



**sapa:**

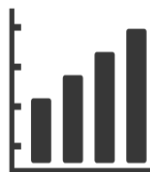
**Stora lastbärande  
lättyiktspaneler**

**Göran Olsson  
Product Development Europe**

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22,800 people



Net sales NOK  
55 billion



1.3 million tonnes  
delivered



More than  
100 locations

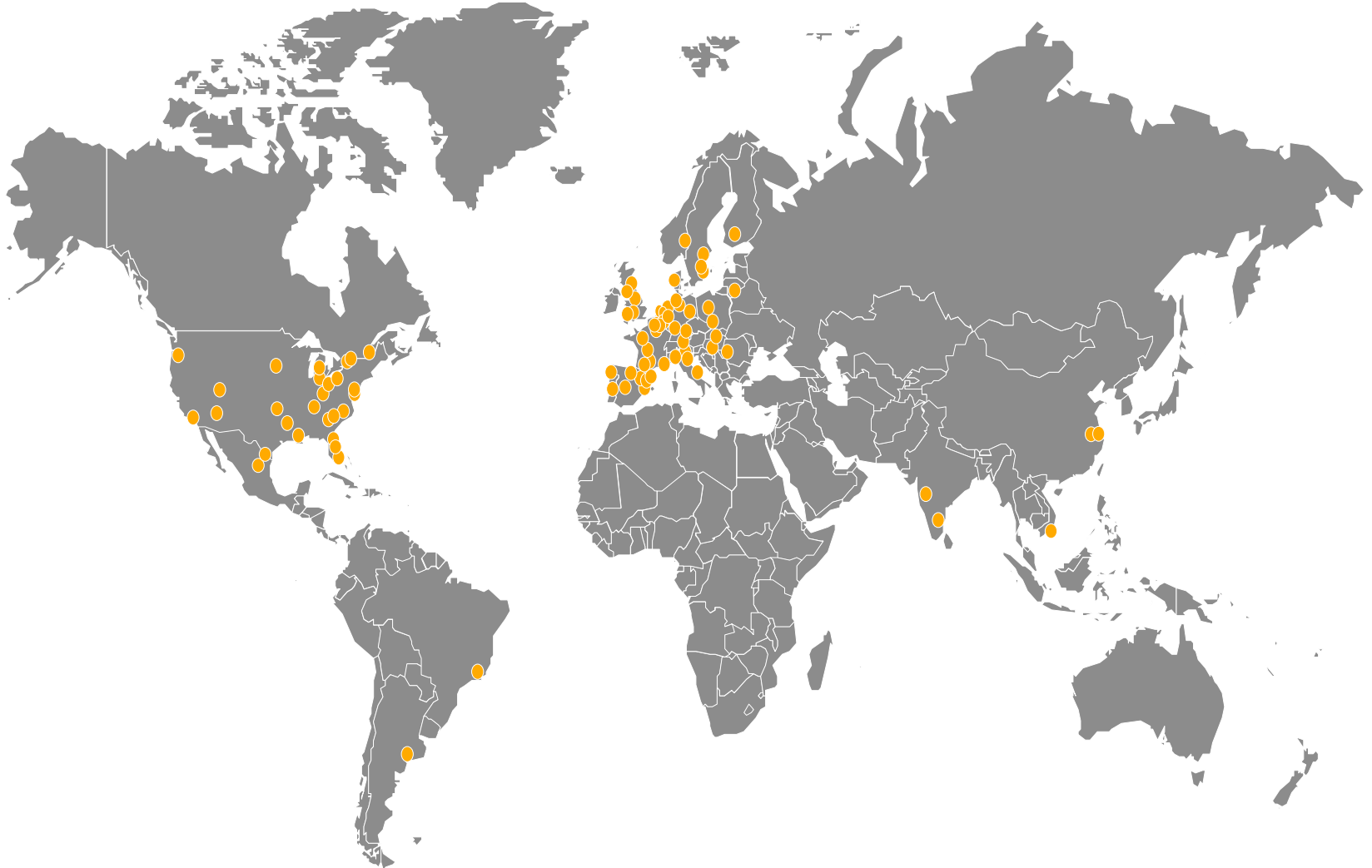


Present in more  
than 40 countries



50% of production based  
on recycled aluminium

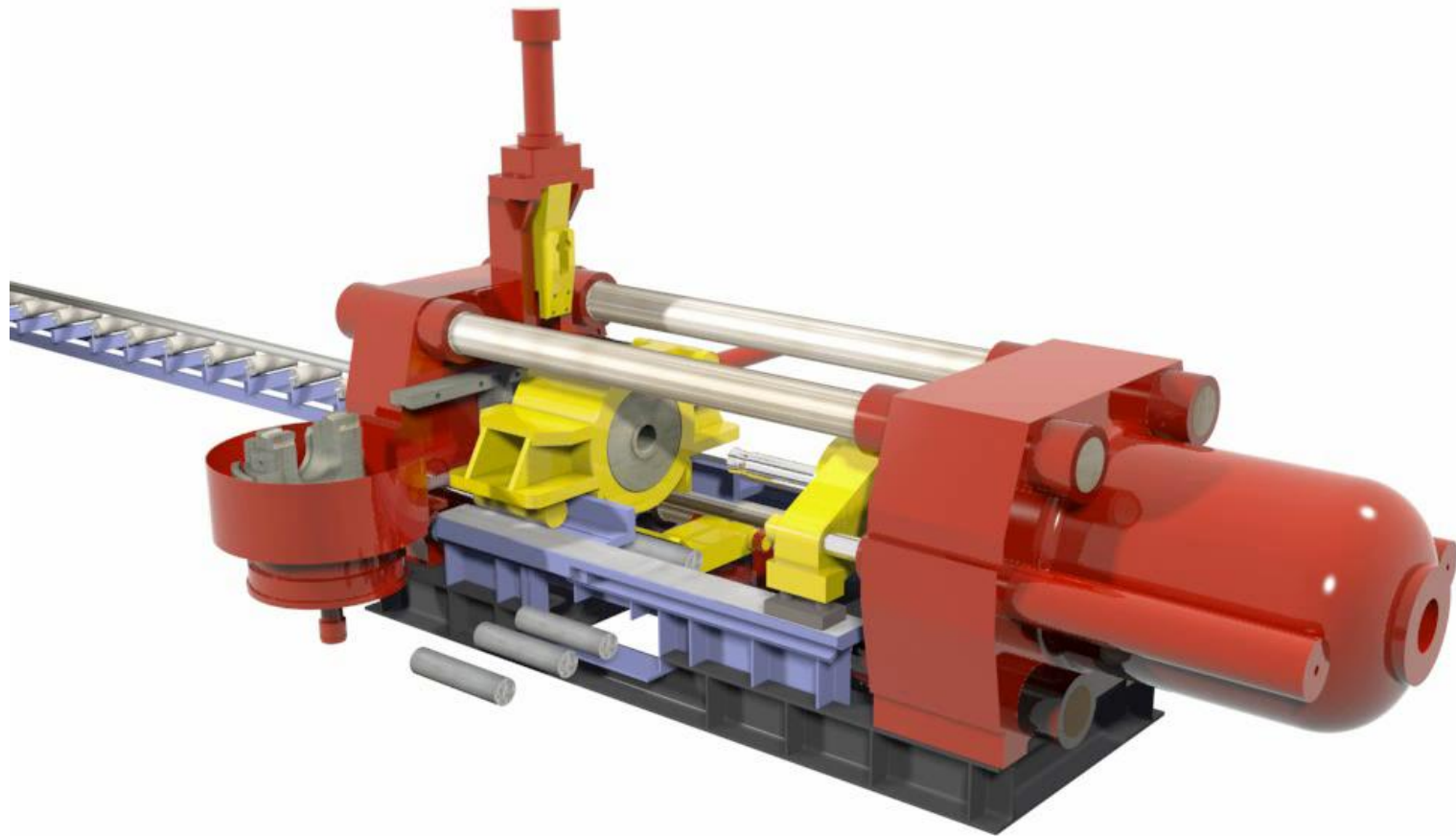
# sapa: Sapa globalt



**sapa:**

# Extrusion process

6



**sapa:**

# Verktyg för strängpressade profiler

8

sapa:

**sapa:**

# De vanligaste legeringarna för profiler

Alloy	Composition (weight-%)					mechanical properties					
	Si	Fe	Cu	Mn	Mg	Rp0,2 (MPa)		Rm (MPa)		A5 (%)	
						T4	T6	T4	T6	T4	T6
<b>EN AW-6060</b>	0,30-0,6	0,10-0,30	0,10	<0,10	0,35-0,6	60	150	120	190	16	8
<b>EN AW-6063</b>	0,20-0,6	<0,35	0,10	<0,10	0,45-0,9	65	170	130	215	14	8
<b>EN AW-6005</b>	0,6-0,9	<0,35	0,10	<0,10	0,40-0,6	90	225	180	270	15	8
<b>EN AW-6005A</b>	0,50-0,9	<0,35	0,30	<0,50*	0,40-0,7	90	225	180	270	15	8
<b>EN AW-6082</b> * Mn+Cr 0,12-0,50	0,7-1,3	<0,50	0,10	0,40-1,0	0,6-1,2	110	260	205	310	14	10

# sapa: Egenskaper för legeringar i 6000-serien

Alloy	Advantages	Disadvantages	Use
<b>AA6060</b>	<ul style="list-style-type: none"> <li>• Good extrudability</li> <li>• Good surface appearance</li> <li>• Good formability , plastic working</li> </ul>	<ul style="list-style-type: none"> <li>• Low mechanical strength</li> <li>• Difficult to machine</li> </ul>	<ul style="list-style-type: none"> <li>• Building systems</li> <li>• Furniture</li> <li>• Anodising</li> </ul>
