current shotgun breech bolt assembly process is entirely manual and requires six full time operators to meet production volumes. Remington and EDL have developed a flexible assembly concept based on a robot assisted process. The system will be primarily a programmable robot working with various assembly worktables.

The following assemblies have been selected for inclusion in the initial system; shotgun breech bolt, common trigger, M/700-7 trigger housing, and shotgun carrier.

EDL is currently fabricating prototype assembly stations for economic and technical evaluation. Preliminary testing is scheduled to begin in April.

Ultraviolet Wood Finishing

Remington is currently investigating the feasibility of utilizing ultraviolet finishing on all wood products. Ultraviolet finishing is a process in which a specially formulated, 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 for curing, 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.

The main area of concern is the high toxicity of the U.V. finish and whether such a finish could be safely adopted by Remington.

Recent tests conducted by Remington personnel at the vendor's facility were favorable utilizing both urethane and polyester finishes. Additional testing is being scheduled in May to continue process development, determine the economic potential, and address the toxicity question.

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

In addition, Bob Vest of Marshall Laboratory was contacted for assistance in improving Remington's wood finishing processes. Dr. Vest reminded Remington that Du Pont had gone out of the wood finishing business several years ago but he would canvass Marshall Lab for any wood experience and review the possibilities of providing assistance.

Office Computer System

The desk top computer system proposed for the Firearms Modernization offices has been approved and ordered. (P.O. 82765 - \$7M).

In addition to having the ability to handle the word processing needs of the group, this Digital Equipment DEC Mate II system has the additional advantage of being able to function as a VT-100 terminal and as such, provide the means of accessing existing engineering software available at Wilmington locations.

The system is scheduled for installation in the second quarter of 1983.

Serial Number Recording System - Phase II

The Serial Number Recording System (SNRS) is a computerized data collecting and storage system. It uses bar coding technology to efficiently and accurately collect production totals. It has been in operation at the Ilion plant since early 1981.

SNRS- Phase II will expand the current system to include shipping and inventory control. Benefits will include automatic data collection and processing, improved inventory control, and greater shipping record accuracy.

The SNRS - Phase II project was approved in January. Detailed system performance specifications are currently being prepared with plant assistance to insure optimum production compatibility. Upon completion, Purchasing will request a requote from the SNRS vendor,

Computer Identics Corporation.

Equipment delivery and software engineering is expected to require approximately five months after the order is placed. System installation is scheduled for 4Q'83 with a full system start-up in 1Q'84.