

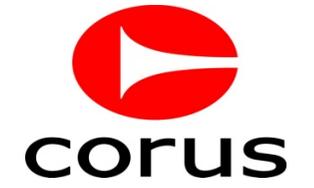
Corus Tubes Energy

UKOPA Meeting

Scott McCann

8th October 2009

UKOPA/09/0062



Corus UK Limited

Corus overview



- An international company, providing steel and services to customers worldwide
- Annual turnover c £9.7bn
- Approximately 41,000 employees worldwide
- Major manufacturing sites in UK, Netherlands, Germany, France, Norway and Belgium
- Sales offices and service centres in over 40 countries
- Supplier to many of the most demanding markets worldwide including construction, automotive, packaging, mechanical engineering and other markets worldwide.
- A subsidiary of Tata Steel

Tata and Corus – a powerful combination

Market presence



UK & Ireland

4 production facilities
 Crude steel capacity 14 mtpa
 16 manufacturing locations
 33 distribution centres

EU (excl. UK, Irl and Netherlands)

19 manufacturing locations
 13 distribution centres

Thailand

3 production facilities
 Crude steel capacity 1.2 mtpa
 3 distribution centres

USA

3 manufacturing locations
 2 distribution centres

Netherlands

1 production facility
 Crude steel capacity 6.8 mtpa
 6 manufacturing locations
 3 distribution centres

India

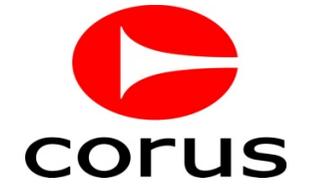
1 production facility
 Crude steel capacity 5 mtpa
 22 distribution centres

South East Asia

1 production facility
 Crude steel capacity 0.65 mtpa
 4 distribution centres



Combined group has a significant presence in both emerging and developed markets spanning over 25 countries/regions



Corus Tubes Energy

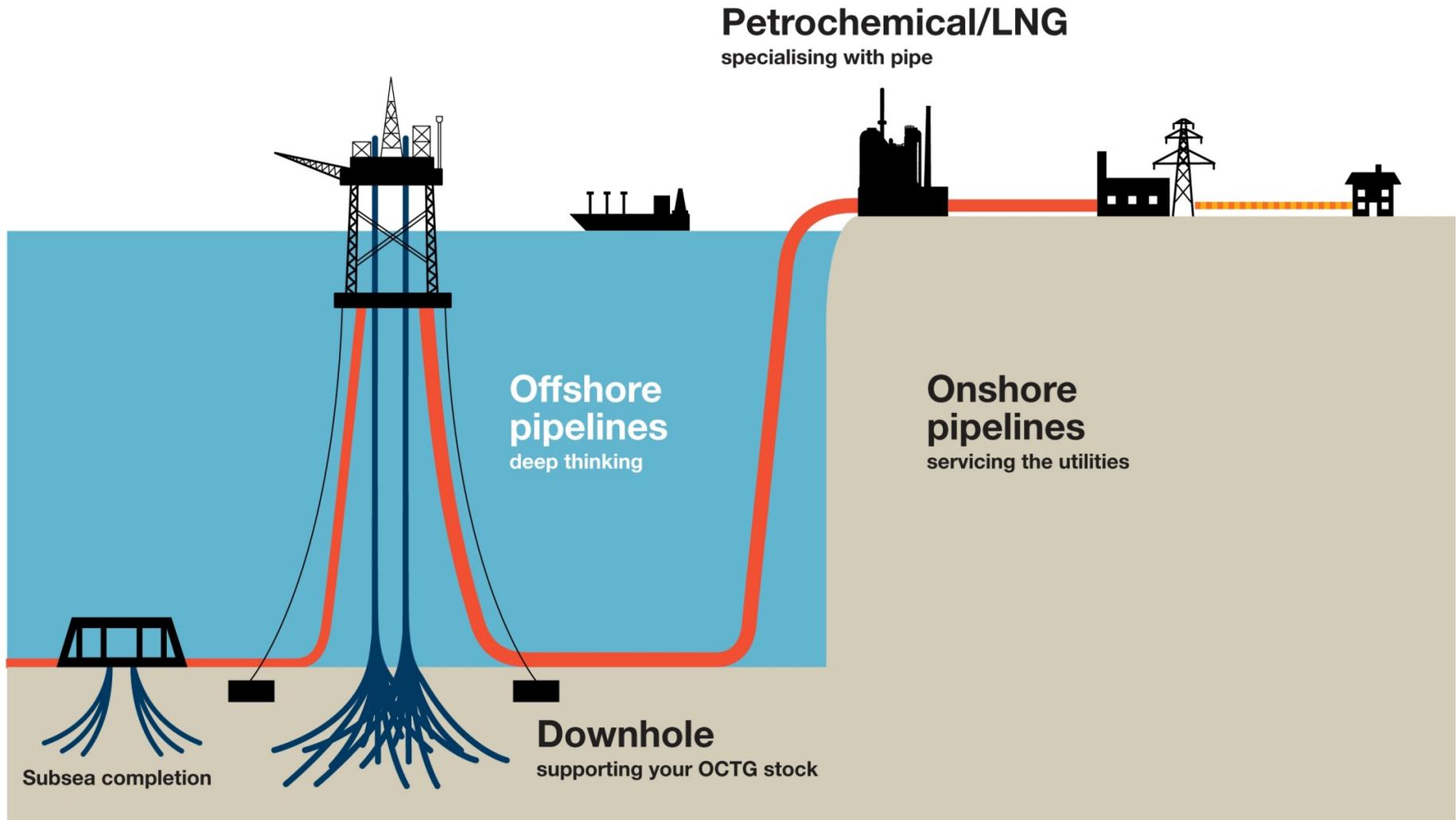
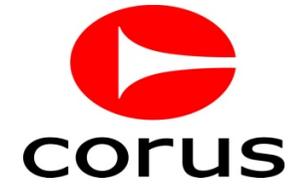
Corus Tubes Energy

