

BondStar® – ACAT Dry Strength Technology

For decades, dry strength agents have been known in paper industry and literature. They can be both natural and synthetic products. Examples are especially starch or products based on polymers. ACAT BondStar® products are mainly based on polymers and they work by an interaction of aldehyde and hydroxyl groups. The strengths develop already in the press section and they are developing completely during drying. The massive bonds strengthen the sheet structure opening new possibilities and tools for papermaking. The BondStar® products made their breakthrough during the last few years. The paper production has changed rapidly and digitization is an ongoing process.

for the market. To achieve this, even cheaper alternative fibers are sought or the amount of filler is increased. More and more dry strength agents must be used to achieve the necessary strength and printability properties of the final product, and therefore also our BondStar® dry strength products are requested. They are available as a commodity in various concentrations. In addition, we offer an on-site technology, where the production of the most cost-effective product takes place in the paper mill on site. ACAT has specialized in this on-site technology and on its base we have developed the BondStar® range.



Figure 1: Project schedule

The increase of waste paper and the decreasing share of fresh fiber are a real challenge for the paper industry. Today, global and political influences play an increasingly important role in the procurement of waste paper. Naturally, this has an impact on quality and prices. In the packaging sector it is tried to produce the best possible end product with the lowest fiber quality. But that does not always succeed.

However, to achieve a better quality, it is possible to stabilize the end product in terms of strength with the ACAT dry strength agents. In recent years, especially the graphic paper sector has suffered considerably from sales losses, and this development is still ongoing. Continuous efforts are made to produce a low cost product

Mostly new projects start with laboratory work laying the foundation for a successful machine trial. If the customer is convinced of the technology on the machine, a customized plant will be constructed. After the installation of the plant engineering, the application will be further optimized, also in terms of cost-effectiveness. State-of-the-art monitoring and maintenance systems guarantee a reliable application. In terms of logistics, we work with the utmost foresight and with telemetric monitoring.

LABORATORY WORK - THE BASIS FOR SUCCESS
Before we recommend a paper machine trial, we often start our work in the laboratory of the customer. We simulate the type of paper and

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the customer's process to determine in advance whether our BondStar® dry strength agents can meet the expectations and the effects that can be expected on the paper machine later. Of course, the results of the laboratory tests must convince the customer of our product. In the laboratory we can reproduce many types of paper on the sheet former and we can simulate the process of mixing and adding of the additives. We test the laboratory produced test sheets on strength parameters and also on some printability properties. The most common test methods for the strengths are: breaking load, breaking stretch, breaking length, SCT / RCT, bursting pressure, ply- bond strength and CMT. As an example for the increase of the ply-bond strength with BondStar®: we couch two wet lab sheets and this way we are simulating a double- or multi-layer paper machine. For the printability tests we closely work together with our customer and, among other things, we

check the Dennison wax test, IGT, smoothness and roughness. An example of this could be the use of BondStar® to increase the amount of filler. It is important to comply with the printability requirements.

For example, the use of too much filler would cause problems on the offset blankets. The ash can be better fixed within the paper by using BondStar®.

THE MACHINE TRIAL WITH BONDSTAR® – ANOTHER MILESTONE

If the laboratory tests convince the customer and he agrees to a paper machine trial, we will organize the suitable equipment and the raw material. We have developed two methods to carry out a paper machine trial.

The first method is very simple and it is used for short tests lasting up to two days. We take the locally produced BondStar® from one of our customers and deliver the product to the trial

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Figure 2: Rapid Köthen sheet former (Source Frank PTI)

customer via IBC container or tank truck. The product is applied in the paper mill with the appropriate dosing technology. The second method is more complex. A manual Bond-Star® unit is installed, which is continuously supervised by

ACAT employees throughout the trial. In this case BondStar® is freshly made on-site. With this system a trial over several days is possible and it is the only method for long term trials. It offers more flexibility, but it requires a large amount of personnel.

All the time the machine trial is supervised by ACAT specialists and accompanied by the respective production management and the machine operators. Thanks to our numerous experiences we know exactly the screws we have to move on the paper machine, to make the trial a success and to exclude losses or damages. For many customers not only strength or printability properties are important, but increasingly the efficiency of the paper machine should also be optimized.

BondStar® is the ideal product for the papermaker. It offers some exciting possibilities, as the graph (Figure 3) shows.

