

NEW CYCLE WORKS FOR B.S.A.

WAVERLEY FACTORY
NOW IN FULL PRODUCTION

By R. H. THOMAS



Wheel lacing

AS I approached the main gate of a factory at the end of a quiet road in Small Heath, Birmingham, several fully-laden lorries pulled smoothly away, but before they gathered speed I was able to read some of the far-away destinations stencilled on the sides of the cases, packed for travel to distant parts. In them were B.S.A. bicycles, leaving the new B.S.A. Waverley works to earn foreign currency for Britain, give good service and uphold the prestige of British craftsmanship throughout the world.

Once inside the works the general impression was of smoothness and orderliness, for these new premises house the latest equipment available for cycle manufacture, the plant being laid out with the benefit of all the knowledge of cycle production gained by the B.S.A. concern over a long period of experience.

Ambitious programme

Finally finished at the end of 1949, the factory represents the completion of an ambitious rebuilding programme commenced in 1946. This task of reconstruction was not an easy one, for 75 per cent of the original plant and buildings was destroyed by enemy air attack, after which vital war production was carried on in almost impossible conditions for many months until the works had been patched up. Salvaging plant from under fallen

roofs and walls took about a year, but normal pre-war production was obtained four or five months after the occurrence.

Now, as a result of the start made in 1946, there stands a new works with three main shops of steel and brick construction, two of which are absolutely new and the other considerably rebuilt, three large aircraft hangars which were brought down from the Hebrides, certain auxiliary shops, and a boiler house for heating purposes which is reputed to be one of the most modern in the Midlands.

Not quite completed is the modern canteen, but when finished this will match the works for layout and equipment. When discussing the canteen, one of the B.S.A. officials paid tribute to the workers, who, he emphasized, had carried on splendidly during the war and during reconstruction.

Despite the size of the factory, it is easy to follow the production of the complete machine, for the work flows in natural sequence through each shop with a minimum of handling. The three main buildings are in line, so that the transfer of work on completion in one shop to the next is a simple task done under cover.

Operations commence in the frame-building shop. From the rough stores, tubing is fed to the tube-manipulation section, in which chain and seat stays are swaged, domed and trapped as necessary, frame tubes cut to length and mitred in the same operation, and one or two small



Polished components are loaded on to frame jigs and taken to the plating plant

machining and drilling operations carried out. After this the material is passed to the tube-manipulation stores, which are located at the head of the sub-assembly benches.

Air-operated fixtures

Material is fed in sets of 1,000 direct from these stores to the sub-assembly benches, which feed in the direction of the work-flow and on which the operators part-assemble the frame diamonds. This is mainly a matter of fitting lugs to tubes and is carried out by the use of air-operated fixtures.

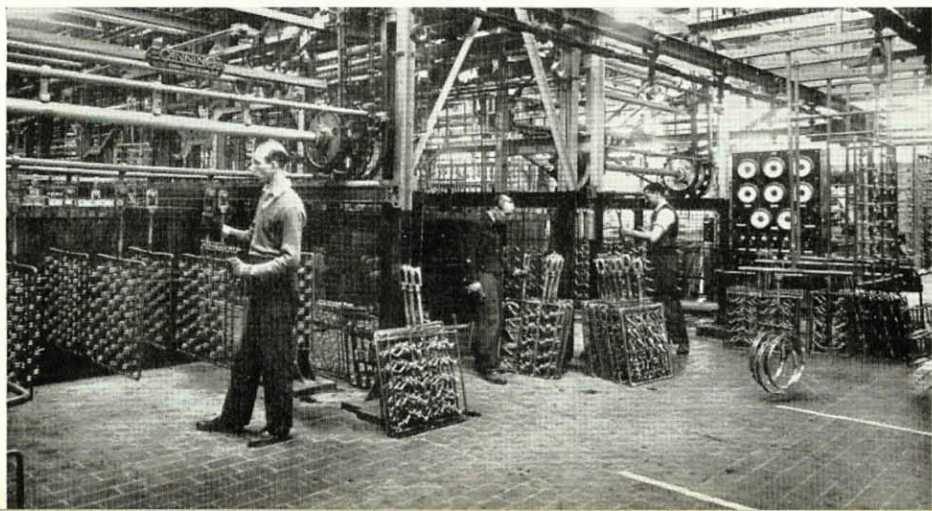
At the end of these benches are located the master jigs for diamond assembly. These are also air-operated and reduce normal labour to a minimum. As each frame diamond is completed, the operator hangs it on an overhead conveyor which

delivers it direct to the brazing hearths for the first brazing operation.

