

Wasa AG, 64293 Darmstadt, Germany

# Production boards made from wood

■ Sönke Tunn, Wasa AG, Germany

Now over a year has passed since Wasa, as a producer for a broad range of production boards, has released a report in CPI about the treatment of production boards in a concrete block plant. This report was accepted well by readers all over the world and can be found in the issue 01/2016. Most of the further inquiries about this report were regarding wooden boards. These today are still well established on the market and quite common in south and east Europe, as well as Russia and South America. Wasa did not expect such positive feedback about their report and therewith decided to explore the topic wooden boards further and provide another report. This report is not technical and can be seen as the exchange of experience which Wasa wanted to share.

## What kind of wood exists on the market?

Nowadays there are more and more options out on the market besides only wooden boards. However, the options you have for wooden boards are limited. Over the last years wood types like spruce, fir, pine and larch have mostly found their way into concrete block plants all over the world. These types are what we call softwood. In just a few cases you will still find Yellow Balau/Bankirai as well as Bongossi /Azobé which is the so called hardwood from Asia or Africa. The difference of each type is the density of the wood and also every type has its own unique characteristics. As some of you may know there are many other wood types available too but these are the ones which have prevailed over the years in our industry.



Wasa softwood boards made from pine

## Density of wooden boards

While being used in concrete block plants as carrier system for the products, these boards must face a great force in the system every single day. Some of the machines have an impact force of up to 20 tons per hit! This energy is supposed to go through the boards directly into the concrete in order to compact the concrete in the moulds. You might now be able to imagine that a more dense board also gives the user the advantage of a better energy transmission. Sometimes this saves precious cycle time or even makes the product more dense. Spruce and fir wood for example has a density of around 400 - 450 kg/m<sup>3</sup>. Pinewood has a little more with 450 - 550 kg/m<sup>3</sup> and European Larchwood has up to 650 kg/m<sup>3</sup>. Hardwood boards have a greater difference which starts with Bankirai having between 650 kg/m<sup>3</sup> and goes up to approx. 1000kg/m<sup>3</sup>. The strongest and most dense wood in our industry is the Azobé wood which has a density of approx. 1020 kg/m<sup>3</sup> up to 1150 kg/m<sup>3</sup>. The last two options are hardly available on the market anymore, since this hardwood is hard to get, due to deforestation controls. Most of it today goes to the furniture industry where also more money is paid for this kind of quality. Looking at the data above you can see that sometimes even a weaker hardwood board could have the same density than a strong European Larchwood board. The quality of the wood varies a lot and keep in mind that it is still a natural product.

## Growth-rings and grow region

An indication about the wooden quality can be determined by its so called growth rings. If you cut a tree or a wooden plank you will see some kind of ring structure inside. If the region where a tree grows for example is low in nutrients then the tree grows slower and the rings inside the tree are thinner. Most of the northern European pinewood for example grows in low nutrient areas and therewith has thin rings which can be an indication of good quality. Maritime pine for example mostly grows in nutrient rich areas around the Mediterranean region and therewith the tree grows faster. The growth-rings can be up to 10 mm thick and therewith the wood might be of lower density. It mostly also has a higher amount of resin inside.

As reference you could say that a slowly grown tree with small growth-rings should have a better density and quality than a fast growing one.



"I gladly share my experience, collected over the past 10 years in this Industry with clients all over the world."  
s.tunn@wasa-technologies.com