Positive Effects of BondStar® Products:

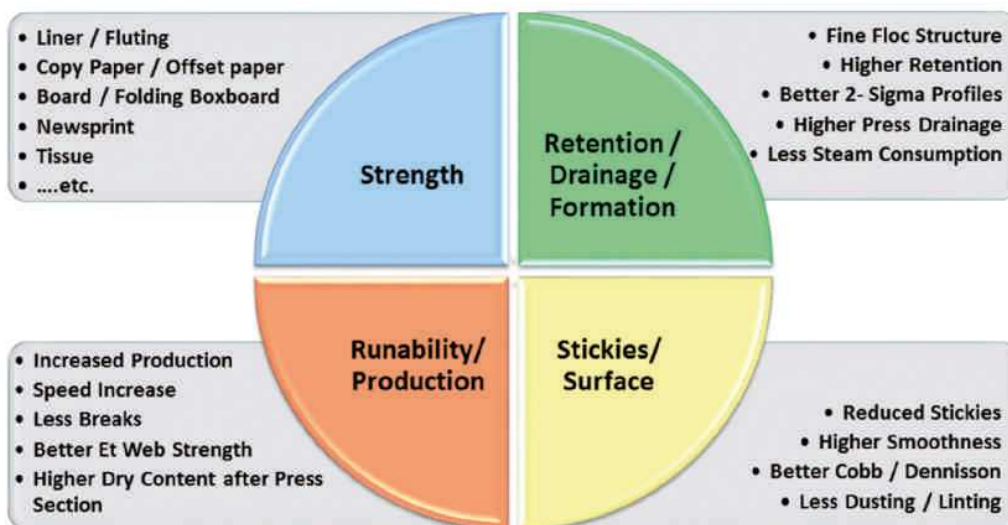


Abbildung 3: Effekte BondStar®

Applied Chemicals Application Technology

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The manufacturers of packaging papers expect from BondStar® the increase of strength, but sometimes in addition it can also increase production and improve runability. The runability is defined as the machine run without breaks and disruptions. The runability is particularly in demand for low basis weights. Dry strength agents, such as BondStar®, can significantly improve the production process using an ever deteriorating quality of waste paper resulting in stagnant strengths and increasing ash contents. In addition, BondStar® is often used to meet or to achieve the desired specification. Thus, very effectively lowers the costs of complaints and often new customers can be attracted.

Soon after the addition of BondStar®, the first positive effects are to be seen and the improved strengths and surface properties are measurable in the laboratory. This gives the papermaker the opportunity to quickly influence the quality parameters. As a side effect in clean cycles retention increases and drainage improves and accordingly the specific steam input to dry the paper decreases. As a result, the draws in the dryer section can be loosened and the machine run can be improved. BondStar® offers the opportunity to perform faster grade changes to higher grades without intermediate grades. The producer of graphic paper expect very different results from the use of BondStar®.

