

ILION RESEARCH DIVISION  
MONTHLY PROGRESS REPORT  
DECEMBER 1978

MODEL 1100 WEIGHTED LT-20, 28 & 410 GA. SKEET SETS

Marketings evaluation selected the weight system simulating the standard frame 20 Gauge. Small Gauge M/1100's are now being assembled for test purposes. ~~Complete design testing should begin soon after this is completed.~~ Model drawings have been turned over to Process for estimating only.

X S G

The first model of the XSG Shotgun has temporarily stopped endurance testing at 2138 total rounds, due to a broken <sup>action</sup> inertia bar. The break occurred in the area where welding, for carrier dog notch adjustment, caused local annealing, ~~and softening of the inertia bar.~~

This model has been retrofit with the floating one piece piston ~~assembly~~ and bolt velocity data worked up with a pair of .086 orifice holes ~~and~~

~~to begin the endurance testing.~~  
<sup>action</sup> New inertia bar assemblies <sup>have been</sup> are now completed and testing will resume on the same gun after fitting and heat treating. The second <sup>test gun</sup> model, also containing a floating piston, <sup>will be</sup> ~~is now being assembled~~ <sup>after</sup> and component parts <sup>have been</sup> ~~being~~ heat treated.

The redesigned magazine cap detent system parts, containing larger detent wear surfaces are complete <sup>have been</sup> and installed in both test models. ~~These~~ components will begin testing upon resuming XSG model testing.

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XSG (Cont.'d)

A sealing band is being designed for the external piston diameter to promote better sealing and increase bolt velocities for the light loads, plus eliminate tight manufacturing tolerances for the piston.

MODEL 3200 4 GAUGE SKEET SETS

Patterns - The REMINGTON SKEET CHOKE can be used in .410, .28 and 20 gauge 3200 barrels. It cannot be used in 12 gauge because the end of the barrel gets too thin when counter-bored.

Changing the model drawings is all that is required ~~to make~~ to make this ~~change~~ change. This will be complete the first week in Jan.

Loading - The problem of "shell slips by ejector" is being investigated. *have been*  
The following solutions ~~were~~ explored ~~and rejected~~:

- Bending ejectors after assembly - this proved unsatisfactory when tried because of the loose fit of the ejector stems in the dove tail slots.
- Tight chambers - By using a SAAMI minimum chamber, clearance is reduced only .003 inches in the best case. This alone is not enough to cure the problem.
- Shortening the ejector throw - *This will help only for high base cases. ~~And it~~ would require addition parts and changes to the mono-block and ejectors.*

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MODEL 3200 4 GAUGE SKEET SETS (Cont'd)

- Ejector sliding at an angle to the bore - this solution may work. *thru*

*Have  
Ejector  
fitting*  
However, it would require extensive changes to the ejectors and to the mono-block.

Some competitive over/unders were measured to see how they solved the problem. The key seems to be very tight ejector stem fits in the mono-block. They have clearances from .000 to .005 where ours are .010 to .017.

The solution to the problem appears to be:

1. Tighten up ejector stem fits to the dove tail slot.
2. Retolerance the ejector so that the stem fit is assured.

~~Currently the ejector foot fit to the breech face is compromised.  
So the stem can be loose.~~

3. Tighten the chamber to SAAMI min.. *Production's* And the chambers should ~~not be polished after they are cut.~~

The details of this solution are being worked out. It is expected that only ejector and chamber dimensions will be affected. Drawings *for prototype parts* should be ~~modified~~ *changed* during the first week in January. *making parts*  
*by mid-* *union*

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MODEL 870 COMPETITION TRAP

✓ Formal drawing transmittal to Production will be completed upon approval of material and heat treat specifications by Chem. and Met. supervisor *(with the exception of the target trigger.)*

MODEL 700-600 FIRE CONTROL

*(Get Target Trigger Report from Brooks)*  
A layout of a new fire control has been completed. This fire control uses the sear block as found on the present safety and also has a trigger block that is actuated by the safety lever. Tolerancing and detailing will be done if the concept is accepted.

MODEL 600 CARBINE

Six rifles have been sent to H. Albaugh, Marketing, for the January Marketing focus panel.