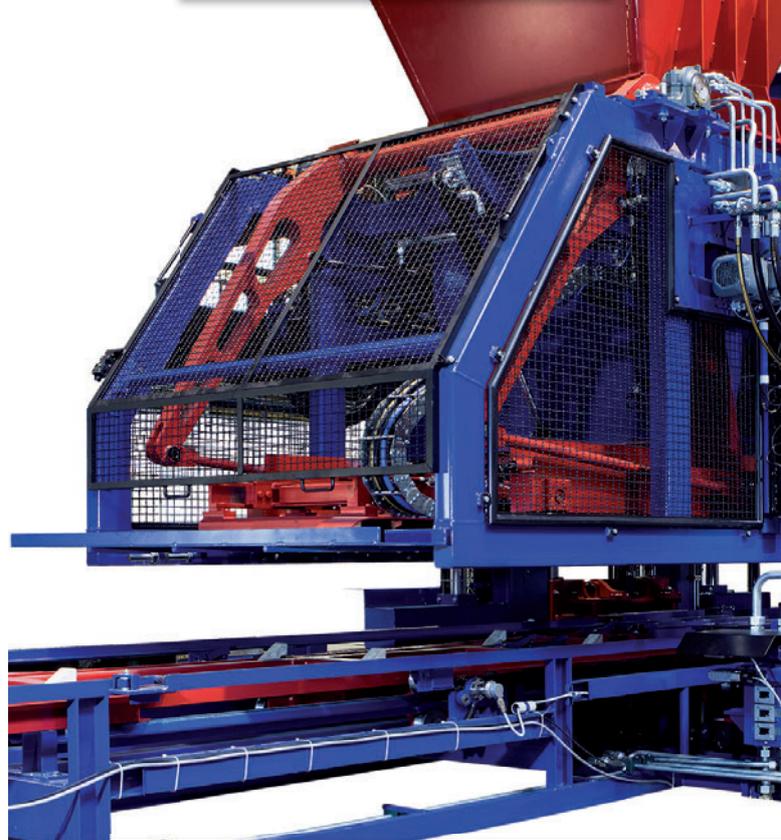


An indication about the wooden quality can be determined by its so called growth-rings

### Vibration characteristics of wood

Well, wood is still a natural product and the vibration characteristics may vary a lot. This characteristic however is quite essential for our industry. While you have a good vibration transmission with new wooden boards you will recognize after a short time already that they get weaker and do not transmit the energy as fast and equal anymore when they are old. Usually softwood boards are ok for the first 2 years but after that they lose their good characteristics relatively fast. In quite a few cases clients call Wasa AG in Germany and express their wish for fast deliveries since it would be almost impossible anymore to produce on their current boards. They then also mention that it would have been still ok a short time ago but suddenly they are struggling with their boards. This phenomenon is unfortunately in many cases typical for softwood. They seem to be ok for the moment but since the performance curve does not decrease in a linear way, it is hard to recognize when the wood will finally become too weak.

One reason of this behaviour is the water absorption of the cell structure. That is why producers of coated boards with a wooden core, like Wasa with its Wasa Woodplast, avoid the ingress of water in such a board with special technologies. More about the moisture content of wooden boards can be found further in this report. You could say that a board with a higher density also transmits the energy more evenly and faster. Looking at hardwood again and here more specific at Bankirai, you can see that due to a greater difference in density of up to approx. 350kg/m<sup>3</sup> the vibration characteristics might vary a lot since it could also happen that some wooden planks in a single production board might have 650kg/m<sup>3</sup> while another one has 1000kg/m<sup>3</sup>. The description of such a board is mixed tropical hardwood but again, usually you do



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not get such products on today's market, since the coated boards are good alternatives for such medium class products as hardwood.

### Lifetime of softwood and hardwood in our industry

Other producers or customers worldwide may have made a different experience but in most cases as average lifetime you could say that a softwood board last around 3-5 years while hardwood may last around 8-10 years. Again, these numbers are collected by Wasa AG over the years and must not be representative for other producers or different markets in the world. There are also customers using softwood like pine for example since over 8 years but most likely then run with a draw plate. It all depends on the quality expectations of each country, the market demand and the product itself. However one thing is clear, with very old and worn boards you actually lose money. It might be that due to the draw plate you lose production time or if the quality of wooden boards is poor you might face complaints.

