

Alkim Kağıt Sanayi ve Ticaret A.Ş. (Izmir) installed new gearbox technology “made in Germany”

A planned speed increase of the PM 1 as well as problems with the existing drive system led to the decision to rebuild the drive of the PM 1 at Alkim Kağıt Sanayi ve Ticaret A.Ş.. On this machine, Alkim produces writing paper with a grammage of 80 g/m² and with a speed of 600 m/min. For the modernization, Alkim selected the drive and lubrication technology from the German machine builder AS Drives & Services GmbH.



Fig. 1: the old open wheel drive (left)

wheels are in force-locking connection (see Fig. 1)

The old open gear wheel drive

Before the rebuild, the PM1 was driven by an open gear wheel drive. With this kind of drive, each dryer group was driven by one motor. The power transmission occurs from the motor to a pre gearbox via coupling and over a cardan shaft to a drive pinion gear, which transfers the power by the way of a bigger drive wheel to the dryer cylinder. In the following drive-chain, the drive wheels are equipped alternating with plastic teeth and steel teeth. All drive

This force-locking connection often leads to problems. Different climate zones within the dryer groups cause uneven expansion of the drive wheels. Especially in the upper cylinder row, the drive wheels expand more than in the lower rows. The result is high stress inside of the drive system. At Alkim enormous background noises and broken teeth, production stoppages and high costs for the maintenance expenses as well repairing expenses were also a result. Furthermore, the replacement of the drives wheels was not easy.

The uneven expansion, caused by the climatic zones, got also an influence on the dryer cylinders itself, which leads to different cylinder circumferences and because of this also to different circumferential speed. The paper passes alternating the upper and lower cylinder rows and were shrunk and stretched due to the varying circumferential speed. As a result, the sheet flutters and cuts in the worst case. Exact these problems happened at Alkim. A sheet flutter at the entire drive side results in production rejects based on an uneven humidity profile.

Because the above-mentioned problems get worse by increasing the speed, Alkim could not reach the speed of 800 m/min with the open wheel drive. In addition, the open turning parts make the open wheel drive critical and contain dangerous risks for the paper makers. The huge drive wheels are also a hindrance for the accessibility to the machine.

Alkim was searching for a flexible solution, which solves the problems of the open wheel drive and in the same way enable the speed increase. Finally, Alkim decided to install gearbox and lubrication solution from the German machine builder AS Drives & Services GmbH

The FlexoGear®-gear box (Duo-Version)



Fig. 2: the new FlexoGear-gear box with coupling, pre gear and motor

The FlexoGear® gearbox solution drives only 30% of the cylinders directly. Therefore, the gearboxes are installed on the cylinder journal. The felt carries the remaining cylinders along. Due to that fact, an equal line (web) speed can be achieved. This so-called forced fit connection is characterized through a very low-tension tendency.

Dependent of the size of the dryer group, one or more motors are required to drive all the cylinders. In case of Alkim, even the existing motors are sufficient to run six cylinders per group, so that no additional motors were necessary. This is possible because two FlexoGear®-gearboxes can be coupled to a so-called Duo-System. Firstly, the power of the motor is transferred over a steel coupling to the first FlexoGear®. From there, the power will be transferred

to the second FlexoGear® as well as to the cylinder.

It is not necessary to grease the steel coupling in contrast to the cardan shaft in the open wheel drive. With this method, up to four gearboxes can be coupled and still need only one motor. Occurring torque will be absorbed through a special torque support. The steam, which is needed for the drying process as well as the condensate, can be led through the gearbox. (See Fig. 2)

Innovative lubrication technology

Compared to the open wheel drive, the FlexoGear® is not lubricated by grease. It is lubricated permanently during operations through a central oil lubrication unit. The oil itself circulates in a closed system and cannot splash on the paper. For the cleaning, degassing and tempering of the oil, Alkim installed a Lubriflex® from AS. Compared to conventional lubrication units, the Lubriflex® got one decisive advantage. Based on a special degassing system inside the tank, the oil can be degassed faster and so, it is possible to halve the required chamber volume of the tank.