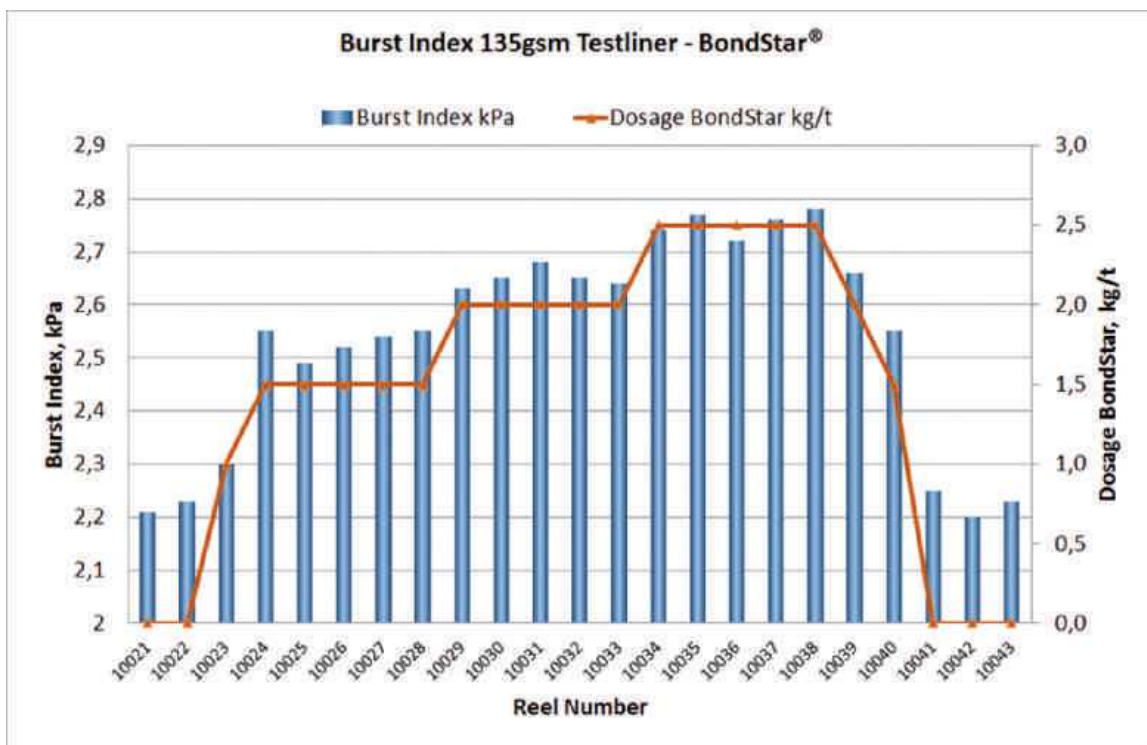


Figure 4: BondStar® results on a modern packaging machine (bursting pressure + 19%)

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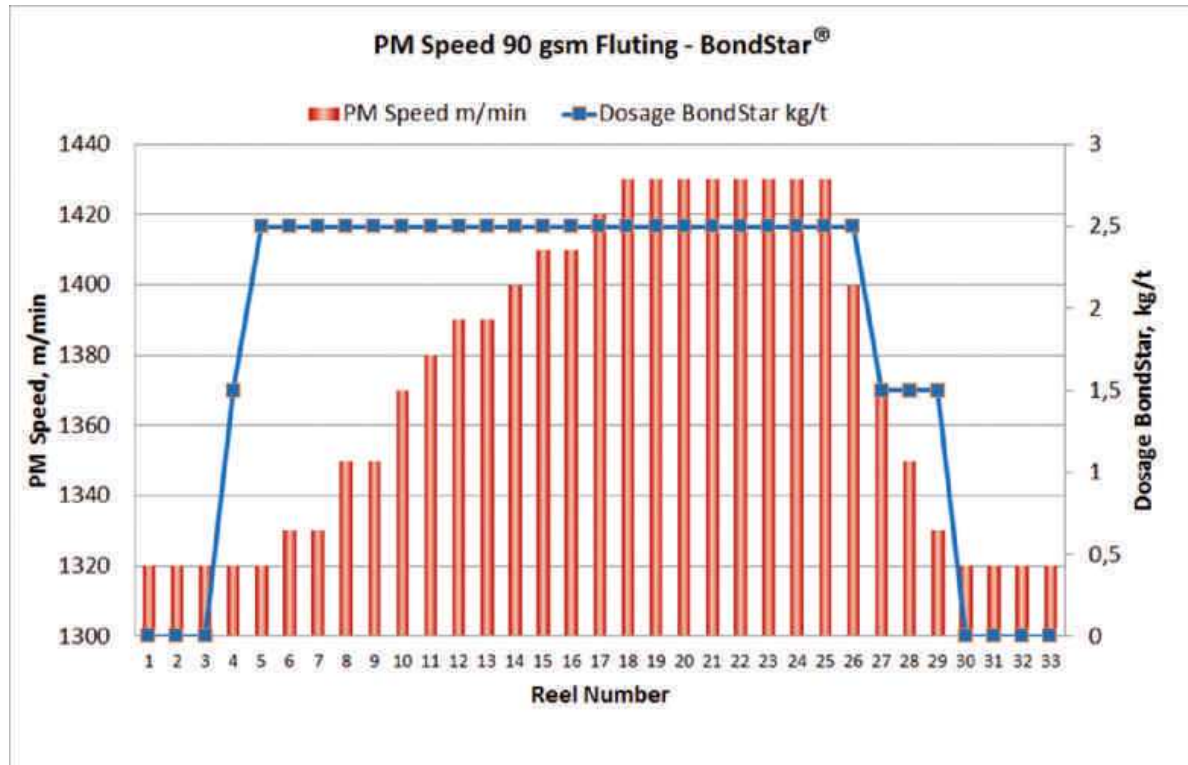


Figure 5: BondStar® speed increases on a modern packaging machine

Their focus is on cost optimization and on the substitution of expensive raw materials with cheaper substitutes. One example is the sector of offset papers: here it is requested to increase the amount of filler while maintaining the printability and strength properties. Using BondStar®, it is possible to increase the amount of filler up to 34% while adhering to all parameters.

