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SOME CHARACTERISTIC ASPECTS REGARDING THE DISMANTLING TECHNOLOGIES FOR ONE GRATE CYLINDER FROM PAPER INDUSTRY

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ABSTRACT
The constrained conditions regarding Romania's integration in the European Community need some qualitative changes in most of the areas of the industry. Therefore, in paper and cellulose industry is a necessary condition to modernize the technology and the equipments.
One of the technical problem that there is in this special program is related to the disassembly and the recycling of the cylinder "Yankee" from paper drafter unit.
On this paper we'll present the specific problems which should be solved, some adopted solutions and in the end the concrete achievement of the disassembly.
Keywords: paper machine, drying cylinder, milling device

1. DESCRIPTION OF THE PAPER MANUFACTURING AGGREGATE
The utilized aggregate is composed by the following main parts (fig.1.):

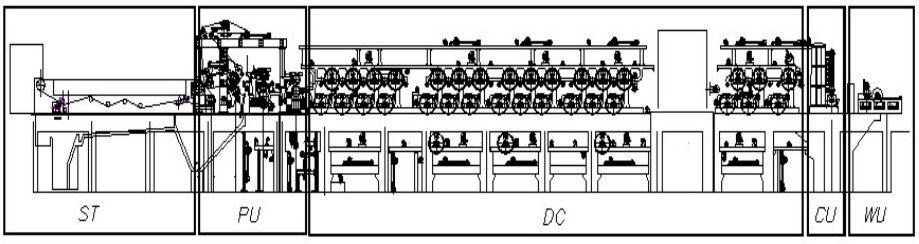

Figure 1. The basic scheme of the paper aggregate

- ST - the table of the sieve
- PU - press unit
- DC - drying cylinders
- CU – calender unit
- WU – wrapping unit

The raw material (the cellulose fiber + water +bonding agent + colouring agent+ filling materials) is launched on the sieve and in the unit **ST** where there are forming the paper sheet and a big part of the

water is being removed. Sequel in the press unit **PU** the paper sheet is pressed in order to remove the remained water. For this purpose the paper sheet is passing through the drying cylinders heated with steam. In the calender unit **CU** the paper is pressed in continuation in order to obtain gloss and then the paper finalized in this way is rolled up in wrapping unit **WU**. The general view of the aggregate is presented in the figure 2.

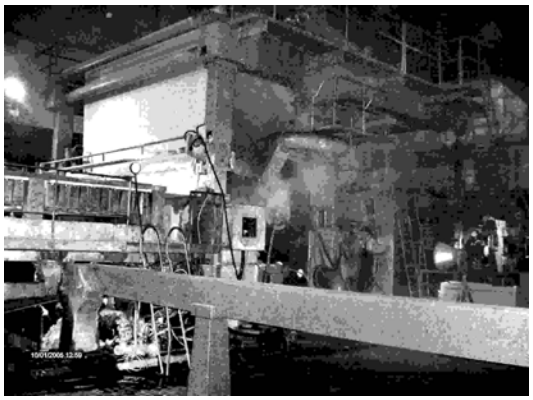

Figure 2 .General view of the paper aggregate

Figure 3. Side view of the drying cylinder

2. THE NECESSITY OF DISASSEMBLY THE DRYING CYLINDER TYPE "YANKEE"

Paper machine from the firm SC. Somes Dej was designed to function at a nominal speed of 380 m/min and with maximum speed of 450 m/min. To increase the working speed of the machine it is necessary to replace some components that can limit the possibility of increasing the speed.

To change this drying side of the machine implies the change of the drying cylinder type „Yankee" with 5 smaller drying cylinders, but also with a better dehydration and drying efficiency. As a result, it is necessary the disassembling of the actual drying cylinder type "Yankee" and the preparation of the machine for the assembly of the new five cylinders.

Taking into account the weight of the drying cylinder (fig.3) of appreciatively 70 tones, there wasn't possible the elevation of the drying cylinder through classical methods, for example like usual cranes, hoists, bridge-cranes, because the maximum elevation capacity of the bridge-crane in the assembly room was of 32 tones. Disassembly of the drying cylinder implies the necessity of finding other solutions.

2.1 Analyzed solutions for the disassembly of the cylinder

A. The total disassembly of the cylinder without any dismantling

First alternative of removal of the drying cylinder took it into account was the disassembly if the cylinder without dismantling.

