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THE IMPLEMENTATION OF ROBOTIC INSTALLATION IN FLEXIBLE FABRICATION CELLS

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ABSTRACT
Given the big topo-dimensional diversity of the camshafts that includes a big quantity of allied steels and manual labor, exposed to usage process, their reconditioning, after following all the reparation steps, becomes a real profitable action. Flexible automatisation as an superior level of the programmable automatisation, suppose an as fast as possible adapting ability for the fabrication technical systems to the change of the production tasks, with the minimum expenses and without constructive modification for the component subsystems

1. THE IMPLEMENTATION OF ROBOTIC INSTALLATION IN FLEXIBLE FABRICATION CELLS
Flexible automatisation as an superior level of the programmable automatisation, suppose an as fast as possible adapting ability for the fabrication technical systems to the change of the production tasks, with the minimum expenses and without constructive modification for the component subsystems.
Given the big topo-dimensional diversity of the camshafts that includes a big quantity of allied steels and manual labor, exposed to usage process, their reconditioning, after following all the reparation steps, becomes a real profitable action. Considering this [4], it was conceived a flexible reconditioning cell (figure 1.) that realize in an automated cycle the following operations from the prescribed technology:

- controlling the initial and final dimensions for every spindle that is reconditioned using a special machine for measure and control 1;
- the reconditioning itself using a robotic installation 2;
- after metallisation rectification, using a round exterior rectification machine with numerical command 3.

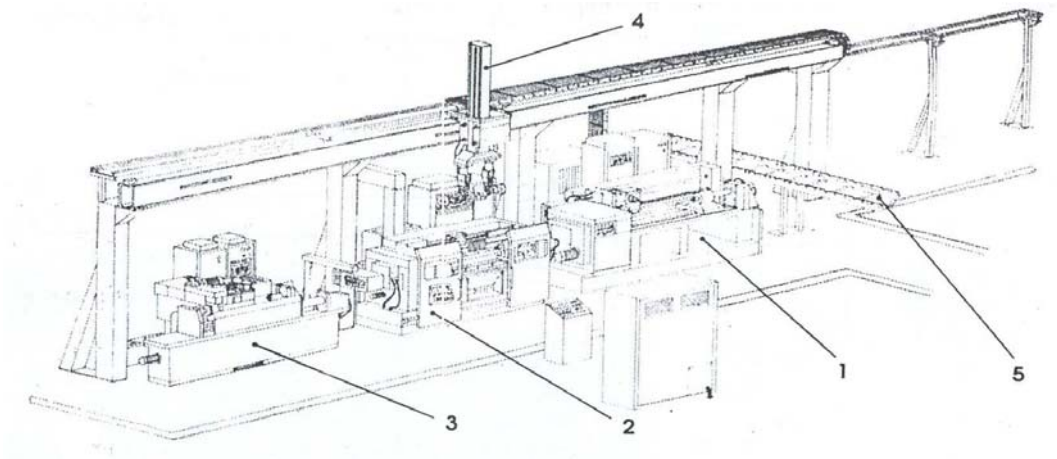

Figure 1.

All these operations are made using numerical commanding installations that are placed in line and served by an electro-hydraulically robot, suspended 4 with 3 freedom grades(3T), according to figure 2.

The robot assures: the taking over semi-finished products from the rolling tape 5; vertical translation for placing the semi-finished products in the equipments axe; axial shifting to introduce these into the special fixation and centring mechanisms; longitudinal long distance shift for serving the equipments in the sequence that was given and the evacuation of the reconditioned piece on the same rolling band.

