

WOOD

Materializing
Excellence

uddeholmstrip®

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Materializing Excellence.



Habitat and raw material supplier. The forest serves many functions that are vital to our entire ecosystem. Forests influence our environment, save water, protect the soil from erosion and filter particulate matter from the air. And of course it is the supplier of raw materials to turn into high-quality products.

Woodworking. Think beyond generations.



Those who work with forests and wood must think over long cycles and generations, in stark contrast to our fast-paced times. But therein lies the strength and modernity of this economic sector. The much-quoted notion of sustainability originates from forestry. We at uddeholmstrip think long-term, and provide the highest quality in our band saw steel. And we rely on the expertise of our staff, their years of experience, and special love for the material.

That has been a long tradition for us. To be specific – it's been in our DNA since 1668. We've done a good deal since then. Wood and steel are inseparable; they are culturally linked to the development of our world, of timber and the development of steel and saws, in shipbuilding, carpentry, and in the development of veneers in the 18th Century. Highly specialised technical developments and innovations can be traced back to our saw steel over many generations. Only band saw steel makes it possible to use wood, a natural material, for various applications as an industrial material. Those who rely on uddeholmstrip's band saw steel have the best materials for wood band saws.

Materializing Excellence.

The timber industry and the Montane timber – common roots.

From the start of Montane timber and iron production, wood has played an important role, as without this natural material, metal could not have been melted. Montane timber was not only needed to burn wood and coal for the smelters, but also was used as pit props for the expansion of underground tunnels. If we look at the history of metal and wood more closely, we discover common roots. Uddeholmstrip has been tied to the wood industry and saw production over many generations.



The saw – a driver of innovation.



The history of the saw goes back to ancient times, but its true triumph came later. The sawmill was developed long before it was possible to saw a tree in a single pass. This innovation was first introduced in Holland for shipbuilding in the 17th Century, and then by the Nordic and Baltic countries in the 18th Century, as they were the largest suppliers of wood to Holland. At the same time, blades were made thinner in order to reduce wood waste, and substantially increase timber yield. Since the blades were made of cast iron, however, they had to be constantly sharpened. Only the development of strip steel made it possible to introduce continuous operation. Sawmills then established themselves around the globe. In North America in the 19th Century, they were one of the most widespread industrial operations, and the “pioneer machines of civilisation.” So you can see that saws and strip steel have changed our world. Uddeholmstrip has delivered the best starting material for wood band saws for generations. Our customers value this, worldwide.



Excellent materials. Wood is one of the oldest materials used in ancient cultures. As a versatile, but particularly renewable resource, wood is still one of the most important products for further processing in the wood industry. Uddeholmstrip's band saw steel forms the basis for the best processing tools. *Materializing Excellence.*



Steel dreams are made of this. Pig iron is the main component of steel. Raw iron is globally the most-used metal, with 95 share by weight. The reason for this is its outstanding strength and toughness when formed into alloys. This also makes it an ideal raw material for strip steel.

The proper material know how for the right application.

Øptimal Material Selection.

Whoever wants to get the most out of products must penetrate to the core of the starting material. This requires a high level of skill, know-how, and love of the material. This applies to sawmills as well as the steel industry. Only with the best logs, the best heartwood and the best cut plan one can make outstanding products. Uddeholmstrip only uses the best strip steel, which results in the best products. In other words: *Materializing Excellence*.