MECHANICAL TRAP

Manuals ready for the printers. Should be received by mid-January.

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MODELS 7400-7600

At the present time one 7400 in .243 Win. and one 7400 in .308 Win. are undergoing velocity tests with the longer take down nut. The results will be available in 2-3 days. Function tests will be carried out with these rifles as soon as possible. The additional updated rifle tests will not be started until all of the final results from the previous tests have been compiled and analyzed. At present there is no intention to retest the 3006 except for magazine changes. *more*

?? The magazine followers are undergoing an audit to determine where the problems exist. ~~When complete, appropriate action will be taken to correct deficiencies to make the followers work.~~ Investigative design work is also being carried out on the magazine and its associated parts. ??

NYLON 66 IMPROVEMENTS

Prototype parts of the Bolt Lock are 80% complete, and pre-pilot ?? line testing will be started in January.

[Quotations for the barrel mounted scope mount are being reviewed.]  
Prototype parts will be made when it is determined which mount will be used.

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MODEL 6600

All ~~functional~~ prototype model shop parts are completed. Vendor parts are 5-6 weeks behind schedule. *why?*

A non-functioning prototype gun is being made, and will be ready for review in January.

MODEL 1100 - 870 IMPROVEMENTS

Ten (10) latches of the split variety with the maximum spread of .450 were inserted in Receivers and the guns were final assembled.

Two (2) of the latches slid out of position during assembly of the action bars but did not fall out of the Receivers. ~~These guns were then~~

~~warehoused.~~

*Assembly Procedures are being reviewed with production.*

M/870 Fore-end Tubes: The new samples with (4) spot welds per bar have not been tested as yet because of the heavy influx of testing on the M/1100

Magnum and M/7400. Testing of the fore-ends should resume the week of 1/8/79.

M/1100 Carriers: *we are working on the side and Process engineering*  
~~Our vendor is working in conjunction with our Process~~  
*to the drawing dimensions for the heavier*  
~~Dept. for finalization of transmitting the heavier material for our carriers. As~~  
~~soon as this information is given to R & D, we will transmit.~~

BENCH REST BULLETS

6 mm Bench Rest Bullets - 60,000 bullets were shipped to warehouse this month.

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BENCH REST BULLETS (Cont'd)

- Investigation into cost reduction and improvement on the bullet job has been re-initiated to determine what is required to produce bullets at a profit. Proposals will be reviewed and submitted for evaluation.

Our bullet job operator has been the successful bidder for engraving job in Arms Service Division. A request to re-evaluate the job for the purpose of establishing proper classification and rate has been made. Job bidding for a new operator will be posted in early January. A 2-month training period will be required for the new operator. This will result in a substantial unit/cost increase during the training period.

PROCESS RESEARCH

ASEA MANIPULATOR

All of the manipulator hardware ~~ordered~~ has been received, and the unit is completely functional.

Jaws were made to fit the standard gripper to clamp on the end of centerfire Barrel blanks. The manipulator was programmed to simulate the machine loading of an Ajax upsetter, to <sup>evaluate</sup> ~~demonstrate~~ the unit's capabilities. The ~~very successful~~

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PROCESS RESEARCH (Cont'd)

ASEA MANIPULATOR (Cont'd)

test consisted of picking up a 1.031 - 1.036"  $\varnothing$  blank about 20" long, from "V" blocks, and after some demonstration maneuvering, the bar was inserted through a 1.063" hole, a distance of 12". The machine capability in both strength and accuracy appears much better than advertised.

A dial test stand has been built to check the O.D. position accuracy on a series of M/742 Receivers, as they are picked up and clamped internally with the ASEA designed gripper. From the test data we can determine what, if any, surface position feedback into the manipulator computer, might be necessary for individual Receivers, to assure relatively constant material removal during polishing. This test work has been started.

The polishing development area has now been moved to building 72-1 & a floor layout is being circulated. A protection wall or barrier will be necessary to insure the safety of curious people as this work progresses. The (2) surplus Devine polishing jacks that were part of the semi-automatic Shotgun Receiver radius polishers will be used for part of this work. Transfer arrangements are under way.