The use of BondStar® often causes an increase in retention and drainage as a side effect. At the same time, the formation can be slightly improved. By using more fillers, a better drying can be achieved. BondStar® is relatively neutral within the system and it is compatible with various commercial chemical additives. This gives the customer great confidence, because he does

not have to adapt his system to BondStar®, or he cannot or he does not want to adapt it. For example, there is no negative influence on optical brighteners, on various sizing agents, retention aids or dyes.

INSTALLATION OF PLANT ENGINEERING - TAILOR-MADE SOLUTIONS FOR EACH CUSTOMER

After the successful paper machine test, the project planning of the plant engineering and its installation takes place. ACAT has its own mechanic workshop in Austria and all necessary facilities to build customized BondStar® units.

Before project planning, the ideal place for the installation of the system is determined together with the customer. With CAD plans, ACAT can draw the units in 3D into the planned location

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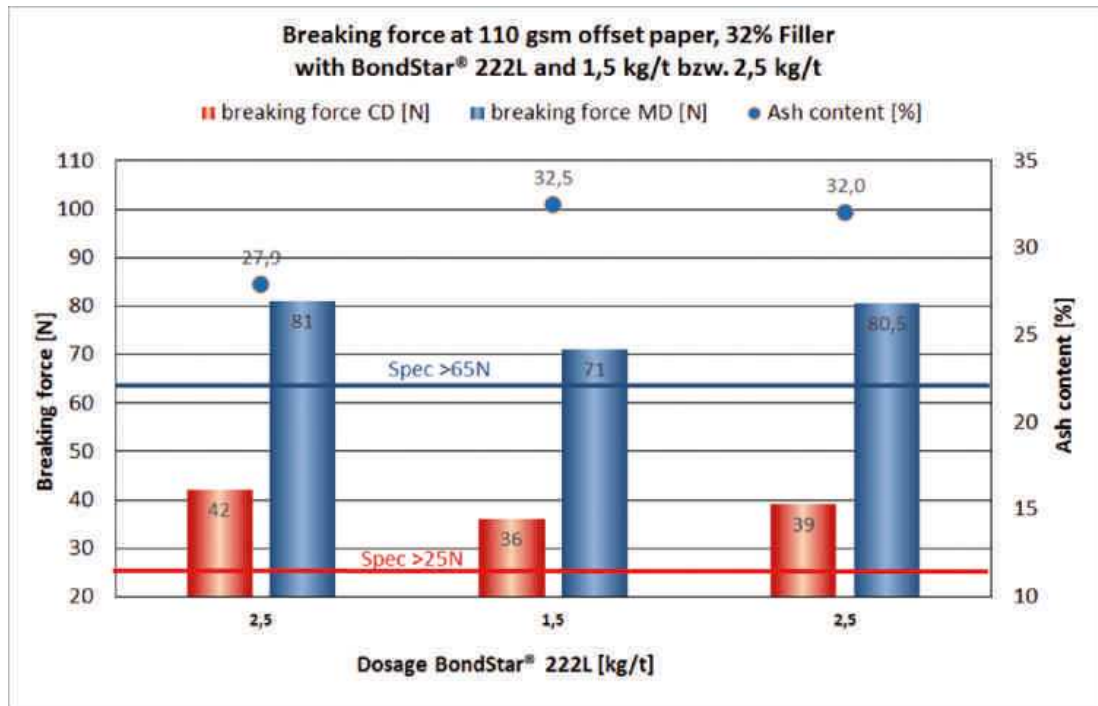


Figure 6: Example BondStar® test with natural offset (breaking force)

