

# Outokumpu Plate Service Center

## Nordic

## Complete solutions for the engineering industry

In Degerfors, Sweden you can find the leading plate service center in the Nordic region. In our machine park we perform plasma- and water jet cutting, bending, edge preparation and welding operations. We often handle thick high strength steel in lengths up to 13 m. One of our strengths is that we work with all steel grades used in the market.

We offer attractive complete stainless steel solutions. Starting from steel production and plate rolling at our mother company via our cutting, bending, edge preparation and welding into ready mounted plate components. These are complete solutions which many times give several advantages for our customers.

Having our own stock of stainless plates in a wide range of grades, including special grades in several dimensions provides us with high availability of starting material. In PSC Nordic we have more than 40 years of professional experience.

Among our customers there are as an example big consumers of steel components to the shipping industry and equipment providers to the cellulose industry. However many of our customers are smaller equipment providers being as small as one staff companies.

### Our products are present all over the world

Steel components from Outokumpu PSC Nordic can be found all over the world. We are an important partner to the shipping industry especially chemical tankers, cellulose industry's equipment providers, stainless constructions, nuclear and infrastructure related projects.

Irrelevant if the volumes are big or small down to individual details, we always put the customer at center of everything we do.

## Water jet cutting

Outokumpu PSC Nordic is specialized in water jet cutting of Moda, Core, Supra, Forta and Ultra range stainless steel grades.

### Outokumpu PSC Nordic offers

- CAD-CAM-steered cutting of various components
- Complex shapes with very narrow tolerances
- Thicknesses up to 150 mm
- Lengths up to 13 000 mm
- Equal and clear cuts
- Maintained mechanical properties
- High yields – less scrap
- Specialist knowledge of stainless steel
- High strength steel, wear plate and other metals
- Stocking of standard and special grades
- Experienced and knowledgeable staff

### Capacity

Using up to 4 nozzles makes it possible to cut out identical details simultaneously. Outokumpu PSC Nordic is equipped with 4 large water jet cutting machines which many times produce material 24 hours a day.

### What is water jet cutting?

Water jet cutting is a completely cold processing method which does not give any heat input to the material. This means that the material properties are maintained in the whole workpiece, all the way to the cut surface. Even small components, for example smaller than 150 x 150 mm remain cold. In addition water jet cutting does not lead into cutting cracks. The method is well suited to cut out complicated profiles and for making holes of varying kinds.

## Maintained material properties

Since water jet cutting is a cold process it does not lead to any heat affected zone (HAZ). This means:

- maintained material properties (hardness) for the whole work piece
- minimal risk for cracks
- no oxidation
- completely cold detail without deformations or changes in hardness – especially important for smaller details

## Less scrap

In each cut surface less material is consumed compared to other cutting methods. This is of special importance for Ultra range grades and smaller details and water jet cutting is in such cases a very competitive cutting method.

## Material

Outokumpu PSC Nordic is specialized in water jet cutting of Moda, Core, Supra, Forta and Ultra range grades. In addition to this water jet cutting can be made of high strength steels, wearing steels and other metals. As an extra advantage we also have access to an extensive stock of starting material.

## Cut surface / cutting speed

The quality of the water jet cut surface is dependent on the cutting speed – lower speed provides smoother cut surface. The cutting speed also affects the cost for the cutting – lower speed gives a higher cost.

## Decreased production costs

Water jet cutting components are most often more cost effective than alternative cutting methods combined with post cutting operations. The cost for water jet cutting is independent of the steel grade while the cost for traditional cutting is strongly dependent of the steel grade being machined/cut. Water jet cutting as a method is therefore ideally suited for cutting highly alloyed or hardened steel grades.

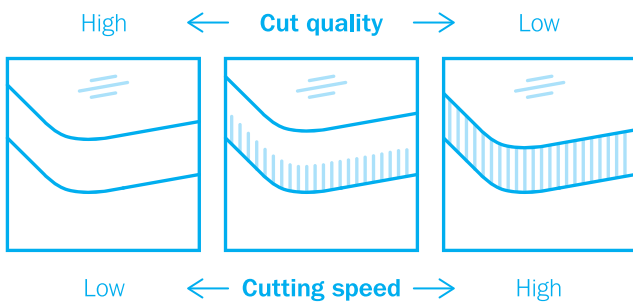


Fig. 1.