Two additional machines plus a dust collector remain to be procured. Acme has quoted, however their equipment appears more cumbersome and not as versatile as the Devine equipment observed during a recent visit. Devine's quote will be in shortly. Both prices are comparable.



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PROCESS RESEARCH (Cont'd)

CENTERFIRE RIVETLESS EXTRACTORS

Tooling to coin an Extractor anti-rotation surface into M/7400-7600 Breech Bolts has been designed and is being built by the Model Shop.

A Purchase Order has been given to H & P to provide 1000 Regular size rivetless Extractors to be made on temporary tooling. These will have the preferred .033" thick section under the claw. Delivery is expected in late February 1979.

20 Rivetless Extractors of all three sizes - Magnum, Small & Regular have been completed and are awaiting heat treatment. These have the current .024" thinner section under the claw. Comparable Bolts are being produced for adverse condition testing. All Centerfire Rifles except the M/742-760 will be tested.

The first Small Rivetless Extractor has been functioned tested to 100 rounds in an XP-100 with no extraction or ejection problems occurring.

P.E. & C. has been furnished with all pertinent Rivetless Extractor and Bolt Head modification information so that they can provide an estimate of tooling cost requirements along with new process sheets to I.E. for an economic evaluation.

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PROCESS RESEARCH (Cont'd)

AUTO-DRILL LINE

The order for a turnkey chip system to collect chips, recover their retained oil, and do all preliminary oil filtration has been signed and sent to the vendor. It was accompanied by a 5-page dissertation on the research involved in choosing the vendor. It is anticipated that the <sup>Chip System Design</sup> fabrication to be cast into the floor concrete, will be available for installation in April 1979, to the vendor's drawings.

Sandvik was visited on 12/5 when they were starting life tests on .906" Ø Ejector drills on 11.9" blanks of 1 1/2" Ø C-1140 Mod. steel. These will become useable 870-12-30 GFM blanks after turning. The test heads were fabricated from Sandvik's choice of carbides, which differ from our specs. In a surprise to them, they were able to drill over 300% further, than they had predicted. These results may make Ejector Drilling with its throw-away heads, an attractive alternative, to replace the proposed twin-jet two-flute spade type drills which require regrinding.

The Wagner Saw people were also contacted ~~on this date~~ to review the inclusion of their controls into the overall automation. Considerable thought must be given to the handling of emergency stops for any reason, plus the subsequent start-up sequencing, to avoid cutter breakage or handling jam-ups.

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PROCESS RESEARCH (Cont'd)

AUTO DRILL LINE (Cont'd)

All the operating units, no matter what source, will be tied together electrically from one main operating console for automatic operation. Complete system emergency stop buttons will be placed in several convenient locations, within the area. In addition, each will be functional in a manual mode from its own panel.

M/1100 INTEGRAL FORMED EJECTORS

Ejectors with a 30° rearward inclined surface were formed into several 12 Ga. - 2 3/4" Barrels at various positions along the extensions. During <sup>field</sup> testing, those from the current Ejector position to .100" rearward produced malfunction free ejection.

A few 12 Ga. Magnum Barrels with contoured ports have been produced with the formed Ejectors, but, as is the case with the current pin type Ejector, testing, so far has not produced satisfactory ejection.

It appears that considerable testing will still be needed to determine an optimum formed Ejector, both in position & surface angle to satisfy all gages, and all shell lengths, in both standard & contoured ports, using all brands of shells.

It is evident, however, from the limited testing done, that with the right combination of position and surface, that satisfactory ejection can be accomplished.

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PROCESS RESEARCH (Cont'd)

M/1100 INTEGRAL FORMED EJECTORS (Cont'd)

The formed Ejector appears to withstand wear as good and perhaps better than the pin type. Ejector marking on the shell bases is negligible even on 12 Ga. - 3" Magnum fired cases.

Temporary tooling is now being made to test other inclined & compounded angle ejection surfaces to investigate an optimum combination. ~~Permanent type~~ Tooling for the M/1100 LT-20 Barrels is being designed, which could be used for regular production, once the optimum has been established.