### Wooden fibre saturation

In plants where washed products are produced for example it could happen that the wooden core gets weak even faster than it already does under normal circumstances. Due to the high amount of water being absorbed during such a production process by the wooden fibres the boards might start to rot. It could also be that the board starts to grow too which sometimes causes deadlocks in the system. A large amount of water can be absorbed by the wooden fibres at the ends of the planks, in the direction of the fibres. This is a natural behaviour since the tree also absorbs most of the water from the ground and the water runs through these fibres.

As the German SLG Guideline says a pinewood board for example should always have a moisture content close to 18-25% which is optimal for our industry. Please keep in mind that this is a guideline and not a standard implemented by board producers around the world. Wasa AG however trusts that this is a good tool to at least define a baseline required quality and should become the industry standard all over the world.

Sometimes wooden boards lose moisture after production, below the recommended moisture content. In that case gaps may appear between the planks.

These gaps are not a dramatic when recognized early. For this reason common concrete block plants have a spraying device which helps to regulate the amount of moisture. Gaps mean that the fibre saturation is too low and the boards and therewith each single plank shrinks. When these gaps are still fresh you could just add water to the boards and the planks will grow back to their original size again. In case you do not recognize these gaps in time you might face concrete built ups in these gaps. This could lead to a problem since you cannot get the boards back to the original size by adding moisture to it.

Wasa AG in Germany for example incorporate steel bars within their softwood boards as a quality feature and as sec-



*If wooden boards are below the recommended moisture content they might get gaps*

ond security in addition to the strong PU compound between each single plank. It has been recognized in the past that customers try to tighten the nuts on these steel bars in order to get the boards back into shape again. This works well at first, but causes issues once the boards start to absorb water again. The planks will grow and instead of gaps there will be visible curvatures which may then cause even more trouble.

### Fungus

This might be an issue for those who are facing very wet production conditions every day. If the moisture content exceeds the fibre saturation of a wooden board then this gives fungus the nutrients to develop. With pinewood for example this can happen if a board has a moisture content over 27%. In the first step there will be the so called blue stain which is not really dangerous or does not really harm the boards. However this could lead to the second step which would be the brown rot. This brown rot makes the core of the wooden board weak and causes it to rot. Because of this reason Wasa AG usually does not recommend wooden boards to customers which do a lot of washed products. There are clients using wooden boards under such conditions but most of them are not really satisfied with the effort they have to take in order to keep the wooden boards in a useful condition.

### Release Agents

It has been proven by customers using wooden boards that spraying a water based concrete release agent may help to increase the lifespan of such a board and as before mentioned also helps to control the moisture content. This procedure should help to reduce the formation of dust in a plant which can lead to a healthier work environment.

### Product coatings

Very famous these days is coated products which give clients a value added product and may lead to a better margin. However these coatings usually do not favour the wooden boards and sometimes even does great harm to them. Mostly it is the



*Pinewood planks with brown rot*

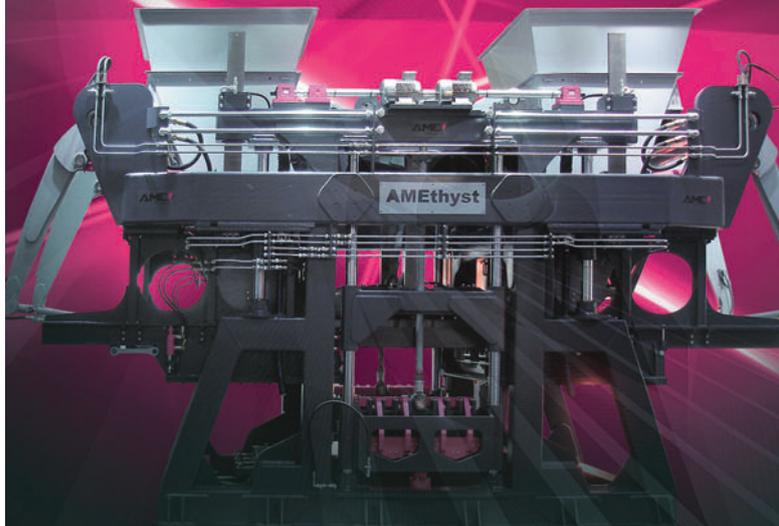
case that the coating gets sprayed on the products from above but also then hits the board surface and therewith sits there where usually the mould frame would be. This could close the cell structure of the wood and even when users properly spray their boards it might cause the boards to dry out which again, as mentioned before, causes gaps and may lead to further damages. Some of these coatings harden and create an acrylic surface and can only be removed with great