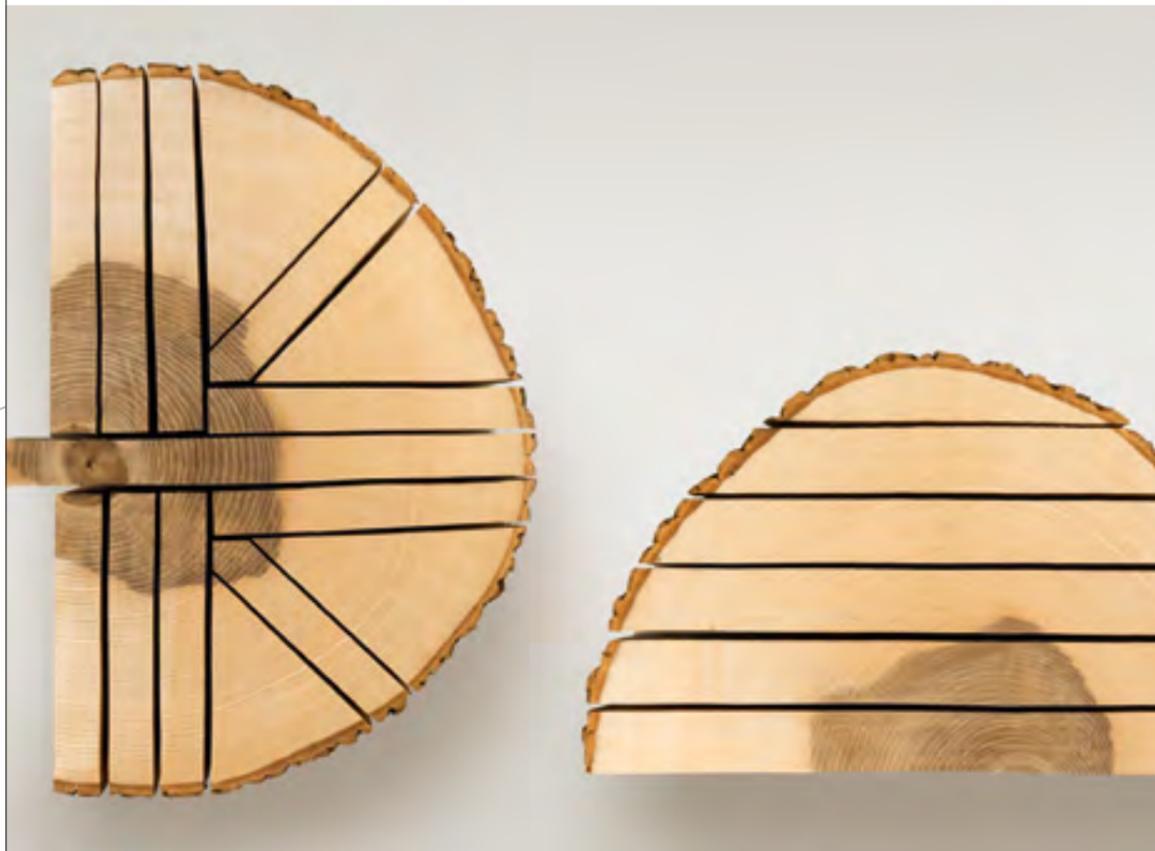
Our core value: excellence.



Good material choice stems from the highest-quality raw materials. Uddeholmstrip is one of the few companies which has access to all parameters in the production of its products, from the metallurgical composition of the raw material to the choice of material exclusively from middle of the strip to the perfect edge of the final product. This guarantees the high quality that our customers expect.

At the core of modern, solid wood structures.

Construction timber is wood obtained by cutting or moulding logs at the sawmill. Individual solid wood pieces are dried and glued lengthwise through finger joints, formed into homogeneous beams and timbers for structural purposes. Construction timber is taken from the heart, or manufactured without heartwood, and is therefore particularly easy to shape, and dimensionally stable. The results: *Materializing Excellence*.



Excellent load-bearing structures.



Glue-laminated timber is ideal for heavy-duty and long-span components. It has high strength and stiffness. It has high shape resistance and dimensional stability. Glulam's high carrying capacity is nearly 80 % that of wood, and can therefore reach any timber length up to 40 metres. In our competence saw center 32 metre-long glulam are used as supporting elements. This is also: *Materializing Excellence*.

Convincing quality at the core:



Just like the tree trunk, heartwood's structure is crucial to the hardness and quality of material, just as band saw steel is at the middle of the strip steel, and is the best material for further processing. Band saw steel from uddeholmstrip offers a rectangular cross-section with the best tolerances in the industry. Therefore, we are: *Materializing Excellence*.

Always the perfect cutting solution. It always depends on what you want to make of wood. This begins with the perfect counterfoil. In order to drive the timber yield to nearly 99 %, one needs a perfect band saw and computer assistance – but mainly a lot of skill and attention from the block band saw operator. He determines the optimal use of core quality and cutting out wood defects.