<b>AA6063 (AA6060)</b>	<ul style="list-style-type: none"> <li>• Good combination of mechanical strength and extrudability</li> <li>• Good surface appearance</li> <li>• Good formability, plastic forming</li> </ul>	<ul style="list-style-type: none"> <li>• No construction alloy</li> </ul>	<ul style="list-style-type: none"> <li>• Building systems</li> <li>• Anodising</li> </ul>
<b>AA6106</b>	<ul style="list-style-type: none"> <li>• Intermediate strength</li> <li>• Decent surface appearance</li> </ul>		<ul style="list-style-type: none"> <li>• Automotive products</li> <li>• Ladders</li> </ul>
<b>AA6005A</b>	<ul style="list-style-type: none"> <li>• Higher strength</li> <li>• Good toughness</li> <li>• Construction alloy</li> </ul>		<ul style="list-style-type: none"> <li>• Transportation</li> <li>• Safety related applications</li> </ul>
<b>AA6082</b>	<ul style="list-style-type: none"> <li>• High mechanical strength</li> <li>• High toughness</li> <li>• Good fatigue properties</li> <li>• Good machinability</li> </ul>	<ul style="list-style-type: none"> <li>• Low extrudability</li> <li>• Anodising -&gt; Look out</li> </ul>	<ul style="list-style-type: none"> <li>• Transportation</li> <li>• Structural components</li> <li>• Safety related applications</li> </ul>