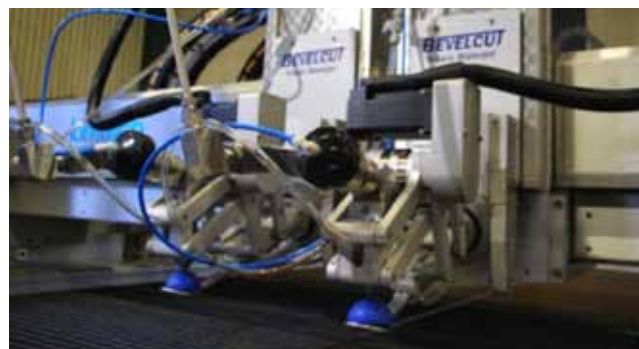
## Tolerances

Table 1

Cut types		A	B	C	D
Material thickness, mm		High Cut quality			Low
0	– 5	+/- 0,4	+/- 0,5	+/- 0,5	+/- 0,7
5,1	– 15	+/- 0,4	+/- 0,5	+/- 0,5	+/- 0,8
15,1	– 25	+/- 0,5	+/- 0,5	+/- 0,7	+/- 1,0
25,1	– 35	+/- 0,5	+/- 0,6	+/- 0,7	
35,1	– 45	+/- 0,6	+/- 0,6	+/- 0,8	
45,1	– 50	+/- 0,6	+/- 0,7	+/- 0,9	
50,1	– 60	+/- 0,7	+/- 0,8	+/- 1,0	
60,1	– 70	+/- 0,8	+/- 0,9	+/- 1,1	
70,1	– 80	+/- 0,9	+/- 1,0	+/- 1,2	
80,1	– 90	+/- 1,0	+/- 1,1	+/- 1,3	
90,1	– 100	+/- 1,0	+/- 1,2	+/- 1,4	
		Low	Cutting speed		High

Table 2

	Cutting table size	Number of sets	Bevel head
Machine 1	13 000 x 5 500 mm	4 st	+/- 45°
Machine 2	6 950 x 3 050 mm	3 st	
Machine 3	7 870 x 5 500 mm	4 st	
Machine 4	14 000 x 3 700 mm	3 st	



# Plasma cutting

Outokumpu PSC Nordic is specialized in plasma cutting of Moda, Core, Supra, Forta and Ultra range stainless steel grades.

## Outokumpu PSC Nordic offers

- CAD-CAM-steered cutting of various components
- Plasma cutting under water
- Maintained flatness and straightness (tolerances)
- Maintained hardness
- Controlled cutting phase
- Infinitely changed cutting phase during ongoing operations
- Minimal oxidation in clear cuts
- Thicknesses up to 150 mm
- Specialist knowledge of stainless steel
- Lengths up to 15 000 mm

## What is plasma cutting?

Plasma cutting is a method developed especially for stainless steel and other more difficult to process material. The hot plasmas energy is used to blow away melted material. Plasma cutting up to 50 mm takes place under water which means that the heat input is kept on a very low level. Flatness and straightness are maintained and the hardness of the material is also practically not affected.

Our big plasma cutting machine has a 5- axis head which leads to possibilities of making phase cuts. During the cutting process the phase angle can be changed infinitely all the way from a positive to a negative angle. This gives the possibility to order special cuts with a perpendicular angle.

Plasma cutting is both quick and economical. Other tolerances and tolerance modes can be offered on special request.

## Material

Outokumpu PSC Nordic is specialized in plasma cutting of Moda, Core, Supra, Forta and Ultra range stainless steel grades. In addition to this plasma cut high strength steel and wear steel can be offered.

## Machine park

Table 3

	Thickness, mm	Max plate size Length x width, mm
Cutting table 1	2 – 100	8 000 – 3 000
Cutting table 2	2 – 75	16 000 – 6 500

## Tolerances

Table 4

Standard		Outside measure		Inside measure	
Thickness, mm		Length, mm		Length, mm	
		≤ 6000	> 6000	≤ 6000	> 6000
–	9,9	-0/+3	-0/+5	-3/+0	-5/+0
10	– 39,9	-0/+5	-0/+7	-5/+0	-7/+0
40	– 100	-0/+10	-0/+12	-10/+0	-12/+0
Special					
Thickness, mm					
0	– 50	-0/+2	-0/+2	-2/+0	-2/+0



# Cutting (Scissors)

Outokumpu PSC Nordic is specialized in cutting Moda, Core, Supra, Forta and Ultra range stainless steel grades.

In our scissor we can cut all types of steel including high strength steel. This type of cutting is very cost effective.