There are seven of these hearths, ranged against one of the outer walls, all completely automatic four-station rotary designs. Frames or part frames are attached in pairs at the loading station. The carriers take one-quarter of a complete turn at regular intervals, moving the work to the next operation, when the carrier lowers itself and brings the work to the correct position. Following loading is the pre-heating stage, then dip-brazing, after which the work comes to the removal point where surplus brass is brushed off. The frame is removed and set while hot by the hearth operator on a jig nearby, this hot setting eliminating distortion and stress.

Once more by overhead conveyor the work travels to the backing section, which is next to the frame assembly section in

From the jiggling benches parts are passed through the automatic plating plant





order of work flow. Frame backs are built by the side of the backing station, passed across and fitted by air-operated jigs. At this stage the frame passes on to the next station for bridging the stays, the bridges being welded in position.

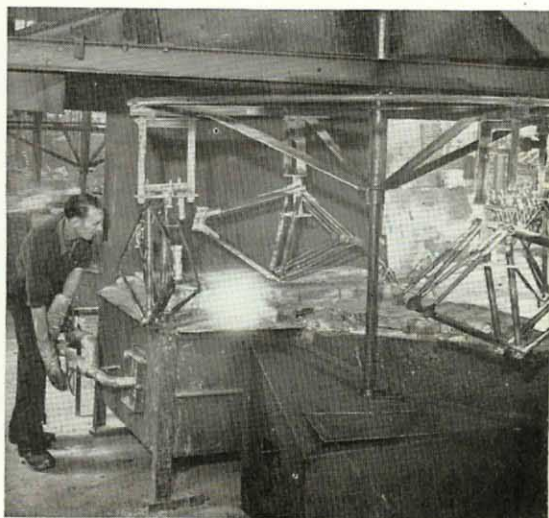
Automatic deburring plant

Another conveyor journey to the brazing hearth for completion in this section is followed by de-boraxing and deburring in a fully automatic electrolytic plant. Frames are fed on to the conveyor passing through the plant and emerge the other end with the operation completed.

Machining follows, the bottom brackets being reamed, top and bottom head lugs form milled, seat tube slit and reamed to remove surplus brass. The frame then goes by conveyor for checking and setting.

Using a datum fixed on the bottom bracket, the bottom rail and top tube are aligned first, followed by an alignment check of the head and the seat tube. Next the rear stays are aligned with the front diamond and the frame finally checked. When the frame is true the rear stay ends on the club models are slotted on a press in one operation to facilitate correct wheel alignment.