Fig. 3: Numan Aytan (Former Mechanical Maintenance Chief) with a look at the Lubriflex®



Fig. 4: FlexoFlow Terminal for the oil flow control

Fully automatically oil flow control

Alkim installed the intelligent flow meter from AS at the PM 1 to control the correct oil amount. These flow meters control the oil volume and adjust the oil amount fully automatically independent of the oil temperature, the viscosity of the oil or the system pressure. The set value in l/min has to be programmed only one time. From them the FlexoFlow[®] adjusts the oil flow via a small valve inside each unit individually and fully autonomy. At Alkim all values can be controlled from the process leading system via PROFIBUS.

The project course

Alkim performed the rebuild of the PM 1 step by step. The first step was done in January 2013, where only the first dryer group was rebuild from the open wheel drive to FlexoGear[®]. Alkim dismantled the old drive wheels and installed the new FlexoGear[®] gearboxes directly on the freed cylinder journals. Only a small correction of the felt runoff was necessary to reach a sufficient wrap angle around the cylinders, which were unfelted before. In this first step, Alkim also installed the entire lubrication technology for the complete rebuild. It is possible to install the FlexoFlow[®] according to installed number of FlexoGear[®] gearboxes. At the end of January 2013 the start-up of the drive and lubrication technology took place, accompanied by an Engineer from AS. The new gearbox system got one-year time to show the advantages and gave Alkim the chance to gather experiences with the new drive technology. During this period, the remaining dryer groups 2-6 were still driven by the old open wheel drive.

The second step took place exact one year later, in January 2014. During this step, Alkim equipped the rest of the machine with the new drive and lubrication technology. The Figure 5 shows the machine layout after the complete rebuild. It is clearly visible that each group is driven by one FlexoGear[®] (Duo-System) respectively one motor.

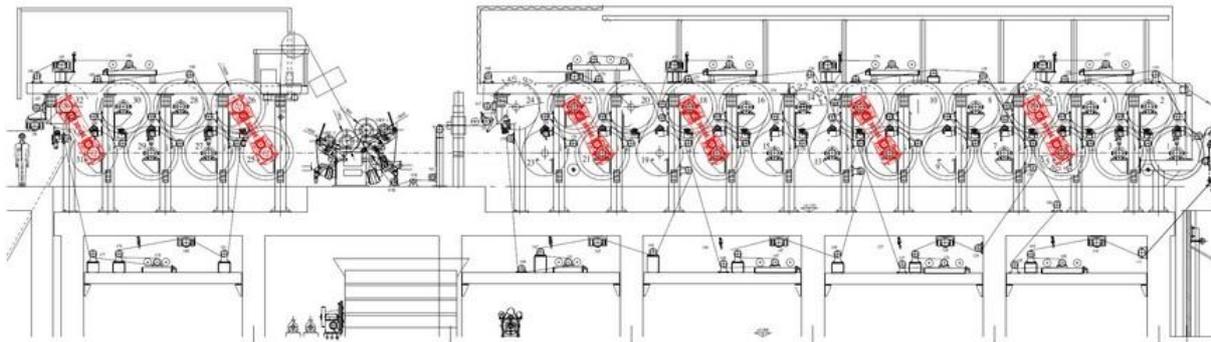


Fig. 5: Machine layout after the complete rebuild

Even twelve gearboxes are sufficient to drive 32 dryer cylinders in sum.

After the last step Alkim reaches the planned production speed of 800 m/min. Furthermore a clearly reduction of background noises and sheet flutter as well as a decline of the paper cuts can be recognized.

Seçkin Yurt (Mechanical Maintenance Chief of Alkim) feels confident for the new gearbox solution from AS: "We recognized a smooth run of the drives, even after the rebuild of the first group. In addition, the sheet flutter decreased to a minimum. After the last step, the downtimes were drastically reduced. Overall we can talk about a very successful rebuild project."