*Release agents, like this one from Ecoratio for example, may reduce dust formation.*



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*Product coating gives clients value added products but may harm the boards.*



*Board stack with mechanical pressure marks*

effort. If some of you may face such a problem and you are using hardwood, plastic or similar products, then maybe grinding the surface might help. Also this service is offered by Wasa AG in Germany. Yet it is most likely not possible or worthwhile to grind softwood boards since the grinding process may even make the surface more susceptible to damage than it was.

### Damages

In many concrete block plants around the world it happens that a board suffers because of mechanical damages. Most wooden boards are a bit more forgiving under mechanical pressure but sometimes even they will warp. Older boards can be damaged more easily since the fibres become weak and parts of the wooden boards may become loose. Surface damage can be normally repaired with a two component filler. Depending on the age of the board this might work well but not in every case. Your board supplier can help since this is part of their daily work.

Most damages reported by Wasas customers in the past few years come from the pushers in the system. They can break off parts of the boards while they are sharp like a razor blade. Sometimes they do not run synchronized or they are simply worn. This also can lead to costly downtime in the system. A simple way to check the condition of the boards is to look at

the board stack. There you can usually see if or where a mechanical force comes from. Marks on the boards already lead to the root of evil since this is more or less always at the same spot.

### Old boards

The sales team from Wasa often faces the question "Are my old board still ok?" This is not easy to tell since this is very much depending on each client's own understanding of what would be still ok. While some clients may produce only grey products and could no doubt live with minor damages on a boards surface others may already be in trouble with such a board. Wasa in any case is willing to help and to give recommendations or advice on what they would do. Clients all over the world are welcome to always send in pictures by E-Mail for evaluation.

### Is it still a product for the future?

Even though more and more users around the world shift from wooden products to medium class or premium production boards, Wasa somehow feels that at least softwood will still have its justified existence for many more years. For those only having low investment sums available this is still a good choice to either start or keep working with. On the other hand there are those who have taken the decision to go away from



*Premium production boards, like this fully plastic board for example, can get up to 20 years old*

such products in favour of investment in higher quality products. It always makes sense to go for such products and to think of the long-term benefits. Consider the standard life expectancy this is for probably everyone a simple calculation. While softwood boards in a standard size from most European suppliers probably have an average value of € 40,-/board and will last around 4 years you would need to replace such a board 4 times in 15 years which would be a total investment of around € 160,-. Now you can imagine why more and more plants move away from such a product since for that much money you spent in 15 years you could already buy a high quality board which in many cases even exceeds the previously mentioned lifespan. Also worth consideration is the loss the user has with softwood boards in the transmission of the vibration energy after a short time which has been mentioned earlier in this report.

Since there are so many other alternatives like the coated boards, hardwood boards could soon belong to the past. It has been a good and reliable product but considered all circumstances it is not contemporary anymore.

For those being interested about what type of board would be the right choice, Matthias Bechtold, the CEO of Wasa AG in Germany has published a report in CPI about this topic in the issue 4/2016 already. ■

**FURTHER INFORMATION**



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WASA AG  
Europaplatz 4, 64293 Darmstadt, Germany  
T +49 6151 7808500, F +49 6151 7808549  
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