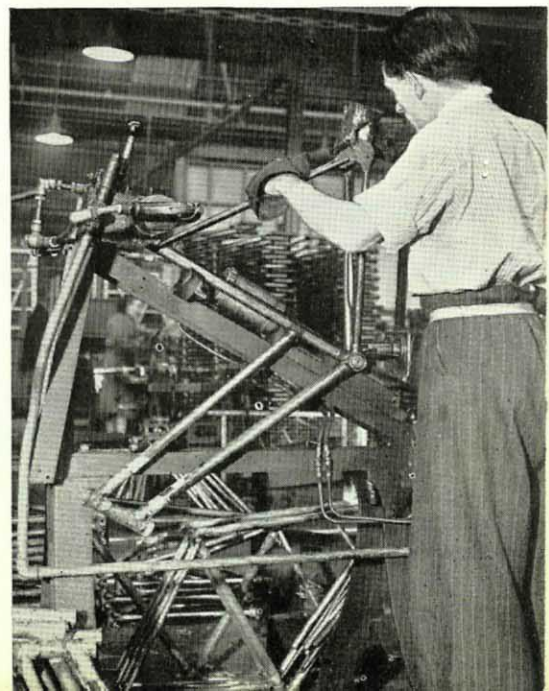
Frames are next shot-blasted and con-

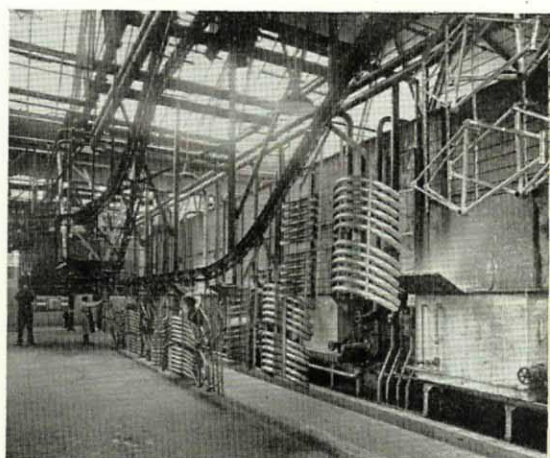
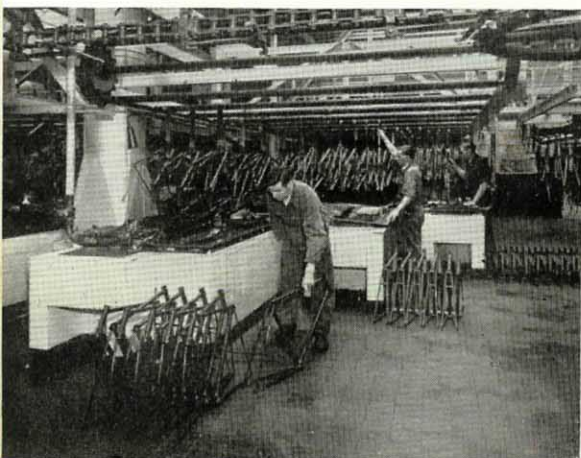


Left: Cut-off tubes and lugs are assembled on pneumatically operated fixtures ready for conveyance to the automatic brazing hearths

Right: Assembled frames are placed on an automatic rotary brazing hearth and are afterwards hot set to eliminate distortion and stress

Below: Fixing seat and chain stays to complete the assembly of the rear triangle. Frame is placed in the jig and the assembly riveted for brazing





After passing through the automatic bonderizing plant shown in the right-hand picture, enamelled parts are dipped and conveyed through the stoving ovens (left) in readiness for the finishing coats

then hung on a conveyor to pass through the oven. Between the tank and the oven is a long inclined slab, tiled all over, to catch surplus paint drippings and return them to a collecting tank at the bottom. Surplus paint is pumped back to the paint store, cleaned and returned to circulation.

Finishing

All frames, whatever the finished colour, receive the first black coat. Frames to be finished black go through the first oven again and then to number two oven for final dip and stoving. Coloured frames proceed from the first oven to the third to receive their first coat of colour, being returned and passed through again for finish coat. Three different colour tanks are maintained on the colour line.

Forks go through as the frames. Mudguards go through the fourth oven separately, receiving a first coat of black and a second of colour in number three, returning to the fifth oven for the addition of the white tail. Small parts are dealt with in a sixth oven.

After enamelling, the parts go to the frame and fork storage section. All parts are kept in racks and during this storage the enamel can harden naturally. As

and when requirements are known, the frames and forks are brought to the lining section on trucks, after which they are stoved, transfers added, stoved again, and sent direct to the assembly bins.

Polishing and plating is done in ideal conditions. The polishing shop is again well illuminated, a necessary adjunct for such a job, and the atmosphere, for this one-time dirty job, is amazing. Air is clear and conditions ideal. Extraction is by individual hoods to each polishing lathe, and between the lathes is trunking connecting to a vertical extractor shaft. All dust is removed immediately, and fresh air fed into the shop under pressure from a central ducting in the roof. This air is heated as required to provide a good working temperature.

Parts to be plated are degreased and passed to the wirers who wire them or mount them on jigs on the plating frames, which are then conveyed to the plating shop. Running the length of this shop are two very large plating plants in which the parts are nickelled and chromium plated automatically. Parts are then de-wired and taken to stores, and by now all components are ready to meet in the main assembly shop.

Again, the atmosphere of speed without haste manifests itself. Work flows through the main assembly shop smoothly yet, as



The finished assembly is carried out on the production conveyor lines shown above. Below is the export packing department from where crates of B.S.A. cycles are dispatched to all parts of the world

production figures tell, at great volume. Such an atmosphere of unfurried speed can only come from careful production planning.