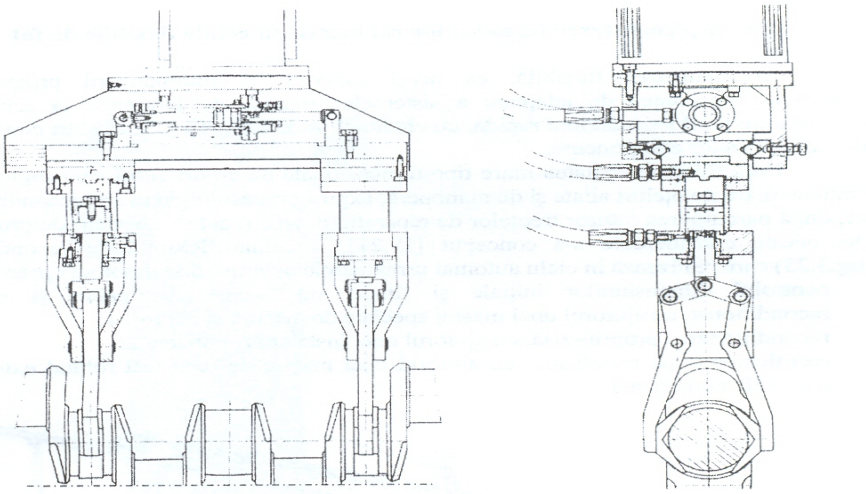

Figure 2.

The equipments from cell and also the serving robot have a high flexibility level determined by the camshafts tipo-dimensions witch need to be reconditioned.

The commanding system (figure 3.) assures the following functions:

- commands the rolling band for bring or to evacuate the camshafts that are reconditioned;
- controls the dimensions of the reconditioned surpasses and the confirmation of their registration to the given tolerance field;
- the launching to execution for the rectifications programs that are resident in the numerical commanding machines equipments memory;
- the control of the movements sequence for the robot that serves the cell.

The specialized computer runs the set of programs through what coordinates the functioning for every post in the cell;

When the zone units specialized in used pieces reconditioning have enough founds for

a perspective investment, they can resort to realising of some flexible system for reconditioning.

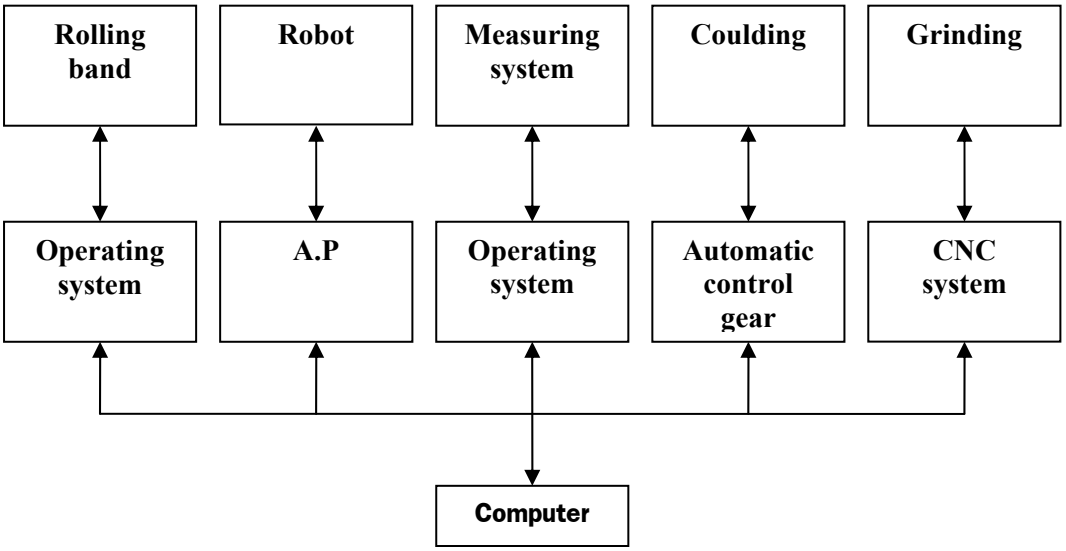

Figure 3.

The big tipo-dimensional used pieces variety, the base material that they are made from and also the annual fabrication series will determine an analyse of the reconditioning tasks. Basing on some typological filtering criteria's, through statistics methods, from the used pieces multitude, the ones that have the closest characteristics will be retain, making the so called typological core. The most important typologically filtration criteria's are the ones that are related to the pieces characteristics (fabrication series, dimensions, mass, base materials, etc) and to prescribed reconditioning technology of them.