Relaxed wood band saw steel. In many small steps to create top-quality band saw steel. Uddeholmstrip uses mechanical and thermal stress reduction.

The right production steps for materializing excellence.

Øptimal Material Processing.

Perfect results are achieved with processing materials in many small and perfectly coordinated steps. This applies both to wood processing of particularly refined surfaces, as well as the production of excellent band saw steel. Only its unique know-how in heat treatment, annealing and mechanical deformation, and rolling in many small steps, produces uddeholmstrip's famous quality; this ensures perfect wood cutting results: *Materializing Excellence*.

Excellence in focus.



When producing our band saw steel, we do not only focus on the costs and efficiency; rather, we concentrate on creating absolutely perfect material. This is the only way to ensure the best homo-geneity and best characteristics for our band saw steel. The result is always stress-free and tension-free steel, for which uddeholmstrip is known around the world.

Materializing excellence since the beginning of woodworking.

Since wood is a common and easily-worked material, wood processing is as old as mankind. Man possessed tools for woodworking in the Stone Age: drills, scrapers, axes, adzes, hatchets, chisels and splitting wedges have been known to be used as far back as Neolithic times, and the sawing production process emerged very early on. As early as the Bronze Age, the Egyptians made bow saws of bronze, with which they made the first inlays. High surface processing came to a virtual standstill in medieval Europe. The first machine processing of wood, using lathes, was found in the earliest civilisations. Fiddle drills and files and rasps were found in prehistoric finds. At first, tree resins were probably used as glues. All these tools were refined and improved through the application of metalworking.



High Performance in wood band saw steel. Minimal steps of processing ensures the best material properties.



Shaping materialized perfection.



In order to reach perfection in woodworking, it's best to proceed in small steps – you can see this when planing. The planer is a great tool for working with wood. It is indispensable in any woodworking shop. The surface of the wood is processed in many small steps, similar to how uddeholmstrip produces band saw steel.



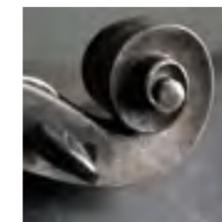
High-tech heat treatment for excellent band saw steel.

Øptimal Material Treatment.

The only way to create excellent conditions for further processing is to start with someone who creates harmonious perfection in one's products.

This applies in the timber industry as well as in making musical instruments – but also in band saw steel production. Drying, optimum storage and heat treatment are the key facets to achieving extraordinary results. We call this: *Materializing Excellence.*

Setting the tone of excellence.



Resonant wood, also called tone wood, is wood which is suitable for making musical instruments due to its type, quality and storage. Mainly wood is used which has grown slowly, and therefore has tightly-packed growth rings. Furthermore, it must be grown in such a way that few branches grow, and its sound speed should be as fast as possible. Different types of wood are preferred, and depend upon the purpose. Resonant wood is stored for many years and air-dried, in order to ensure that all stresses in the wood have been removed. Spruce is normally used for stringed instruments for the cover. The quality of the cover wood is determined either by visual or physical characteristics. This ensures that the wood has a uniform and close age rings, and only a small amount of latewood. In addition, wood for the cover must have high elasticity.

The best is good enough for our excellent band saw steel. Uddeholmstrip sets new standards in energy efficiency, while applying the same highest quality standards in the industry.

Optimal drying ensures the perfect material.

The goal of controlled drying processes in the wood industry is to control wood's moisture content. This is usually between 10 and 15%. Wood fresh from the forest contains about 40% water. Only controlled drying can prevent drying damage, such as tearing and boarding, which would require discarding the timber. Wood drying is done through open-air drying or kiln drying using heat in so-called 'dryers'.

The most common method used is convection, usually in the form of fresh air and exhaust air drying, wherein the drying gaps are regulated by controlling temperature, the flow velocity of the drying air and the relative humidity in the drying chamber. The relative humidity is maintained during the warm-up phase for better heat transfer at a high level, sometimes enhanced by spraying water into the drying chamber. In the drying phase, the drying gradient is then customised to the wood's characteristics. The conditioning phase at the end of this process manages the moisture balance within the timber. One can partially recover the energy used by using condensation heat from the exhaust air.