Adopted solution was abandoned due to some of its disadvantages as following:

- Expensive costs of the work (180.000 €). Working time of the work exceeds 3 weeks.
- Consolidation of the platform floor assumes the deviation of some technological pipes routes and some bridges for supporting electric cables, work that may take 1 week. Rebuilding the initial routes after the work is ended takes another week of hard working.
- Manufacturing a special base, a metallic structure on which it will be laid the drying cylinder with adapted bearings. The special base is a metallic structure made from I30 profiles that suppose a lot of conversion costs, therefore higher costs.
- After the setting of the drying cylinder on the metallic base and its translation to the charging platform, the loading on a special transport means it could be done only with a handling crane of 350 tones; equipment renting costs are also very high.

B. Disassembly of the drying cylinder by plasma-jet cutting

This method was unfavorable of all the analyzed solutions due to the very imminent danger of producing fire burnings.

To apply this method it is absolutely necessary the dismantling of the lubricating system under the cylinder, thing of a higher complexity. Also it is necessary condition a special cleaning of the working area to avoid breaking a fire burning.

The method consists in the cutting of the drying cylinder casing in many pieces so that the necessary load for lifting the bridge crane not to exceed 32 tones.

C. Disassembly by drilling.

The method consist in applying on the cylinder casing of some holes of 10 mm in diameter (d=10 mm) with the pitch of 5 mm in 3 directions obtaining in the end 3 spherical cap from the drying cylinder casing with a weight that allows an easy handling by the help of the bridge crane.

The solution consists in manufacturing a device on which should be located the drilling machine, using in this way, a total of 1500 number of holes of d=10 mm.

The problem arise here in applying this solution is the possibility of breaking the contact bridges resulted as a consequence of the drilling process and taking into account the fact that the thickness of the casing is of 40 mm.

D. Combined disassembly by drilling and milling. We have analyzed 2 possibilities of milling:

a). by rounding cutter with alternative teeth with the diameter of 350 mm from 2 passes;

b). by end-milling cutter with nicked teeth with diameter of 18 mm from rapid steel covered by TiNC.

Analyzing different alternatives of milling devices in order to be mounted on the cylinder and in order to assure the possibility of the mill feed we jumped the conclusion that only the last solution, the one made by end-milling cutter it could be applied. The designed device, lately the manufactured device, mounted on the cylinder is shown on figure 4.

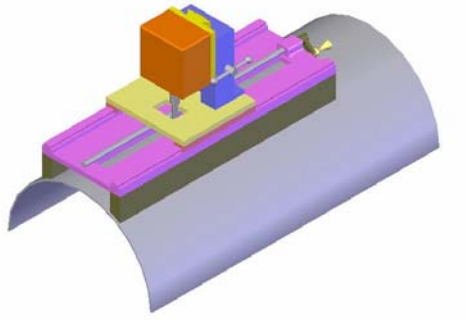

Figure 4. Design of the milling device

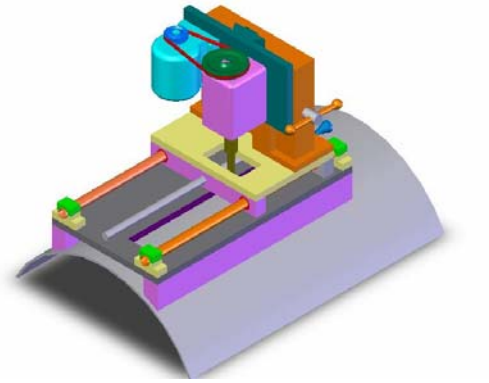

Figure 5. Improved device by 2 guide bars

Milling device was fixed by 4 screws M 10 in the cylinder holes made before, and it was moved step by step along the canal in the milling cut on the length of 250-300 mm. The required end-milling cutters with nicked teeth covered by TiNC is of 5 pieces, purchased at the price of 130 € / piece.

At the first tests it could be remarked the appearance of some big oscillatory movements in cross direction and it was necessary the improvement of the device by using 2 guide bars. (fig.5)

3. RESULTS OBTAINED

Using the combined process of drilling and milling with the presented device (fig.5) it could be done the disassembling of the cylinder during 45 hours. The cylinder was disassembled in 3 cylindrical sectors (fig. 6) and in 2 flanges and the axle (fig.7).

Figure 6. Cylindrical sectors after disassembly

Figure 7. Front view of the cylinder after disassembly

4. CONCLUSION

After a long study and some practical tests it could be accomplished the disassembly of the cylinder, on the impose requirements and also creating the conditions of the recycling and modernizing demands.

5. REFERENCES

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