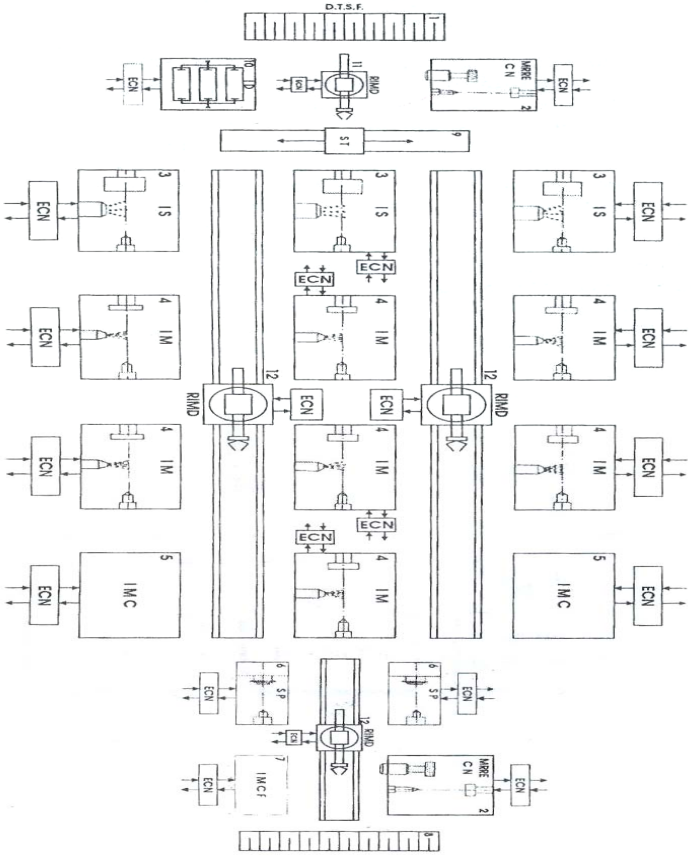

Figure 4.

The maximal length, maximal diameter and the semi fabrics retained in the typological core will supply information about the following: gauges and functioning limits of the machines, of the centering and fixating equipments, measuring and controlling equipments, of the logistical subsystem elements, etc. The semi fabric material will determine the data base limits concerning the process technological parameters and the corresponding choosing for the tools type and their geometry.
The information concerning the time norm for every operation are necessary for determining the number of machines or automated installations from every type, to avoid the appearance of narrow working points witch goes to a smaller charging for some utility machines and implicitly of the system.
Starting from an initial typology of one hundred of used camshafts, after the production task analyse [4], it was determined the following: the typological core, the type and the number of the needed machine and equipments for their reconditioning in a flexible system. Basing on technological information from the pieces that are retained in the typological core, the number of all types machine is:
1 – degreasing installation;
2 – rectifying round exterior machines NC;
3 – automated sand blasting machines;
7 – metallising automated machines;
2 – parallel lathes with numerical command;
3 – automated measuring and controlling machines;
All the system equipments are placed in a mixed network (figure 3.28) and are served by four industrial manipulating robots. The used symbols have the following meaning:
1 – DTSF – semi fabrics buffer depot;
2 – MRRE – rectifying machine for round exterior;
3 – IS – sand blasting installation;
4 – IM – metallising installation;
5 – IMC – measuring and controlling installation;
6 – SP – parallel lathe with numerical command;
7 – IMCF – final measure and control installation;
8 – DTPF – buffer depot for finite pieces;
9 – ST – automated transport system;
10 – ID – degreasing installation;
11 – RIMS – industrial stationary modular robot;
12 – RIMD – mobile industrial modular robot;

2. CONCLUSIONS

All the prefabrication, transporting and depositing system elements have their own numerical commanding equipments, that are connected to a central commanding and supervising computer.
The system projecting and his implementation in real situations, comes with special complexity problems and big investments that can be recover in 5-7 years. Anyway, the projecting and realizing of a system like that is made today for a 10 years from now perspective.

3. REFERENCES

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