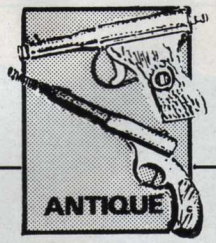


Meteor on the move

Les Wilson follows the manufacture of the BSA Meteor

HAVING COMPLETED the previous two articles for *Airgun World* on the BSA Meteor air rifle, I was curious to see what changes had taken place in production since its introduction 26 years ago.

Last month James Edmiston, the new owner of BSA Guns Limited, invited me to the BSA works in Small Heath, Birmingham for a guided tour of the Meteor production line.

A year or so ago the entire BSA factory was consolidated and the works and offices were rehoused in a newly equipped, modernised single unit next door to the old factory site.

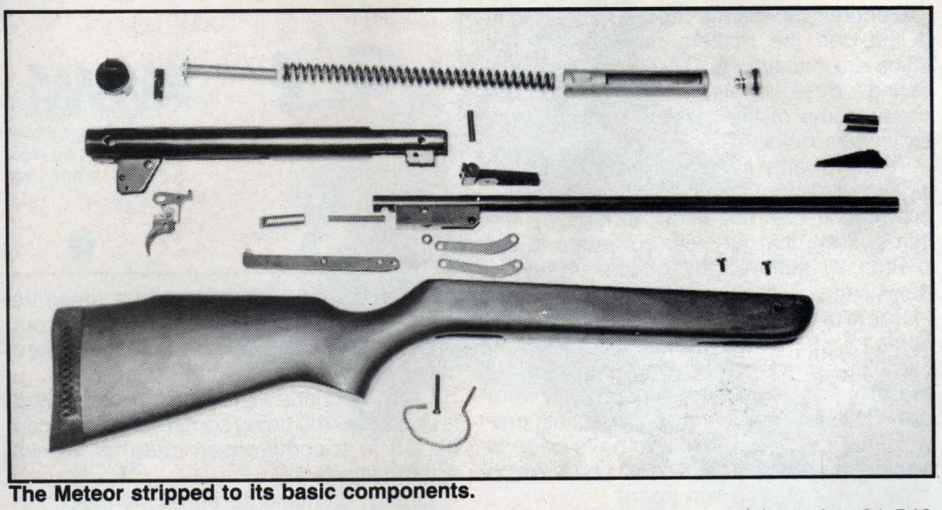
The works superintendent, Brian Coy, started my tour of inspection at the barrel mill. As readers will appreciate, any air rifle is only as good as its barrel, and barrel manufacture is a skill and craft perfected by BSA since the company's formation in 1861.

BSA have always been the largest supplier of rifled barrels in the UK, and the quantity of rifled arms produced by the company runs into millions. It is this experience which gives BSA air rifle barrels their excellent reputation.

Cut 16½ inch lengths of special drawn steel are received at the barrel mill from the Midland suppliers and are drilled, three at a time, on a gun drilling machine. The bars are rotated in the opposite direction to the special carbide cutting bits which are fed with oil at high pressure to lubricate the cutting edge and float the swarf out of the bore.

This process cannot be hurried, as the concentricity and finish of this precision drilling dictates the final accuracy of the rifle.

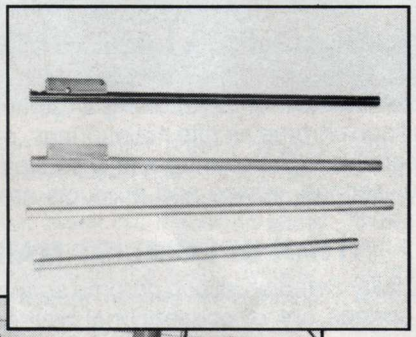
Ten minutes later the barrel, with its slightly over-sized bore, is ready for cold swageing of the rifling.



The Meteor stripped to its basic components.

Instead of each groove of the rifling being cut individually, the rifling in BSA barrels is hammered into the bore. A hardened mandril on which the impression of the rifling is cut is inserted into the bore, and the outside of the barrel is hammered by four specially shaped dies.

This hammering of 30 blows per second gives the inside and outside of the barrel a hardened, smooth finish and results in the barrel being stretched from 16½ ins to 19 ins reducing the diameter by almost .1 ins.



Right: the four stages, from drilled bar before swageing (bottom) to finished barrel (top).

Each Meteor barrel is subjected to 21,542 hammer blows by this machine!