## Cutting capacity

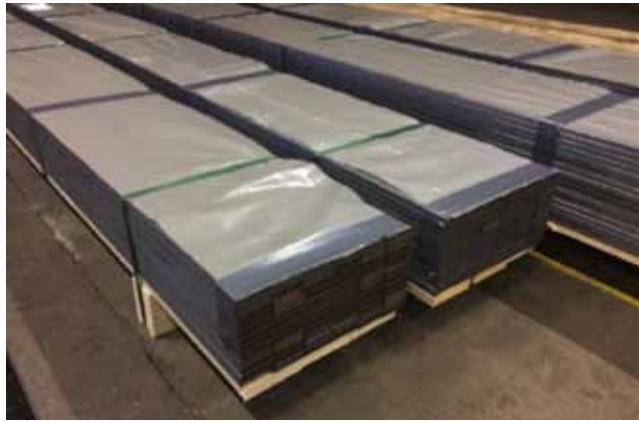
In our big and powerful scissor we can cut plates up to 6,5 meters in length and thicknesses from 2 mm up to 20 mm in stainless steel. Given the power of the scissor we are able to work with a small cutting angle which gives great precision and flatness.

## NC-steered input

Our scissor is equipped with NC-steered input. This gives a high productivity and measuring precision. The scissor has also a programmable setup of the cutting bars tilt and column.

## Cutting/straightening of flat bars

We have the possibility to offer cut and straightened flat bars in dimensions from 20 \* 3 mm to 200 \* 15 mm. One advantage with this is that we can offer customer made dimensions not available in standard stocks.



# Edge preparation for welding

Outokumpu PSC Nordic is specialized in edge preparation of Moda, Core, Supra, Forta and Ultra range stainless steel grades.

We perform edge preparation on everything from plates to profiles. Our main process for edge preparation is via our specialized belt grinding machine. This machine has an adjustable grinding assembly in order to handle edge preparations infinitely from more or less 0 – 90 degrees. The machine is constructed to be able to handle the most frequently used edge preparations but also equipped to handle so called released joints.

In addition to this technology we can also offer edge preparation in one of our plasma cutting- or water jet cutting machines being equipped with a phase cut unit making it possible to offer phase cuts. It is also possible during cutting to seamlessly change the phase angle. Performing edge preparation of small details we can also offer edge preparation through milling or edge preparation with phase machines.

## Dimensions

Our machine park for edge preparation can handle dimensions from 100 mm wide strips up to 3 000 mm wide plates. The maximum length that can be edge prepared is 13 000 mm.

Edge preparations like I, V, K or X edges are easily made and offered. The customer will have their cut and/or bent detail including edge preparation ready to be welded into the customer application.

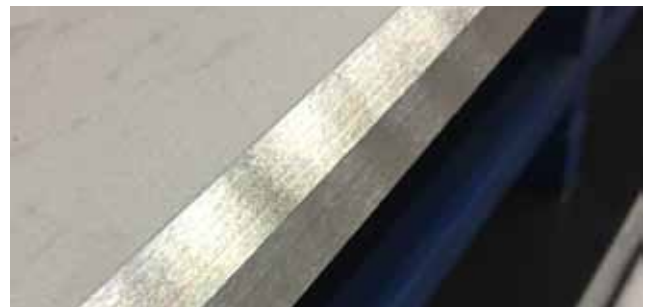
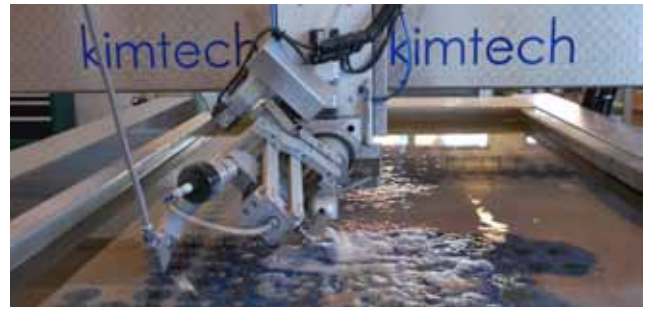


Table 5

	Max plate size, mm	Max plate thickness, mm	Edge preparation	Angle
Belt grinding machine edging	12 500 x 3 000	40	V-fog, X-fog	0–90°
Plasma cutting machine	13 000 x 3 000	25	V-fog, X-fog	+/- 45°
Edging machine	13 000 x 3 000	50	V-fog, X-fog	20–50°
Water jet cutting machine	6 600 x 3 300	50	V-fog, X-fog	+/- 45°

# Bending

Outokumpu PSC Nordic is specialized in bending of Moda, Core, Supra, Forta and Ultra range stainless steel grades.

