

## How to come off well in cutting

The way to the ideal cut

(An experience report by Jochen Wingsch and Bernd Böhlert, IKS Klingelberg GmbH)

Whether deckle trim at the paper machine (PM), rolls or format, processing of rejects or recycling, cutting is performed in many sectors of paper production and processing. You often encounter well-established processes which are based on the principle: *"it has always been like this"* or *"this passes with the rest"*, because the key competence of the paper maker is – as its name already implies – the production of paper.

But we often ignore that a good cut is vital at the end of the process chain, as it may affect the product quality substantially and may produce unwanted operation and maintenance costs which could have for certain been avoided. Of course, this is all about knives, their use and handling.

### A recent quotation of a customer:

*"Those at the other PM don't have such a cost pressure either. This is our cash cow, there is no urgent need for improvement actions. There are other things which are more important for them. But we have set up a project team which is assigned with the reduction of costs."*

To be more precise, it's about two sectors within the same paper-mill. On closer inspection, it turned out that the so-called cash cow still works with low-quality tool steel knives on a modern high-speed reel cutting machine, whereas the colleagues of the cost centre "which needs to be improved" already use better ones. But as is so often the case: The left hand doesn't know what the right hand is doing.

This example once again shows clearly how important it is to exchange experience and not to allow "free rein to things" thoughtlessly.

### Another example:

There are numerous manufacturers of copying paper. If you put their products in the copying machine or the laser printer, the final customer hardly recognizes any difference. However, the production processes differentiate considerably.

### Manufacturer -A-

Already at the paper machine, the tidiness of the floor is eye-catching. The air is fresh and the hall is flooded with light. Even the noise level directly at the PM still allows some conversation. The operating personnel wear clean uniforms and are good-tempered, as there are hardly any breakdowns and work seems to be fun. This appearance persists up to the format department, where the final product is made, which should after all reach a preferably high level on a specific quality scale (e.g. Rank Xerox). You could even eat from the floor here too.

### Manufacturer -B-

When I enter the factory, a cream-white layer deposits on my trousers which also seems to be visible on the hall floor. It is wet and dark everywhere and the drums of the PM are screeching in an ear-splitting way. It goes without saying that this machine wasn't manufactured in 2005, but I should also mention that a great number of the paper machines of producer -A- are already older than 30 years, too. At the reel cutting machine, circular knives are scattered: here an upper knife, there a bottom knife. The whole machine is completely covered with this cream-white deposit already known and just now I realize that the grubby overall in the corner is still alive, and then it becomes blurred in the diffuse light of the factory. Afterwards, we reach the format department which looks like a bakery where the flour tank has just exploded. There isn't any machine which is not completely covered with a thick dust layer. The paper stacks move on the conveyor rollers along dust piles to the ream wrapping machine. The air is filled with white dust - it snows! The production manager proudly shows the quality control which is based on the Rank-Xerox scale (Value 3) and says that the knives still needed to run in for a certain time.

No, I do not exaggerate. It's a flagrant difference, but both examples are reality.

Due to the initiative of some employees, manufacturer -A- has already made process optimization top priority some time ago and specified optimum parameters by means of various tests.

Manufacturer -B- is still wondering about the unmotivated employees and a rising rate of complaints in addition to the high current costs.

### **The ideal cut**

So, which are the ideal parameters? What is the ideal cut? There are certainly a lot of factors which play a decisive role in the entire process chain. Thus, the paper recipe as well as the maintenance of the machines do have a material effect. But where shall we begin? And: *Do we really need this?*

In comparison to the general running costs of a paper-mill, the need for knives is to be considered as minor, even if the grinding costs are added. Is it really worth making an approach here? Figures can prove a lot, but they require corresponding regular records over a longer period of time. Who does make such an effort? Paper-mills differ from one another and there are always different factors which are decisive.

So, first of all, the process chain has to be considered step-by-step and the necessary conclusions have to be drawn. Experience reports of employees - if they are interviewed - often reveal more than complex analyses. An important step is to exchange experiences and information with colleagues who are involved. The wealth of experience of the own team also presents the wealth of the entire company.