After being ground to final size, the barrels are crowned and recessed at the muzzle, and the breech end is machined for the barrel seal washer and chambered. The famous BSA 'piled arms' trade mark is impressed and the barrel block induction brazed in position. The barrel is now cleaned and passed to the barrel setter, who checks each one for bore finish and straightness.

Barrel setting is one of gunmaking's oldest skills. At BSA it is still carried out in the traditional manner with the setter shadow viewing the bore for straightness and correcting any distortions with one blow from his special hammer.

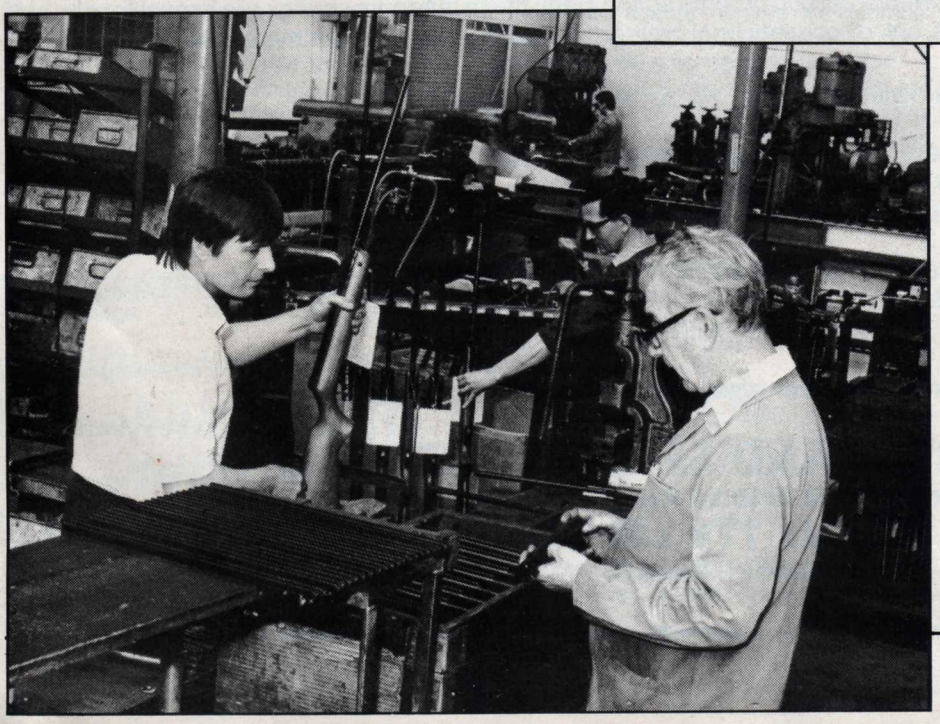
Setting is a skill requiring many years of training, perfect eyesight and delicate use of the hammer. BSA's Albert Hough has 51 years service, and his skill is one which cannot be replaced by a machine or computer — like so many of the old gunmaking traditions.

The air cylinder is made by raising and pressing a flat steel sheet requiring six separate operations before it reaches its familiar shape. The cylinder end plug — in which the transfer port will later be drilled — together with the side plates, are brazed in position, and the assembled cylinder is checked for air tightness under high pressure in a water tank.

The telescopic sight grooves are machined into the cylinder, which is polished internally to produce a perfectly parallel bore for the piston to operate.

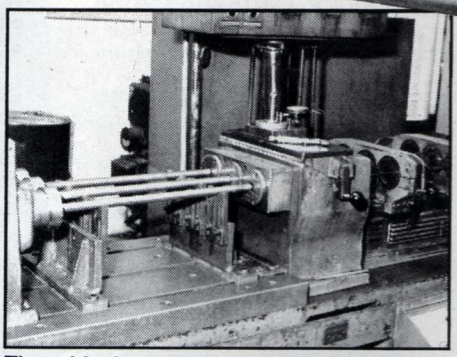
I was then taken to see how every barrel and cylinder is carefully matched up and hand polished in preparation for the special Meteor finish.

This finish — unique to BSA — consists of a sprayed-on tough enamel, the recipe for which is still a closely guarded secret!



Left: part of the Meteor assembly line.

Top: The 1959 Mk I Meteor and sight. Bottom: The latest Meteor Super with telescopic sight.



Three blanks on the gun drilling machine.