## Outokumpu PSC Nordic offers

- Bending with press forces up to 2 300 ton
- Profile lengths up to 13 000 mm
- Great flexibility thanks to press brakes with different forces and own developed tools
- Profile bending within a large dimensional program
- Special profiles according to customer need
- Corrugated plates
- Specialist knowledge of stainless steel
- High strength materials in thick dimensions
- Stocking of stainless steel plates in standard and special grades
- Experienced and skilled staff

## Cold formed profiles

The manufacturing program includes standard profiles of L, U, C types but also special profiles of various kinds. Having a maximum length of 13 000 mm and a bending force of 2 300 tons together with several own developed tools means that we can handle many complex profiles.

## Special profiles

Bending of profiles with other angles than perpendicular can also be produced, for example sweep bending, conical profiles and other shapes on request.

## Corrugated plate

Thanks to a set of special tools we are able to produce corrugated plates. There are certain limitations when it comes to appearance and thickness of the material.

## Tolerances

We deliver our products according to PSC Nordics standard tolerances. Other tolerances can be agreed at request.



Table 6

Thickness, mm	Length	< 6 000 mm	> 6 000 – 13 000 mm
2 – 12	Ends	+/- 2	+/- 2,0
	Middle	+/- 2	+/- 3,0
13 – 20	Ends	+/- 2,5	+/- 2,5
	Middle	+/- 3,0	+/- 3,5
21 – 30	Ends	+/- 2,5	+/- 3,5
	Middle	+/- 3,5	+/- 3,5

## Machine park

Table 7

	Press brake 2300	Press brake 1250
Press force, ton	2 300	1 250
Total length, mm	13 000	8 400
Gap depth, mm	1 005	700
Distance side housings, mm	10 200	7 300

# Welding

Outokumpu PSC Nordic can produce many various types of welded products in Forta range stainless steel grades using a method which gives high flexibility.

## Square hollow sections

Our manufacturing process for square hollow sections starts with two bended U-profiles that are welded together through mechanized plasma arc welding (PAW) and submerged arc welding (SAW). These two methods give a high flexibility and we can make square hollow sections in a wide thickness and dimensional range. Special- as well as standard dimensions can be made according to customer need.

Stainless welded hollow sections are produced in thicknesses from 5 mm up to 20 mm. The maximum thickness available depends on the steel grade, dimension and length of the finished section. In our range we offer both rectangular and square hollow sections. Depending on the grade we can produce from 100 \* 100 \* 5 mm to 1000 \* 1000 \* 20 mm. Maximum length of the sections could be dependent on the steel grade but normally up to 13 000 mm (without further joints).

Post welding we perform a clean cut which provides us with possibilities to cut the section into shorter lengths or cut with an angle.

The square hollow sections are straightened to the agreed tolerances and the surface could be further treated by shot blasting or pickling. Our production method does not require long series of production even if this is of course possible as well.

## Welded beams

Outokumpu offers a wide selection of welded beams in Forta range stainless steel grades. The welding method for this product is mechanized submerged arc welding (SAW). This method gives high flexibility and we can make various types of beams such as IPE, HEA, HEB and HEM in various sizes and thicknesses.

Maximum length in our mechanized production line is 13 000 mm. Depending on the steel grade we produce our beams from IPE 100 to HEM 1000. Other dimensions can also be made but then we need to have manual steps in our production. Post welding the welded beam is cut clean which gives us the possibility to cut the beam in shorter lengths or cut with an angle. The beam is

straightened to the agreed tolerances and the surface could be further treated by shot blasting or pickling.

As an additional service we can offer welding splicing of stainless steel.

## Standards and tolerances

Being part of the Outokumpu group provides us with access to vast technical knowledge and development in order to satisfy the most demanding customer requirements.

If no specific requirements has been made by the customer we offer according to the following standards: EN-ISO 5817:2007 Class C and EN-ISO 3834-4. Other requirements and tolerances could be offered from case to case.

## Why use stainless steel?

Stainless hollow sections, beams and profiles can be used in all kinds of load bearing constructions and can especially substitute carbon steel when the material is subject to:

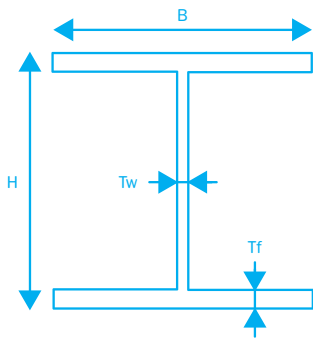
- High corrosion
- Various kind of acids
- Aesthetic demands
- Hygienic demands
- Environmental demands

The range of applications is therefore not limited to building & construction but also include pulp & paper, petrochemical, food, nuclear and architecture among others.