A positive example in recent times has been provided by a paper maker foreman who incorporated the process optimization including "the ideal cut" in his final thesis while being supported by his employer as well as the knife manufacturer IKS Klingelberg GmbH.

Besides, technical factors are of importance, which are hereinafter described in detail:

## **State of the machine / Maintenance**

In order to turn the use of optimum knife qualities – maybe even the cream of the crop – into a reasonable matter you have to ensure that your machines work effectively, too. Among other things, this includes:

- Tightness of the pneumatic lines
- Keeping mechanical travels clean
- Well running; height as well as side stop of the knife holder
- Eliminating vibrations
- Avoiding moisture  
(e.g. pulper right below reel cutter)
- Checking web tension and lead

## **The choice of the appropriate knife**

It is not always right that the choice of the most expensive product is also the best choice. The cost/performance ration has to be balanced. The service life is as varying as the paper quality. In conjunction with the knife manufacturer the right choice is ensured. Today, there are new grinding technologies which lead to excellent cutting results in connection with the appropriate material. Sometimes people don't dare to try something new, as negative experience in the past has caused concerns or they work according to the motto: Don't stop a running system. Just don't cause any problems! Although it is actually not possible to make any mistakes in the choice of high-quality knives. Here again the principle applies: An ounce of practice is worth a pound of theory!

## **Handling and adjustment of the knives**

As described in the case of manufacturer -B-, it may occur that high-quality knives are lying around in a more or less careless way. Blades may of course be damaged thereby. The ideal storage place at the machine or in the magazine should ensure optimum protection for the knives. This also applies to the transportation to the grinding service.

A knife has to be adjusted properly to cut optimally. Surely this is more difficult in case of a cross cutter than in case of a reel cutter. But anyway the machine manufacturer provides mounting instructions. But also the right feel, i.e. the experience of the employees, is very important. The clearance of the cross cutter, the optimal overlapping of the circular knife as well as the contact pressure and the shear plane angle are decisive factors.

After a break-down, machines are often started without checking the knives for damages. Even if the upper circular knives are exchanged, the blade of the bottom knife is not always checked for wear or damages which may then cause a new stop of the machine, as the cut will get worse suddenly. In case of the cross cutters, a break-down may even cause an increased bearing or tooth play in the drive and suddenly they say: The knives don't cut anymore!

## **Trainings**

The employees who are responsible for the quality of the final product in their special field should actually take part in trainings and further education. IKS Klingelberg GmbH has already realized this and therefore offers individual trainings and practical trainings for machine, maintenance and production personnel. Moreover, Bernd Böhlert, seminar and training leader at IKS Klingelberg, is integrated in the program of the paper centre Gernsbach and the training centre of the Austrian paper industry Steyrermühl.

## **Who does actually perform grinding in our factory?**

The answers to this question are always as variable as surprising.

From *"No idea"* and *"One part here, one part there"* to *"We do it ourselves"*, every answer is possible. Sometimes it even occurs that one single paper-mill charges several grinding shops, because the division managers do not know one another or prefer the one or the other due to

tradition or experience. But wouldn't it be better if the entire grinding know-how is available to the whole company?

IKS KlingelInberg GmbH has already made it its business to consult the customers to that effect and offers a grinding service on production level in cooperation with its subsidiary DIACARB. We should not accept that reground knives cannot provide the same cutting performance and quality as new ones!

### **The journey is the reward**

The "way to the ideal cut" can only be walked, if the respective division managers are committed to this task. In this context, we remember a quotation of a quality management representative: The one who stops becoming better, has already stopped being good (!) The wealth of ideas of the own employees should not be underestimated in this respect. But also the good and extensive consultation by the knife suppliers can reveal starting points and solutions can be found together.

The visible or even invisible success on the way to the ideal cut is not always tangible right from the beginning, as it is hardly measureable in euro and cent without corresponding records and comparative values. Positive impacts such as

- more running smoothness of the machines due to longer service life of the knives,
- less scrap due to a better cut = higher customer satisfaction,
- more satisfied employees due to less accidents (= motivation),
- reduced knife and grinding costs due to longer service life

are, however, unmistakable signs. Not least, it would be imaginable that a satisfied smile is visible on the face of the managing director when reading the annual accounts. And let's face it: Isn't it worth it?