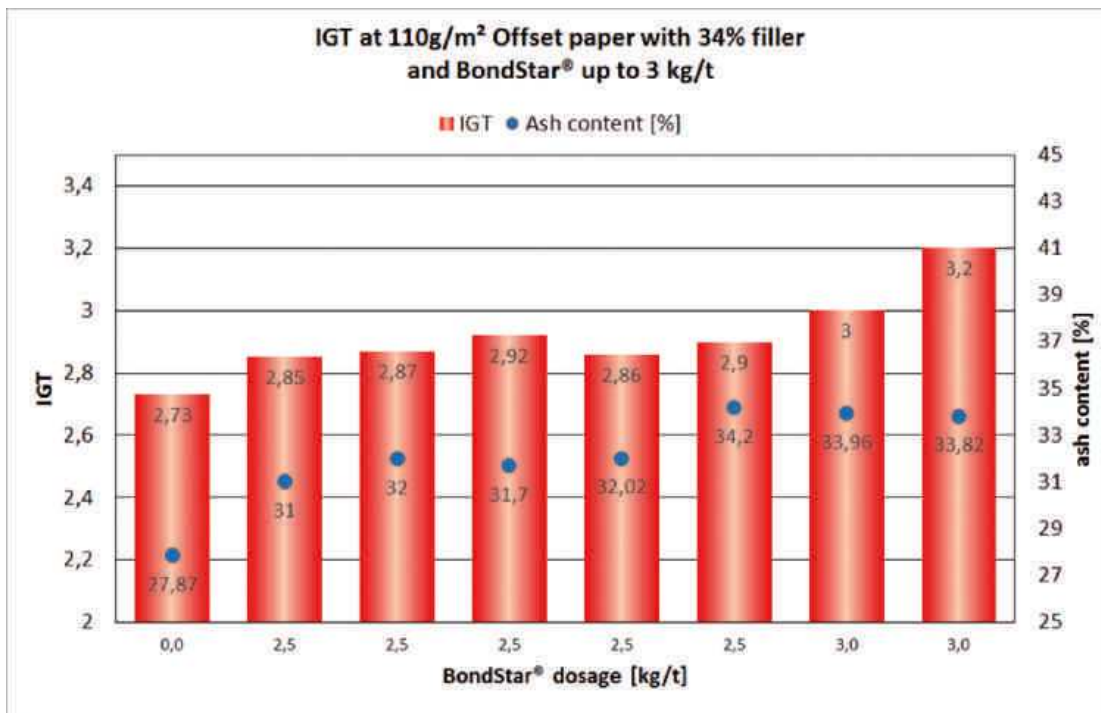


Figure 7: Example BondStar® test with natural offset (IGT)

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and present it to the customer in advance. When installing a system, many factors must be considered, such as the unloading of the raw material and the proximity to the dosing point. Usually the installation and commissioning of the BondStar® equipment takes not more than five working days.

START-UP AND OPTIMIZATION

The equipment is put into operation by the ACAT startup team. The product is supported both technically and technologically by the employees of ACAT for a longer period of time. During this time continuously the mill staff are trained and together they are optimizing the

dosages and the product. During the start-up phase you get a feeling for the required dosages and for the ideal logistics timing of the raw materials. After some time, the customer often controls the BondStar® by himself.

Whenever BondStar® is needed, he starts the pumps. The units are always on standby and produces automatically when needed.

AFTER SALES SERVICE – CONTROL OF LOGISTICS

Regular visits and the maintenance of the system technology are part of the ACAT service. Via various telemetric services, we are able to monitor, control and maintain the equipment worldwide. In consultation with the customer, it also handles the entire raw material logistics.

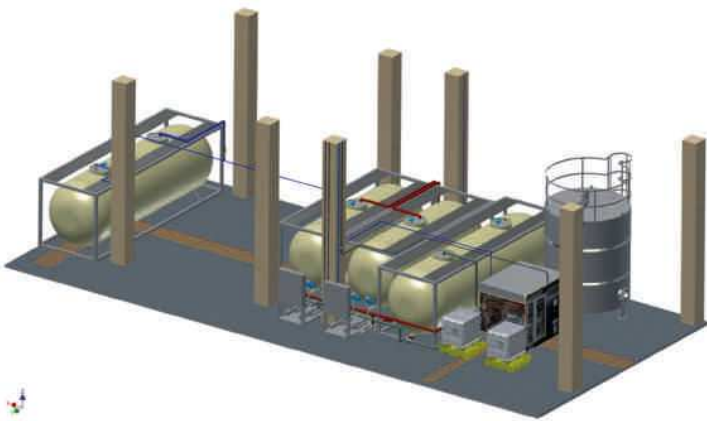


Figure 8: Example of a BondStar® system for a modern packaging paper machine with raw material storage

BondStar® Rohstofflogistik: Eigenes Inventory Management System für Rohstoffe

ACAT MeasureStar



Figure 9: Logistics tool ACAT MeasureStar

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BONDSTAR® – WORLDWIDE

ACAT is the world leader in BondStar® on-site production of synthetic dry strength agents because of its many years of experience. ACAT is represented with this technology from the USA to China. We look forward to new projects and we are really excited to see where the next trip will take us to.

Weltweite wachsende BondStar® Aktivitäten