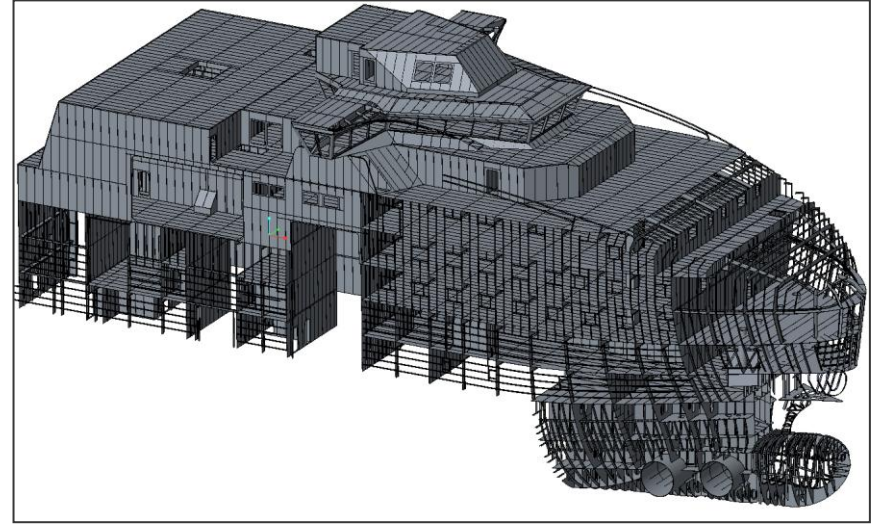
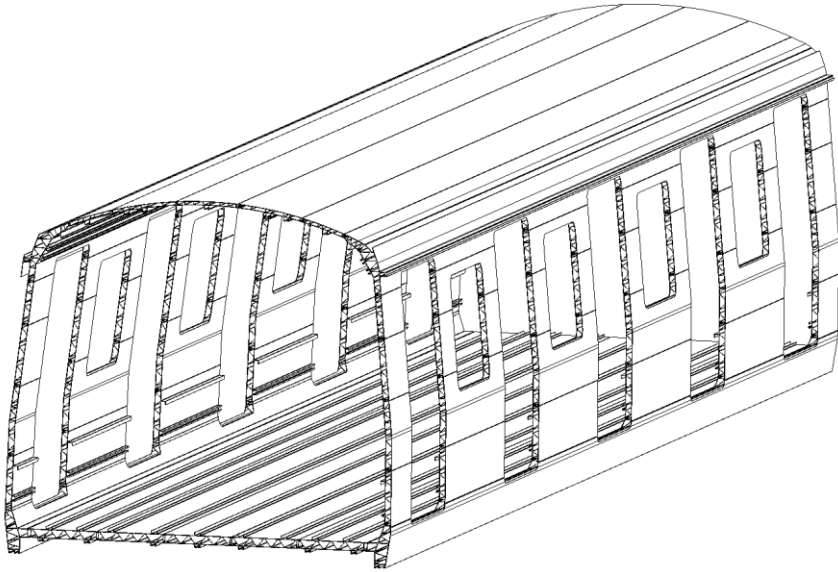
**sapa:**