After application, the components are baked for 20 minutes at over 600°F. This is double the baking time for normal stove enamel and is why most old and second hand Meteors rarely show any signs of wear to the metal finish.

The other components, such as pistons, sights, trigger guards etc, are all assembled in the factory. Some of the moulded nylon parts are purchased from specialist suppliers, as are Meteor stocks — which are also manufactured to BSA's specification by an outside contractor.

The barrels, cylinders and all other components are thoroughly inspected during and after manufacture and I was fascinated by the Meteor assembly department, where all the parts are put together. Talking to the craftsmen who carry out assembly, I learnt the reasons why the Meteor has such a high performance for such a small air rifle.

The high consistent power output is achieved by a combination of a lightweight piston body, the unique BSA 'Power Seal' piston head assembly, a high quality Birmingham made mainspring and, most importantly, an air transfer port with a size calculated to give the optimum performance.

It is a common fallacy among DIY airgun tuners that power can be increased by increasing the air transfer port. In practice, this modification actually decreases the efficiency of most rifles and, in the case of the Meteor, is a complete disaster.

The mainspring is another feature that can affect performance. The factory mainspring is designed to give consistent performance. As the Meteor is often a 'first' rifle, it must be easy to cock, and this was taken into consideration when the spring was designed.

Some specialist spring makers, such as P. & J. Springs of Birmingham, can supply quality steel mainsprings which ensure maximum performance for a very long period of use. Even these heavy duty mainsprings are made to the same specification as the standard factory spring as regards diameter, quantity of coils and most important, size and shape of wire used.

Fitting mainsprings intended for other makes of rifle or of unproven design could give inconsistent results in the Meteor, as well as causing increased wear and tear.

The 'Power Seal' piston head is difficult to improve upon. Its special fitting to the piston ensures that the unit is self centring in the cylinder and the flexible neoprene sealing ring produces a perfect airtight seal.

During assembly, I noticed that grease or oil was used very sparingly. Before assembly, the piston head is lightly smeared with a grease containing molybdenum disulphide, and the mainspring is very sparingly coated with Young's 303 oil. I was told that over-lubrication can only adversely affect performance and, in extreme cases, can cause serious damage to the mechanism, particularly if dieselling occurs.

Another special feature pointed out to me was the Meteor's muzzle. This is countersunk to a depth of 1¼ ins — for two important reasons. The first is to protect the muzzle end of the rifled bore — essential for precise accuracy for which BSA barrels are famous.

The second was a reason which had never occurred to me before. BSA foresights are either fitted onto integral ramps or, as with the air rifle range, the ramp is screwed to the barrel. The threaded screw hole is drilled into the recessed portion of the muzzle, making any damage or distortion to the rifled bore impossible and allowing the thread to be cut at the bottom of the hole.

A cheaper method of foresight fixing used on other makes is actually to press dovetail grooves into the barrel to accommodate a foresight fitment. The action of this pressing operation can distort the bore at the muzzle, causing minute dents. For marketing purposes, this distortion is often referred to as a 'choke'. It does not adversely affect accuracy with lead pellets, but the removal of this 'choked' portion of the barrel during customising sometimes produces a startling increase in accuracy, especially with nylon skirted pellets.

When the Meteor has been completely assembled, the familiar yellow inspection tag is attached and every mechanical feature of the rifle is given a final quality control check. It is then tested on the test range.

The range officer visually inspects each rifle and five or six pellets are fired to clear any grease or oil from the barrel and cylinder. Five shots are then fired over a chronograph to confirm that every rifle leaves the factory with a muzzle energy within the legal limit of 12 ft lbs.

The rifle is then fitted into a test rig and a group of ten shots fired at 25 yards. When the range officer is satisfied with the group size using Pylarm pellets, he fits a special sighting scope which allows the rifle's sights to be zeroed on to the group. Every Meteor rifle leaves the factory zeroed at 25 yards.

The final operation is packaging the finished Meteor in its expanded polystyrene mould and inserting the BSA shooting kit or targets, target holder, oil, pellets and instruction leaflet, not forgetting the safety leaflet *Gun Sense is Good Sense.*

Now that BSA Guns is under new ownership, many exciting new models are being developed, but even after careful and extensive study the Meteor is still the bread and butter production item at Small Heath — and it is doubtful if its well proven design will alter radically in the near future.

Each barrel is checked for straightness.