Open-air drying as the original form of convection is used less for timber drying. It is still the most-widely used method for firewood drying. The wood to be dried is protected against precipitation with air circulation outdoors being hindered as little as possible.

The drying takes place without the application of external energy through evaporation of water from the wood, and air movement.



Heat treatment on the cutting edge of technology.



Since heat treatment is crucial to the production of excellent, precision steel for band saws, we pay special attention to this process. In short: uddeholmstrip has the best formula to make band saw steel. Only special, state-of-the-art heat treatment together with know-how developed over decades, brings together the qualities that make uddeholmstrip's band saw steel the best. Our customers appreciate this, worldwide. Materializing Excellence.



Dynamic Developments. The future is an exciting task.

Modern wood construction and the timber industry continue to develop, but these dynamic developments would not be possible without excellent band saw steel. Band saw steel makes it possible to develop innovative processing options that drive our world.

But regardless of what comes tomorrow, we help our customers to blaze new paths. Uddeholmstrip will continue to stand for one thing in the future: *Materializing Excellence.*



Wood is again on the way up as it replaces more and more concrete.



Wood replaces concrete. This renaissance of wood structures was revealed in the Pyramidenkogel in Carinthia, Austria. Concrete structures were replaced by a nearly 100-metre-high viewing tower. It is built of 16 strong, elliptically arranged wooden supports, with the spiral threads acting as a 'basket structure' in the sky. The entire structure is built from 16 glulam columns, stiffened with 10 elliptical rings and 80 diagonal struts. At about 60 metres, one can stand on the protected platform with the panoramic "Skybox" windows, which can be reached either by stairs or by a lift.

New perspectives in wood construction: New processing methods and material processing technologies combine the carpentry of the past with engineered wood in the future. A good example of this is the Panoramic Tower Pyramidenkogel in Austria. The combination of steel construction and timber creates a successful symbiosis that reaches beyond national borders as a landmark monument.

Live and work in the wood skyscrapers of the future.

Wooden buildings are anything but a new invention. There are 1,400-year-old wood pagodas in Japan which are up to 19 storeys high. There are also high wooden buildings in other countries that are several centuries old. With the development of modern timber building materials, the material has been experiencing a construction renaissance in recent years. The vertical race in wood structures continues to grow. "Woodscrapers" of the future are being considered which will have more than 20 storeys.

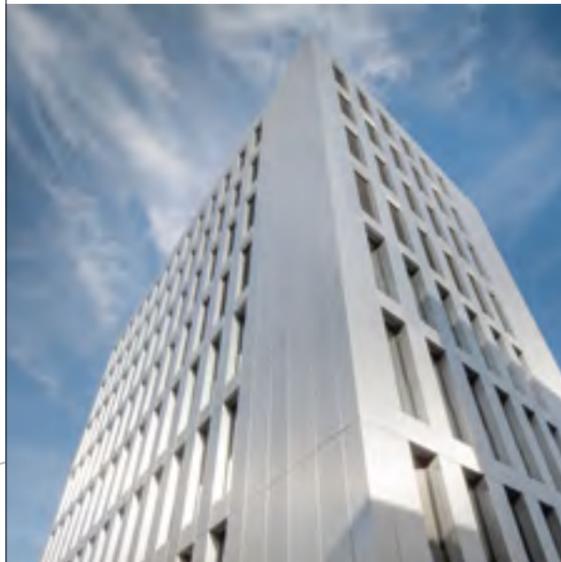


Photo: Cree GmbH, LCT ONE 2012 © Architekten Hermann Kaufmann



The future will be made from courage and customer satisfaction.

The Future.

Uddeholmstrip has full control from raw material to the finished product, thanks to its belonging to the voestalpine. We are committed to this. Together with our customers, we find new ways to think outside of the box, work together with them to grow dynamically. This is based on the excellent services offered by uddeholmstrip, which focus on the satisfaction of our customers.

We can deliver products rapidly, even with minimum orders of one coil (in standard dimension). Uddeholmstrip has a large range of dimensions available from stock, with local inventories available in many countries around the world. Whether from stock or specially-made, our customers can count on outstanding and consistent quality. We respond quickly to customer needs.



At the cutting edge of technology.
Our centre of excellence for band saw steel.