**Stora paneler**



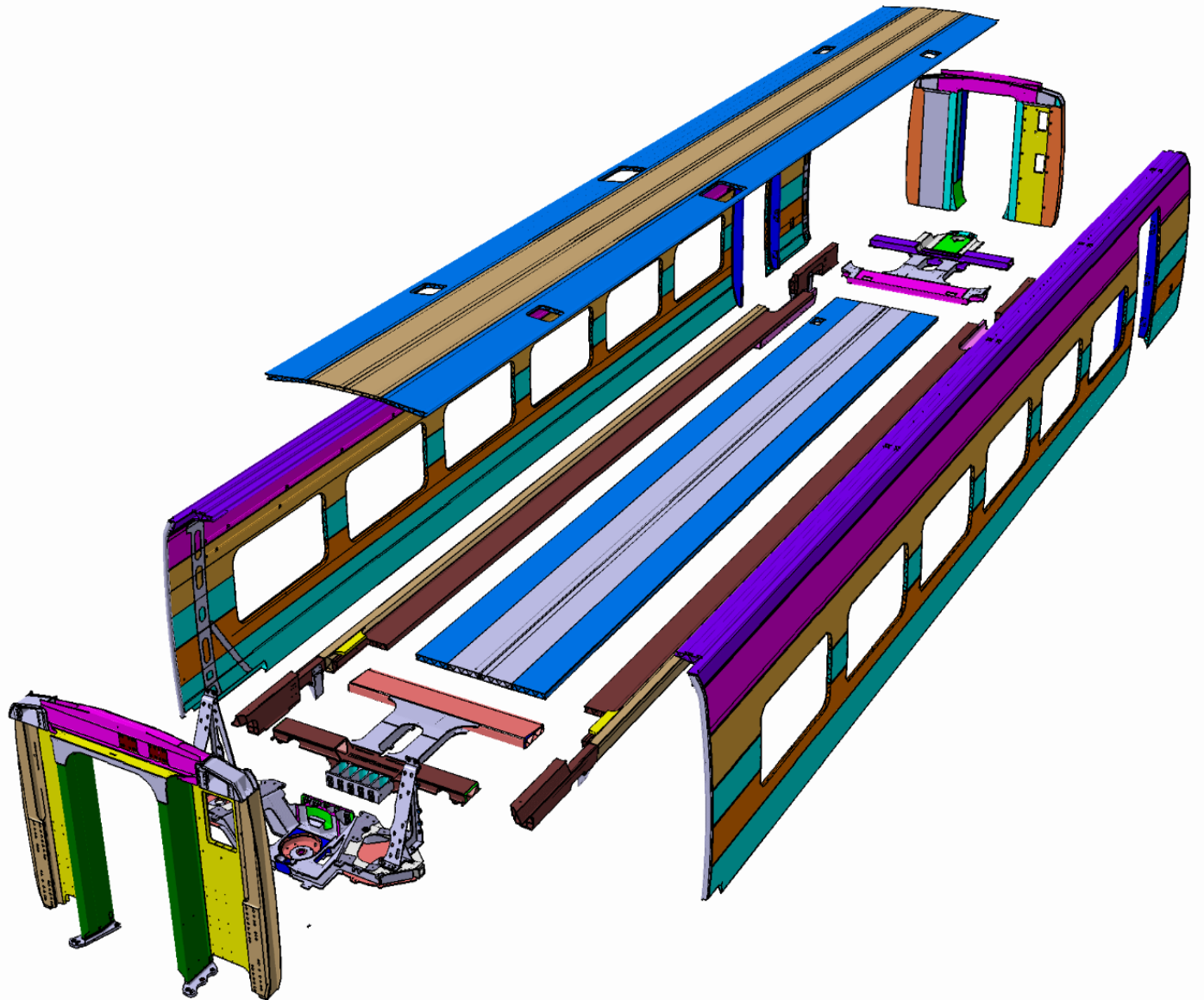


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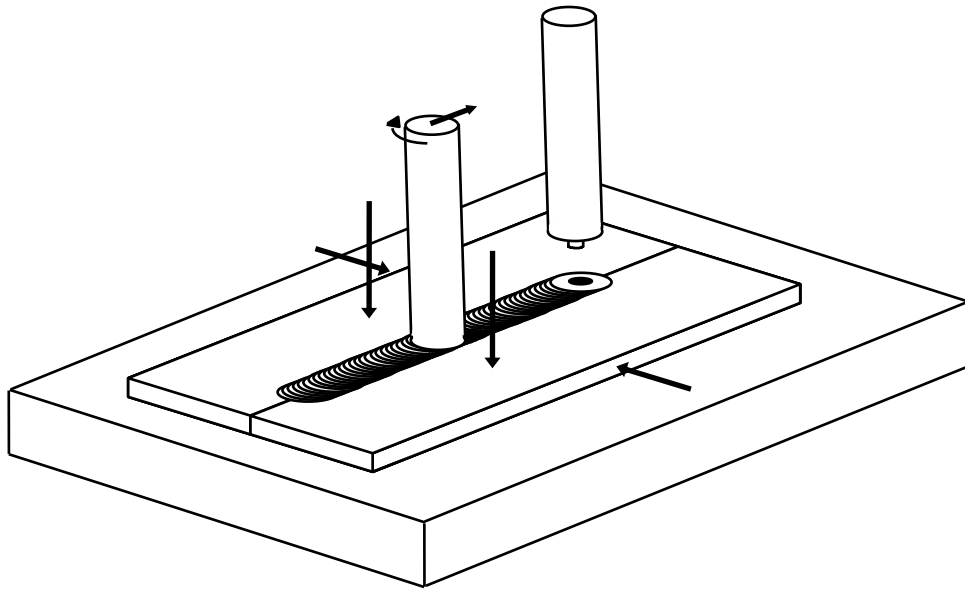
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## Paneler i ett tåg

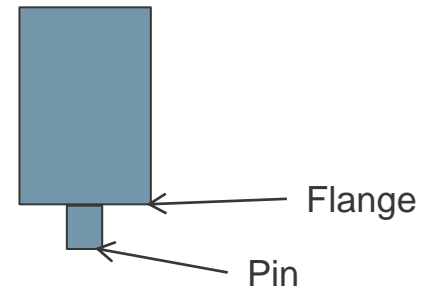


sapa:

# FSW-metoden



Stabilt underlag  
Noggrann fixering  
Ingen smältning av materialet



**sapa:**

## **FSW i verkligheten**



# sapa:

## Maskin 1

Length 14,5 m

Width 3 m

## Maskin 2

Length 18,5 m

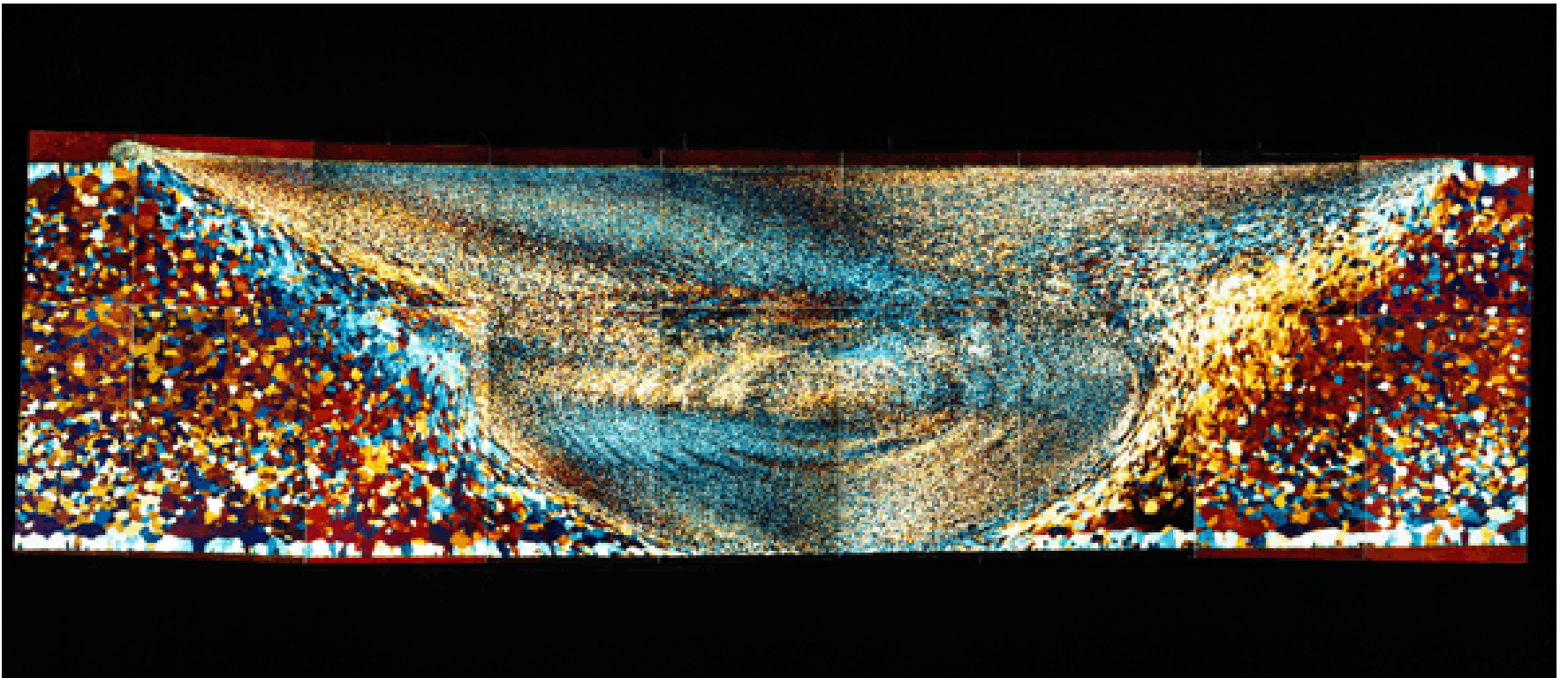
Width 3,5 m



**sapa:**      **Friction Stir Welding i långlängd**



sapa:  
**FSW –weld structure**



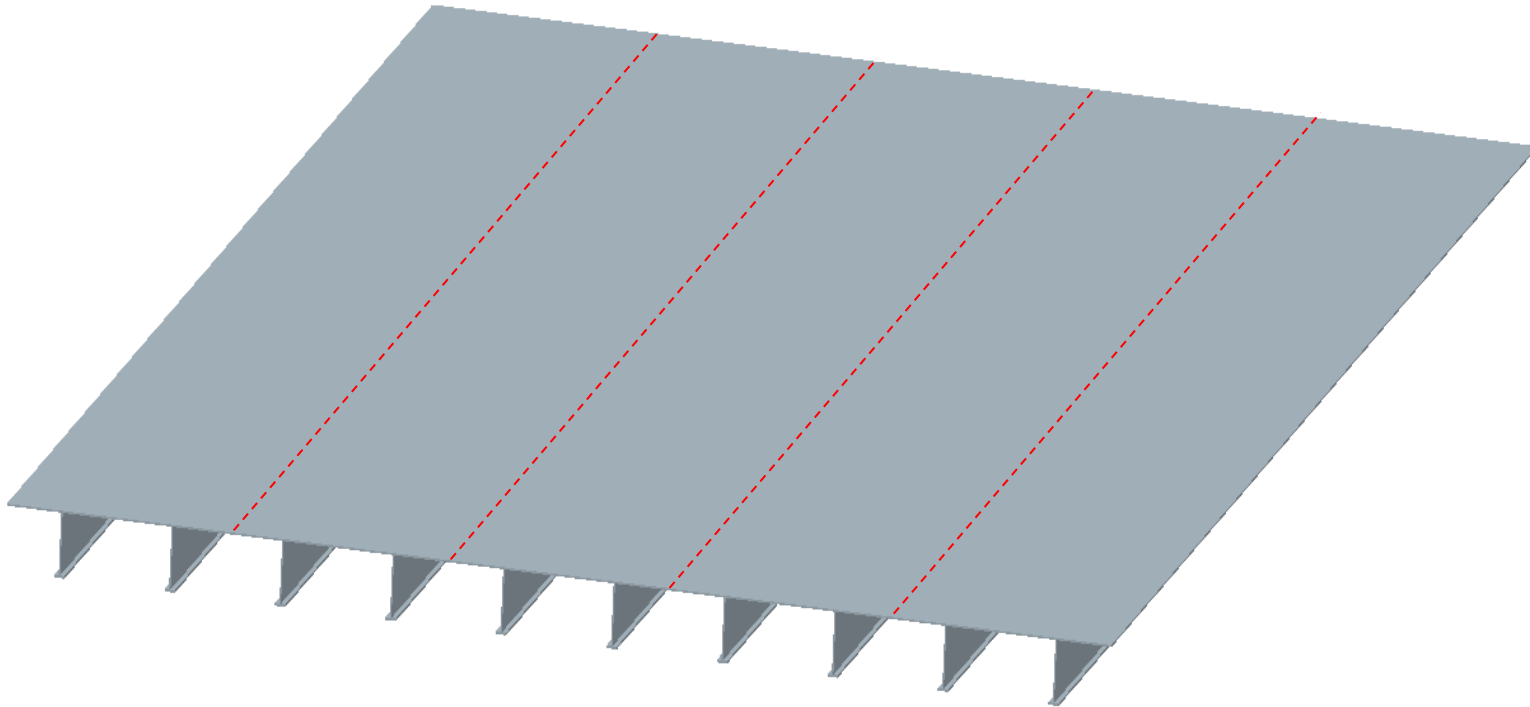
**sapa:**      Mekaniska egenskaper hos FSW i Al