## Why use duplex stainless steel?

Utilizing Forta range duplex stainless steel in an optimized design will lead into weight savings in your load bearing construction which then leads to cost savings. The high chromium content gives high corrosion resistance and this together with the low nickel content makes duplex a very cost efficient solution. If you choose the right grade for your application you will most probably have a lower life cycle cost since the steel will not corrode and no or minimal maintenance is needed.





### Standard dimensions

Height H: 96 – 1 008 mm  
 Flange width B: 55 – 500 mm  
 Web thickness Tw: 5 – 30 mm  
 Flange thickness Tf: 6 – 40 mm  
 Length: 5000 – 12 000 mm

Fig. 2.

Table 8

Beamsize	IPE-balk (DIN 1025-5)				
	H	B	Tw	Tf	r
100	100	55	5	6	5
160	160	82	5	8	5
200	200	100	5	8	5
240	240	120	6	10	6
300	300	150	8	10	6
360	360	170	8	12	6
400	400	180	8	12	7
450	450	190	10	15	7
500	500	200	10	15	7
550	550	210	10	20	9
600	600	220	12	20	9
700	-	-	-	-	-
800	-	-	-	-	-
900	-	-	-	-	-
1000	-	-	-	-	-

Table 9

Beamsize	HEA-balk (DIN 1025-3)				
	H	B	Tw	Tf	r
100	96	100	5	8	5
160	152	160	6	8	5
200	190	200	6	10	6
240	230	240	8	12	6
300	290	300	8	15	7
360	350	300	10	20	7
400	390	300	12	20	9
450	440	300	12	20	9
500	490	300	12	25	9
550	540	300	12	25	11
600	590	300	12	25	11
700	690	300	15	25	11
800	790	300	15	30	11
900	890	300	15	30	14
1000	990	300	15	30	14

Table 10

Beamsize	HEB-balk (DIN 1025-2)				
	H	B	Tw	Tf	r
100	100	100	6	10	5
160	160	160	8	12	6
200	200	200	8	15	7
240	240	240	10	20	7
300	300	300	10	20	9
360	360	300	12	25	11
400	400	300	12	25	11
450	450	300	15	25	11
500	500	300	15	30	11
550	550	300	15	30	11
600	600	300	15	30	14
700	700	300	20	30	14
800	800	300	20	35	14
900	900	300	20	35	14
1000	1000	300	20	35	14

Table 11

Beamsize	HEM-balk (DIN 1025-4)				
	H	B	Tw	Tf	r
100	120	106	12	20	14
160	180	166	15	25	11
200	220	206	15	25	11
240	270	248	20	30	14
300	340	310	20	40	18
360	395	308	20	40	18
400	432	307	20	40	18
450	478	307	20	40	18
500	524	306	20	40	18
550	572	306	20	40	18
600	620	305	20	40	18
700	716	304	20	40	18
800	814	303	20	40	18
900	910	302	20	40	18
1000	1008	302	20	40	18

Table 12

Height x Width (mm)		5	6	8	10	12	15
120	120	x	x	x	x		
140	140	x	x	x	x	x	
150	150	x	x	x	x	x	
160	160	x	x	x	x	x	
180	180	x	x	x	x	x	
200	200	x	x	x	x	x	
250	250	x	x	x	x	x	x
300	300	x	x	x	x	x	x
350	350	x	x	x	x	x	x
400	400	x	x	x	x	x	x
450	450	x	x	x	x	x	x
500	500	x	x	x	x	x	x



# Own notes

A series of horizontal dotted lines for writing notes.





# Working towards forever.

We work with our customers and partners to create long lasting solutions for the tools of modern life and the world's most critical problems: clean energy, clean water, and efficient infrastructure. Because we believe in a world that lasts forever.

outokumpu classic			outokumpu pro					
<b>Moda</b>	<b>Core</b>	<b>Supra</b>	<b>Forta</b>	<b>Ultra</b>	<b>Dura</b>	<b>Therma</b>	<b>Prodec</b>	<b>Deco</b>
Mildly corrosive environments	Corrosive environments	Highly corrosive environments	Duplex & other high strength	Extremely corrosive environments	High hardness	High service temperatures	Improved machinability	Special surfaces

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