Assembly Stores

At the head of the shop is the small-part assembly stores from which parts are fed on to counters at the head of the lines of sub-assembly conveyors. These are the "flow-line" type, made by Fisher and Ludlow. On these lines such parts as hubs, brakes, pedals and handle-bars are assembled and passed to the sub-assembly stores at the other end of the line.

From this latter stores the parts are passed via a counter to the main assembly conveyors. All other parts feed round the shop to the beginning of the main assembly line. Frames are fed from their own stores to the shop and have the badges fixed, bottom brackets tapped and enamel cleaned out, and oil holes drilled.

After this point the frame meets the gearing section from another stores which also distributes "bought out" components. Frames are fitted with bottom bracket assemblies, the forks meet up with the frames and from this point they go to the head of the main assembly lines.

(Concluded on next page)



New Cycle Factory for B.S.A. *Continued from page 35*

At the head of the shop, on the other side to the small-parts assembly stores, is the wheel building section. A central stores feeds to counters on both sides. On the other side of these counters operators lace the wheels and place them on a gravity conveyor for delivery to the pulling-up section, this operation being done with automatic-powered screw-drivers. Truing is completed by an optical system, the wheel then being conveyed by an endless overhead conveyor for spoke grinding. Conveyed again to the tyreing section, the wheel is finally carried to stores. Throughout this section, fittings and racks are so placed that no operator has to move to collect or deliver the parts or finished goods.

Finished wheels meet the mudguards and join the main assembly line at the head. Adjustment and final inspection complete operations and cycles are conveyed overhead to the wrapping and packing department for the home market.

For overseas orders the system is not quite the same. The majority of cycles are exported in C.K.D. condition, even the wheels not being laced. In order to meet overseas requirements, the various parts side-track the main assembly line and go

direct to the export packing section which occupies considerable floor space.

The method of packing is interesting and is designed to be foolproof and guard against errors and omissions. In the export department are a large number of packing bays which must be checked to ensure they are empty before the assembly of each order. All necessary parts are assembled in the bay, checked, re-viewed, packed in their cases—usually 25 machines to two crates—re-checked and then sealed and dispatched.

This assembly is for standard machines only. Special machines, with Reynolds 531 tubing and the like, are built in separate sections by skilled men.

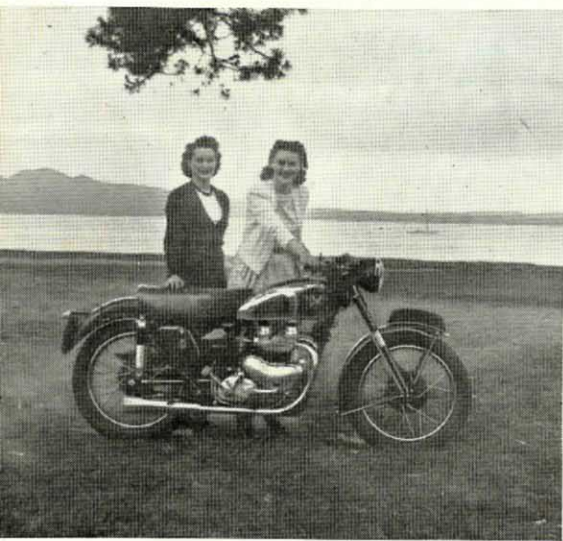
Much money has been spent on building and equipping the factory and behind this expenditure is the knowledge and experience of building high-class products over a long time.

Mechanization plays a large part, and manual operation and the attendant possibility of errors has been reduced to a minimum. The high standard of B.S.A. products has been maintained, and present-day knowledge utilized to the maximum to keep down costs and provide high-grade products at the lowest possible cost.

F.B.I. Register

NEARLY 6,000 firms and their products are listed in the 1949/50 F.B.I. Register of British Manufacturers, which is published for the Federation of British Industries by Kelly's Directories and Illiffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1. Bound in full cloth, its price is 42s., post free and its 807 pages include a vast amount of information of interest and usefulness to overseas buyers. Reference facilities in French and Spanish are included, while supporting the directory information is a comprehensive advertisement section printed in colour.

A delightful picture from Auckland showing two attractive New Zealanders with one of the new Matchless vertical twin-cylinder motor cycles



IceniCAM Information Service



www.icenicam.org.uk