**sapa:**

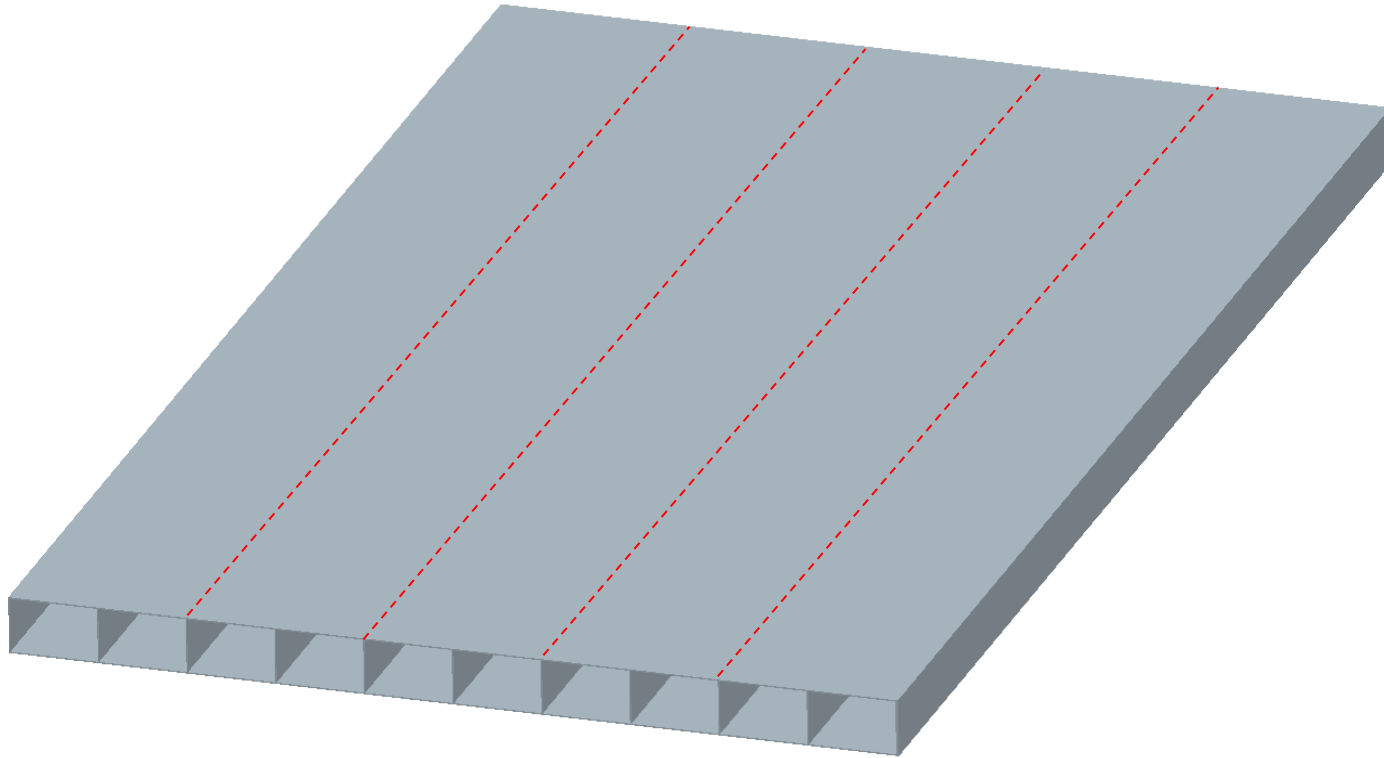
## **Solid Panel**



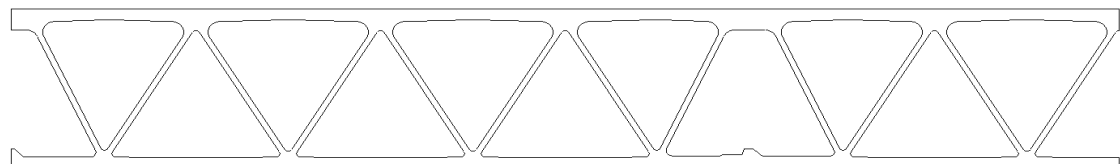
5 extrusions FSW together

**sapa:**

# Hålprofil



5 extrusions FSW (double sided) together



# **sapa: FSW - summary**

1. Solid state method
2. No added material
3. Low heat input
4. Low thermal distortion of panels
5. High mechanical properties in heat treatable alloys
6. Both solid and hollow profiles can be welded
7. Reliable method
8. Suitable for automation
9. Cost effective
10. Sapa is market leader in FSW of structural panels

sapa:

## Marine segmentation

1. Cruise Vessels

- Fincantieri
- STX



2. Mega Yachts

- Feadship
- Ocea



3. Fast Ferries

- Austal
- Damen
- STX



4. Naval Vessels

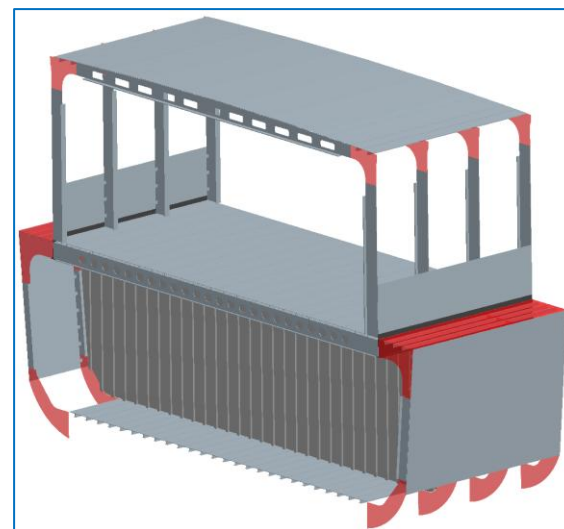
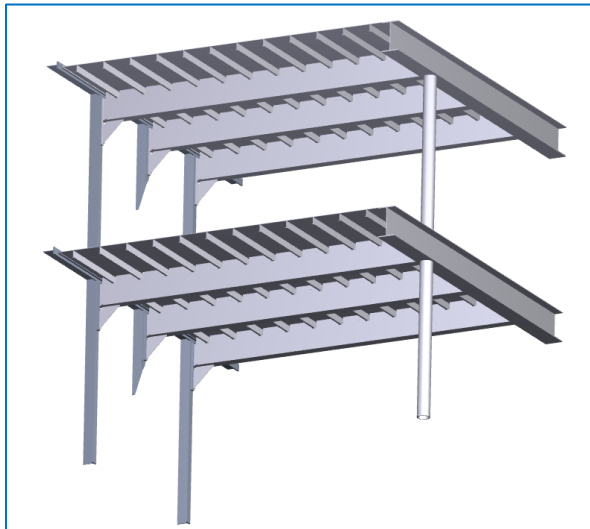
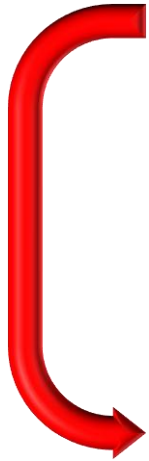
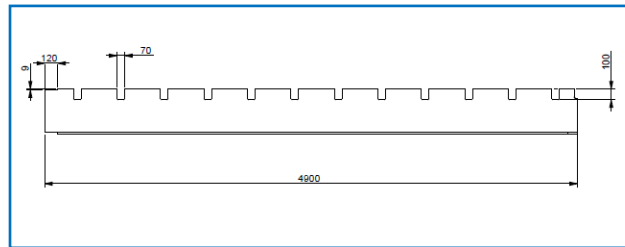
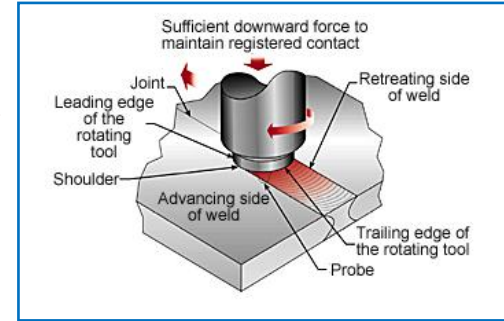
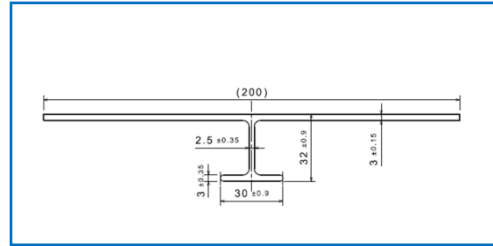
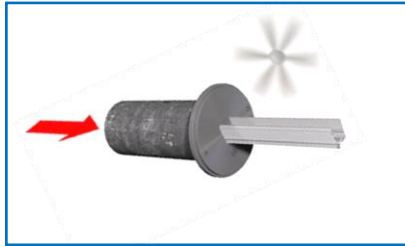
- Austal

5. Offshore & Vessels



# sapa:

## Från ide till verklighet



## Cruise Vessels

World wide

Predominantly Europe,

### Scope of Supply

FSW panels and profiles.



## – Mega Yachts

– World wide

– Europe & North America

### Scope of Supply

– FSW Panels and profiles.



## – Fast Ferries and Defence

– Europe.

– North America

– Asia Pacific

### Scope of Supply

– FSW Panels and profiles and machining.



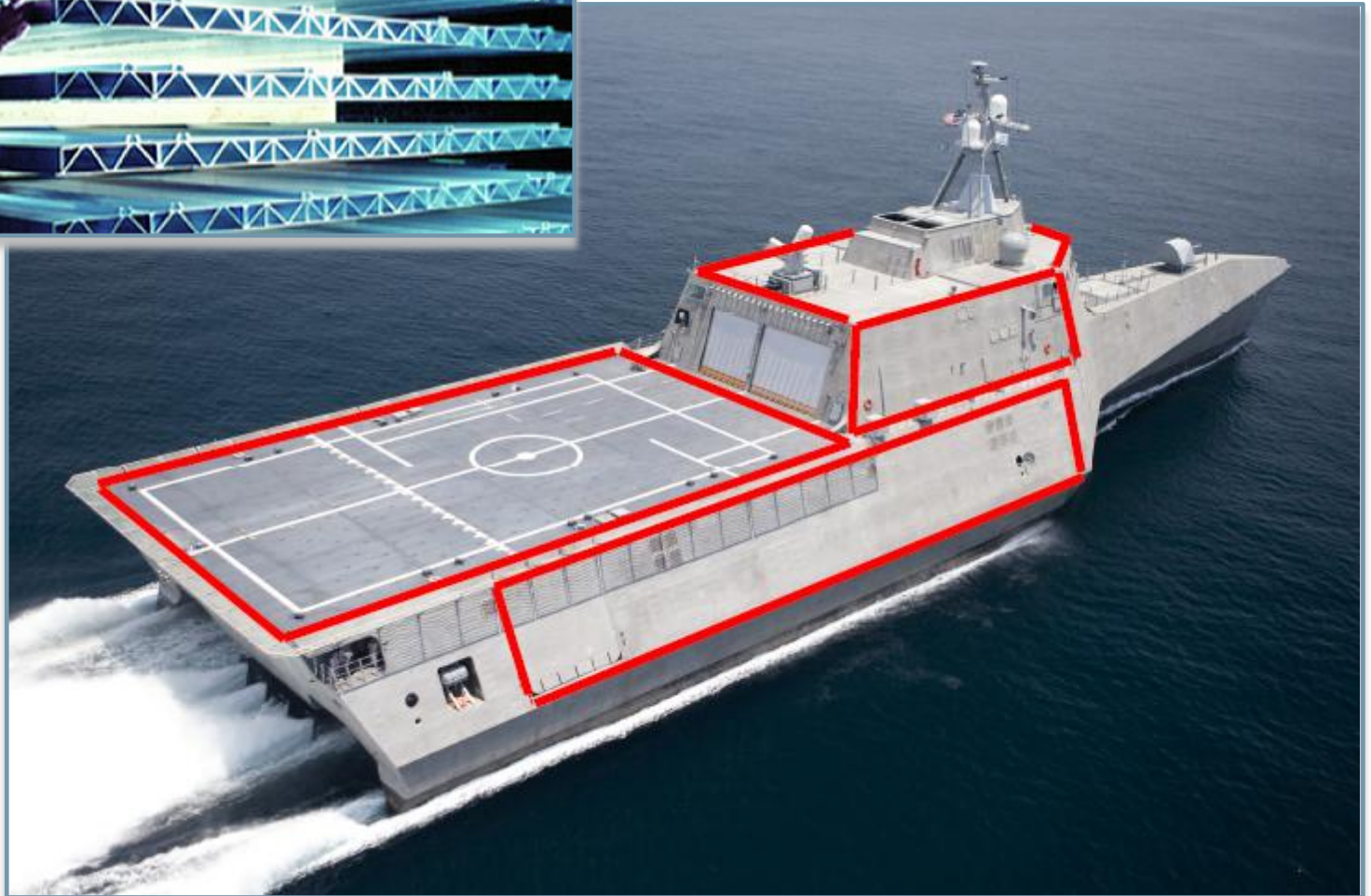
sapa:

