AUTOMATIC TRANSFER MACHINES

by

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Mr. Woollard, as a director of Morris Motors (Engines), headed the team responsible for designing the first transfer machine in 1923. He is now a consulting engineer. Much is heard nowadays of automation, and we think that this article on the subject will be of interest to members. It is reproduced by kind permission of "The Financial Times".

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The automatic transfer machine can best be described as a group of machine heads mounted, in series, on a common bed and equipped with transfer mechanism which automatically moves the workpieces from station to station, locates them accurately and clamps them firmly so that the machine heads can perform their cutting operations. After the operation the cycle is repeated thus: move-locate-clamp-operate-move and so on. Thus the transfer machine combines both processing and mechanical handling.

There are two forms of transfer machines, the "rotary" and "in-line" types. The rotary machine is not really new in principle although some of the details such as the control mechanism and the unit heads are novel. While these perform a most useful function they suffer certain limitations.

The diameter of the rotating table is restricted and thus the number of machine heads is limited usually to seven or maybe ten at most. It is therefore impossible to incorporate other heads for additional operations should these become necessary. Moreover, when compared with in-line machines, the automatic transference of the workpiece to other machines presents a considerable problem.

There is a third machine known as the drum type. This is, in effect, a rotary machine with the work-table rotating in the vertical instead of the horizontal plane. Virtually all that has been said of the rotary type applies to the drum machine. Strictly speaking, neither rotary nor drum types are true transfer machines.

It is recognised that for work-pieces requiring only a limited number of operation the rotary machine is attractive because of its greater simplicity but, for complicated pieces, the in-line machine is much more practicable.

The in-line machine is not limited in length and thus can take any number of machine heads. There is, at the Austin Motor Company, a 31-station machine. With the in-line machine it is possible without great cost to allow space for intermediate stations or to add stations to the end of the lines should this be found necessary. With the in-line machine transference to other machinesm by linking devices, presents no difficulty.

In practice the length of the in-line machine is determined by the amount of time required for tool-changing. If the machines mount a very large number of heads tool changing may become an uneconomically lengthy process. This has been overcome by the Cross Company, the Detroit machine tool specialists, who have built a 350-foot machine divided into five units with live storage banks between each unit through which all the workpieces pass. With this arrangementswhen section (1) is stopped for tool changing section (2) draws off the bank which is replenished by section (1) when section (2) is stopped for re-tooling, and so on. By these means the down-time for tooling is reduced to 5% of the total operating time. In this country we are so far, arranging for scheduled tool changes to be made either in meal breaks or between changes of shift.

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