PERFECTING THE PRODUCTION TECHNOLOGY
OF MEDICAL PRODUCTS

B. E. Apatovskii and A. A. Belinkin

The "Red Guard" Production Union produces hundreds of varieties of medical products. More than 75% of these products are produced in comparatively small lots.

In the Union factories, which prepare many different types of products, different technologies are involved. Because of this, installing progressive technology, mechanization, and automation causes significant difficulties.

Union production engineers, faced with the task of reducing the labor consumption of the items manufactured, seek production reserves and direct their energies primarily to perfecting those technological processes which have a general nature and are used in the production of many items. This justifies the allocation of supplementary material outlays. Perfection of production technology has also been attempted through the assimilation of new techniques and a raising of the products' technological level.

Sheet Stamping of Parts. Cold stamping processes are the most productive and progressive methods of metal processing. However, the large expenditures required to prepare the dies limit the use of the stamping processes to small lots and experimental production.

A means of stamping small sheet metal parts, which appears to be feasible for small production runs (1000 or fewer parts per year), was installed in our main factory. The essence of parts stamping consists of preparing the finished part by a successive stamping of standard dies. Each of these dies does only one operation of the total stamping. For example, an opening of a defined size and shape is attached, and the perimeter forms a rectangular contour of curved or straight line segments, etc. Using a constant selection by type and size of various standard dies, one can make, by cold stamping, numerous parts of sufficiently high accuracy with a minimal expenditure of preparation time.

At the factory, dies with interchangeable parts are used. The dies have fixed supports, which guarantees that the materials may be placed in a definite position. By an adjustment of the supports and changing tools (die and matrix), the workers obtain pieces of the required size and shape.

In the collection there are dies for punching round openings, slot cutters, radial right angle cutters, radial detail end cutters, and bending cutters.

Each die shape of the selection has a range of values available. To reduce the number of dies, the Union technologists have developed standard shapes and sizes.

The full efficiency of stamping is achieved only when not one, but a whole group of presses, up to 10 units (through a collection of basic blocks used in the enterprises of parts stamps), is organized in a universal stamping operation. In this case, all universal block dies are secured in the presses, and the process of parts stamping takes place continuously. It is preceded only by an adjustment of the necessary collection of dies to the exact measurements of the processed piece.

For stamping small details, crank shaft-hinged table presses of a power not greater than 5-7 m are required. In addition, small guillotine knives (of a power up to 10 tons), table lever knives (of special construction) for precise material layouts, and a bending table lathe are included. This system, which can be operated in factory conditions, is linearly arranged in order of use.

The annual economic saving from the use of parts stamping is 6000-7000 rubles.

Stamping on a Universal Revolving Press. The parts stamping process is effective in the preparation of articles up to 150-200 mm in size. Meanwhile, in modern apparatus one encounters articles of comparatively larger size with apertures filled during the assembly of various instruments: cases, panels, plates, chassies, instrument panels, etc. Preparing these without special dies is highly laborious, and the costs for the latter in a small production lot are not worth it. In such instances, contemporary technology of cold stamping is based on the use of universal punch presses with a coordinate table and a revolving head (see Fig. 1).*

Fig. 1. General view of the universal revolving press with coordinate table.

All required holes and contours in such a press are realized by a selection of removable dies and matrices of standard design. They are fastened in two revolving disks having 18 pairs of sockets. The disk is automatically turned to a working position with the attached die and matrix complex, by means of a turn of one of the press' control levers.

The block devised for making the articles is attached to a special carrier, which moves with the piece in perpendicular directions. Installation of the carrier, and subsequently of the piece relative to the axis of the press block by which the operating instrument is aligned, is accomplished by a special pattern fastened to the press table. The pattern is a steel sheet 3 mm in thickness with openings 6 mm in diameter, precisely reproducing the placement of the hole centers of the finished piece. The moving carrier has a joint pin of that diameter which can be attached to the pattern. A push of a finger on the upper end of the joint pin causes its release to the pattern opening, which automatically closes the press and pierces the next opening. The process of stamping a part requires a sequential movement of the carrier and alignment of the press at each opening in the pattern.

Using the pattern, the operator turns the disks, transferring them to the position of the next punch and matrix complex.

The time expended in stamping in a revolving press is not great. For example, the labor consumption of "chassis" stamping, 270 × 300 mm in size, in which it is necessary to punch about 150 holes of 16 different types, is about 10 min for a lot of 100 pieces.

It is possible to make patterns in the same press. For this, there is on the press an optical or indicator device permitting movement of the pattern according to a list of the coordinates. The engineer calculates the coordinates to be used in a flow sheet. In 1969, the main Union factory used such a press to make more than 100 different designs, saving over 12,000 rubles.

Underwater Polishing. In Union factories, the technology of finishing operations has been perfected for many years. The most effective of these operations appears to be so-called underwater polishing: parts are placed in a revolving perforated drum, which is plunged into a bath filled with a polishing emulsion (solution of soap in water).

The essence of this process is the removal of microroughnesses on the surface of the metal parts (made of steel, brass, aluminum and its alloys, zinc alloys, etc.) with the help of various abrasive materials, preferably of porcelain chippings smoothed down by rolling, hardened and polished steel balls, etc.

Underwater polishing is an operation superior to galvanic polishing because the former handles parts made of stainless steels of the austenite class, for which this treatment is the final finishing operation. The cleanliness of the surface is increased after this operation by two or three classes, and reaches the sixth to seventh class.

* Manufactured by the Odessa Sixteenth Party Congress Factory.