# STX EUROPE FSW DECK PANELS



sapa:

# Sapa FSW Panels on LCS





**sapa:**

# Austal Ships USA JHSV (Joint High Speed Vessel)

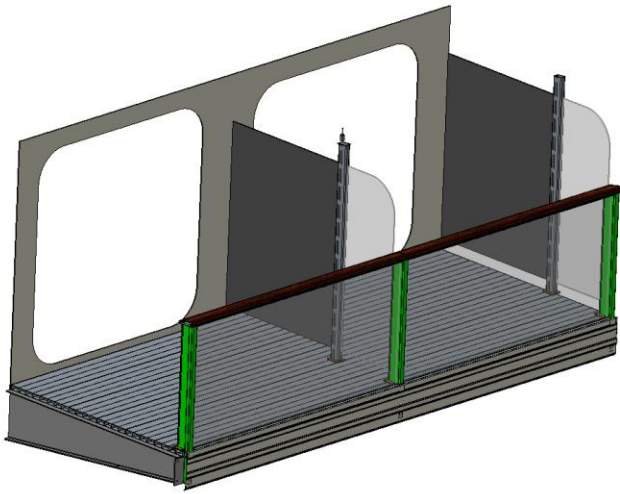
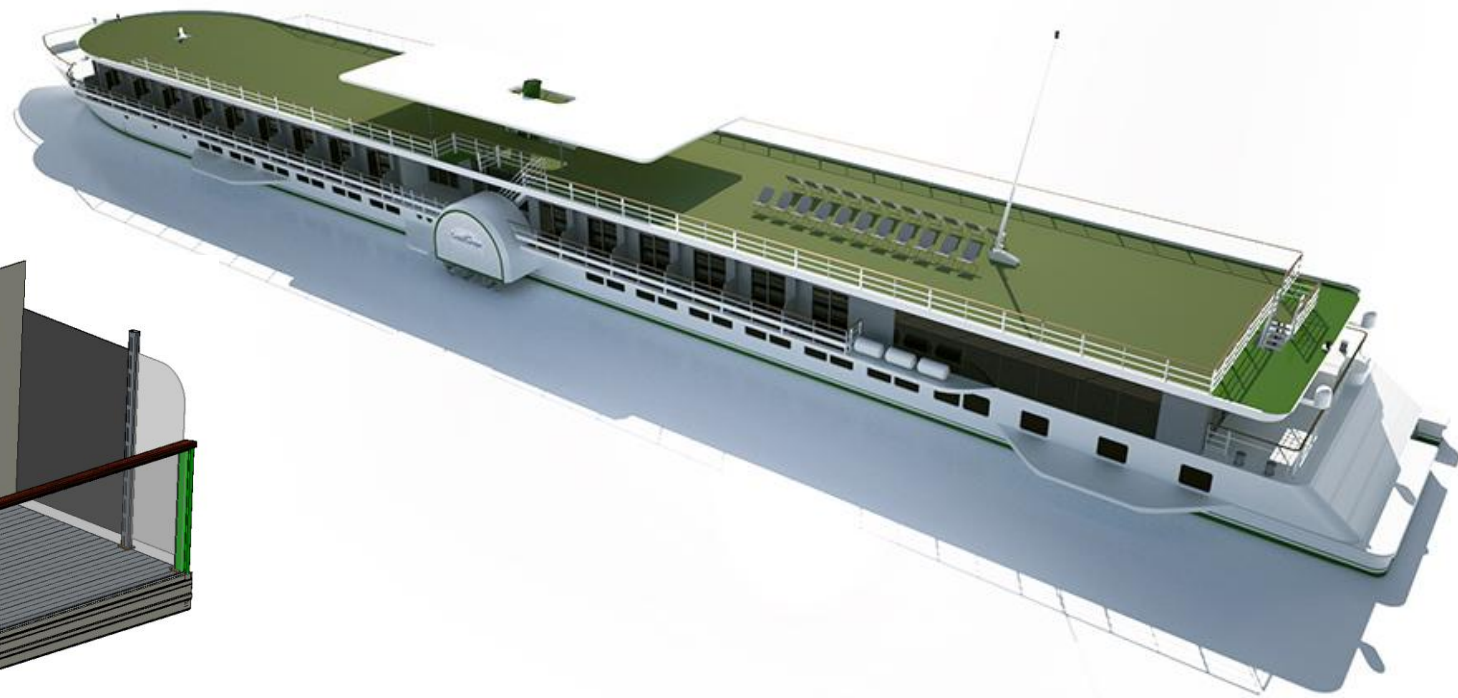


- 10 vessels over 5 years
- 74 000m of FSW per vessel



sapa:

Acco, France



- **Paneler av Al-profiler ger stor frihet i design**
- **Placera materialet där du behöver det, optimera konstruktionen**
- **Allt material och samtliga svetsar är certifierade (DNV, Lloyds, ABS etc.)**
- **Bakomliggande förstävningar (Bulber, T-förstävningar) integreras direkt i profilerna**
- **Slät utsida utan märken efter svets**
- **Ingen deformation efter svetskrämpning som vid MIG**

**FRÅGOR?**