In order to meet our customers' future needs, uddeholmstrip has invested 113 million Euros in one of the most modern centres of excellence in the world for band saw steel. Our customers will increasingly benefit from this investment.

We do everything to offer genuine premium solutions to our customers. Only the latest production of state-of-the-art products makes it possible to produce excellent band saw steel that meets all specifications. *Materializing Excellence.*



Convincing Facts

Client benefits

- Consistent and unique quality
- Improved surface quality
- Precise thickness along strip steel length
- Homogeneous section profile
- Increased capacity

Investment

- € 113 million
- Floor space 70,000 m².
- State-of-the-art technology
- Latest environmental standards

Equipment & Technology

- Cold rolling plant
- Annealing lines
- Slitting lines
- Edge treatment lines
- Hardening lines





Steel Specification.

We easily meet the requirements.

Wood band saw blades have a tough life. They are subjected to severe stresses. Teeth hitting the wood at extremely high speeds give rise to shock stress. Every day a blade runs over band saw wheels several hundred thousand times exposing it to high fatigue stress. Heat, particularly at the edges of the teeth, creates thermal stresses, which must be absorbed by the rest of the saw blade to avoid distortion.

Traditionally sawmills required blades with teeth that could withstand setting or swaging without cracking or breaking yet still maintain their sharpness. The increasing use of stellite tipping means that the blade material has to be suitable for stellite.

A band saw blade must be able to keep its set and remain straight whilst being subjected to relatively high and varying temperatures. The demands made on wood band saw blade material are very exacting and somewhat contradictory. Thanks to the high purity of the basic materials we use and the precise control of the heat treatment methods used in our production lines our band saw steel easily copes with the exacting demands placed on it. Our experience ensures that uddeholmstrip band saw steel has the right combination of hardness and flexibility for the job. These qualities make for:

- High wear resistance.
- High fatigue strength.
- Good elasticity and resilience.

Accurate flatness coupled with an extremely high degree of straightness makes the task of aligning the saw blade easier. This in turn yields:

- Low production costs.
- High and uniform blade quality.

UHB 15 LM

Grade	(C 0.75 %)	Carbon strip steel
Thickness		0.5 mm – 1.10 mm

UHB 15 N20

Grade	(C 0.75 %, Ni 2.0 %)	Nickel strip steel
Thickness		1.20 mm – 3.05 mm



Traditional values which are sustained. This is especially true in uddeholmstrip's band saw works, which provides consistently high quality. Our customers from all over the world know us for: *Materializing Excellence.*

Properties

Hardened and tempered

Tensile strength: for thicknesses:
 1.450N/mm² < 2 mm (< .079")
 1.370N/mm² ≥ 2 mm (≥ .079")

White, smooth surface

Edge E4/90° squared with rounded corners

Width Tolerance B1

Thickness Tolerance T1

Flatness P4, (max. deviation 0.1 % x width of strip)

Special straightness (R9)

Coil weights

Weight

min.	0.8 kg/mm (44.7 lbs/inch) strip width
max.	5.5 kg/mm (308.0 lbs/inch) strip width

Dimensions

Width	6.3–412.8mm (0.25"–16.25")
Thickness	0.50–3.05mm (.016"–.120", 27–11 BWG)

Standard case weights

Strip Widths	Weight
< 40mm (< 1.57")	200–300kg (440–660lbs) net
40–130mm (1.57"–5.12")	220–750kg (485–1660lbs) net
≥ 130mm (≥ 5.12")	1 coil per skid

Steel Grades

UHB 15 LM – Carbon strip
 For standard requirements.

UHB 15 N20 – Nickel strip
 With special heat treatment;
 for saw thickness >1.2 mm.

Forms of delivery

Supplied in coils or cut to lengths.



Size Program

Size	mm	inch x BWG	Weight kg/100m
6.30 x 0.50	0.248	x .0197	2.47
10.00 x 0.50	0.394	x .0197	3.93
0.60		.0236	4.71
12.50 x 0.50	0.492	x .0197	4.91
0.60		.0236	5.89
0.70		.0276	6.87
16.00 x 0.40	0.630	x .0157	5.02
0.50		.0197	6.28
0.60		.0236	7.54
0.70		.0276	8.79
20.00 x 0.50	0.787	x .0197	7.85
0.60		.0236	9.42
0.70		.0276	11.0
25.00 x 0.60	0.984	x .0236	11.8
0.70		.0276	13.7
0.80		.0315	15.7
30.00 x 0.60	1.181	x .0236	14.1
0.70		.0276	16.5
0.80		.0315	18.8
35.00 x 0.70	1.378	x .0276	19.2
0.80		.0315	22.0
0.90		.0354	24.7
1.00		.0394	27.3
40.00 x 0.70	1.575	x .0276	22.0
0.80		.0315	25.1
0.90		.0354	28.3
1.00		.0394	31.2
45.00 x 0.80	1.771	x .0315	28.3
0.90		.0354	31.8
50.00 x 0.80	1.969	x .0315	31.4
0.90		.0354	35.3
1.00		.0394	39.3
60.00 x 0.90	2.362	x .0354	42.4
1.00		.0394	47.1
63.00 x 0.90	2.480	x .0354	44.5
1.00		.0394	49.5
70.00 x 0.90	2.756	x .0433	49.1
1.00		.0394	55.0
1.10		.0433	60.5
76.20 x 0.89	3.000	x 20 BWG	53.2
80.00 x 0.90	3.150	x .0354	56.5
1.00		.0394	62.8
1.10		.0433	69.1
90.00 x 0.90	3.543	x .0354	63.6
1.00		.0394	70.7
1.10		.0433	77.7
100.00 x 1.00	3.937	x .0394	78.5
1.10		.0433	86.4
1.20		.0472	94.2
104.80 x 0.89	4 1/8	x 20 BWG	73.2
1.07		19 BWG	88.0
1.25		18 BWG	103.0
110.00 x 1.00	4.331	x .0394	86.4
1.10		.0433	95.0
115.00 x 1.20	4.528	x .0472	108.0
120.00 x 1.00	4.724	x .0394	94.2
1.10		.0433	104.0
1.20		.0472	113.0

Size	mm	inch x BWG	Weight kg/100m
130.00 x 1.00	5.118	x .0394	102
1.20		.0472	122
130.20 x 0.89		20 BWG	91
1.07		5 1/8 x 19 BWG	109
1.25		18 BWG	128
140.00 x 1.10	5.512	x .0433	121
1.20		.0472	132
150.00 x 1.10	5.906	x .0433	130
1.20		.0472	141
1.30		.0512	153
155.60 x 1.07	6 1/8	x 19 BWG	131
1.25		18 BWG	153
1.47		17 BWG	180
160.00 x 1.20	6.299	x .0472	151
1.30		.0512	162
181.00 x 1.07	7 1/8	x 19 BWG	152
1.25		18 BWG	178
1.38		.0543	195
1.47		17 BWG	209
1.65		16 BWG	234
206.40 x 1.25	8 1/8	x 18 BWG	203
1.47		17 BWG	238
1.65		16 BWG	267
1.83		15 BWG	295
231.80 x 1.47	9 1/8	x 17 BWG	267
1.65		16 BWG	300
260.40 x 1.47	10 1/4	x 17 BWG	301
1.65		16 BWG	337
1.83		15 BWG	374
1.96		.0772	398
2.11		14 BWG	431
285.80 x 1.65	11 1/4	x 16 BWG	370
1.83		15 BWG	411
1.96		.0772	437
2.11		14 BWG	473
2.26		.0890	507
311.20 x 1.65	12 1/4	x 16 BWG	403
1.83		15 BWG	447
1.96		.0772	479
2.11		14 BWG	515
2.26		.0890	552
2.41		13 BWG	589
336.60 x 2.11	13 1/4	x 14 BWG	558
362.00 x 1.83	14 1/4	x 15 BWG	520
2.11		14 BWG	600
2.26		.0890	642
2.41		13 BWG	685
2.57		.101	730
2.77		12 BWG	787
387.40 x 2.41	15 1/4	x 13 BWG	733
2.57		.101	782
2.77		12 BWG	842
412.80 x 2.41	16 1/4	x 13 BWG	781
2.77		12 BWG	898
3.05		11 BWG	988



Materializing Excellence. Today. Tomorrow.



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000 sawsteel 000

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