Our aim



To be a **pioneering** leader in the supply of innovative pipeline solutions which assist our customers to access new energy resources in the world's most hostile and challenging environments

Corus Tubes Energy Product Portfolio

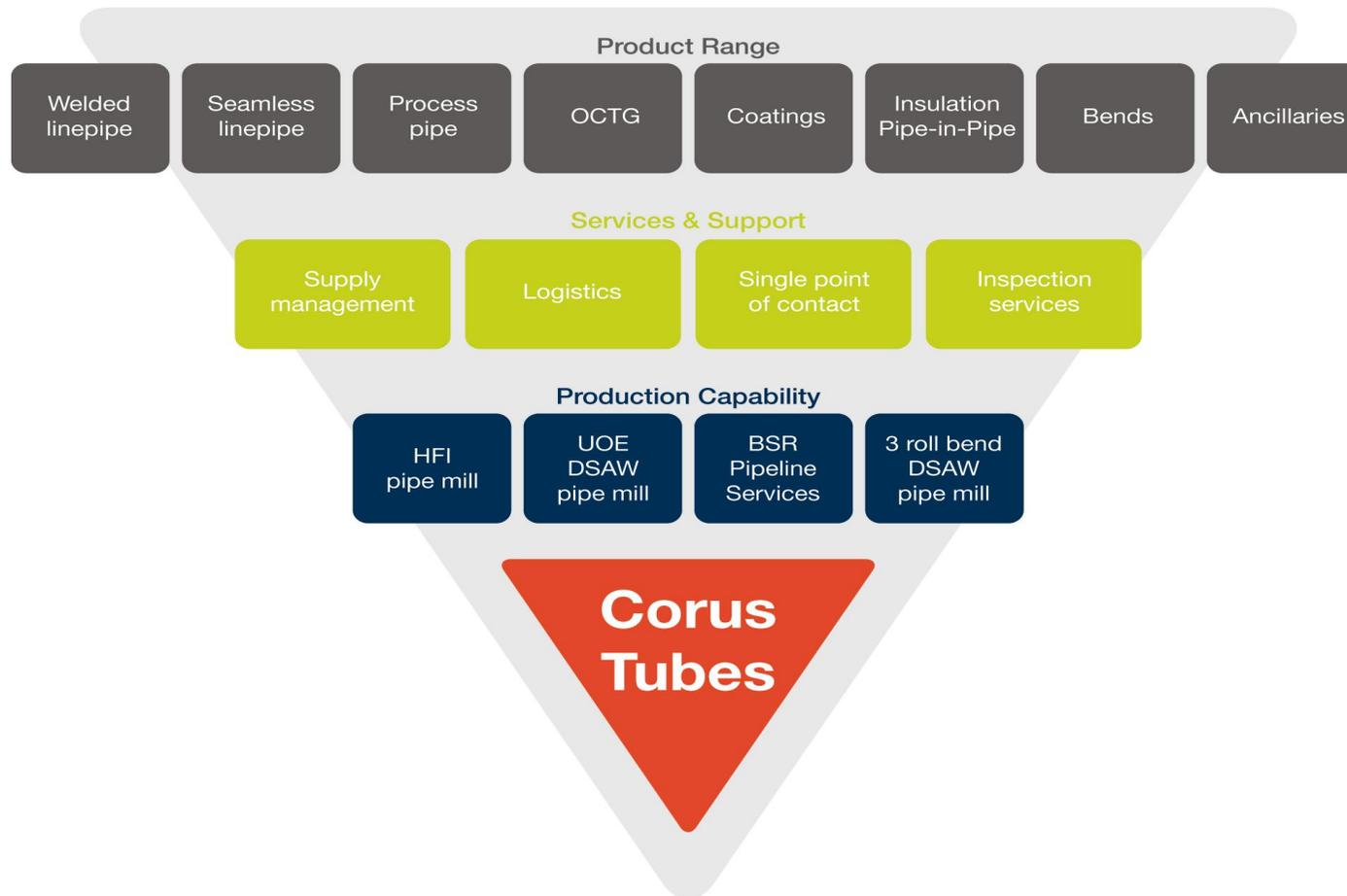


Corus Tubes Energy

The complete package



Your partner in the global search for energy



Corus Tube's supply quality linepipe products from their own mills

To provide a complete supply management service, Corus Tubes also source other linepipe products and services from approved subcontractors

Service reduces customer's contract interfaces, saving time and expense

Manufacturing Facilities



Hartlepool

UOE SAW Pipe Mill

HFI Pipe Mill

3 Roll Bend SAW Mill

BSR Pipelines Services

Pipe in Pipe Fabrication Facility

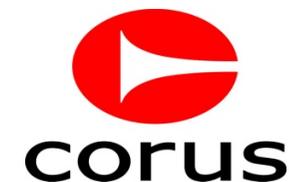
Corby

Commercial Office

Corby 6" HFI Mill

Manufacturing Capabilities

Pipe Mills



Process Route	Min OD	Max OD	Min WT	Max WT	Comments
U-O-E Submerged Arc Welded (Hartlepool)	16" (406.4mm)	44" (1117.6mm)	9.5mm	50mm	Extensive Track Record Thickwall/Deepwater capability Portfolio of assured Plate Supply routes
High Frequency Induction Welded (Hartlepool)	8" (219.1mm)	20" (508mm)	4mm	16mm	Most Powerful HFI welder in the world (1800kw) Corus steel supply route Very fast leadtimes
High Frequency Induction Welded (Corby)	2" (60.3mm)	6 5/8" (168.3mm)	2.8mm	12.7mm	Specialist product for gas and chemical injection lines Very fast leadtimes
3 Roll Submerged Arc Welded (Hartlepool)	18" (457m m)	84" (2133.6mm)	6.4mm	30.2mm	Small quantity flexibility Non standard OD's Full body heat treatment

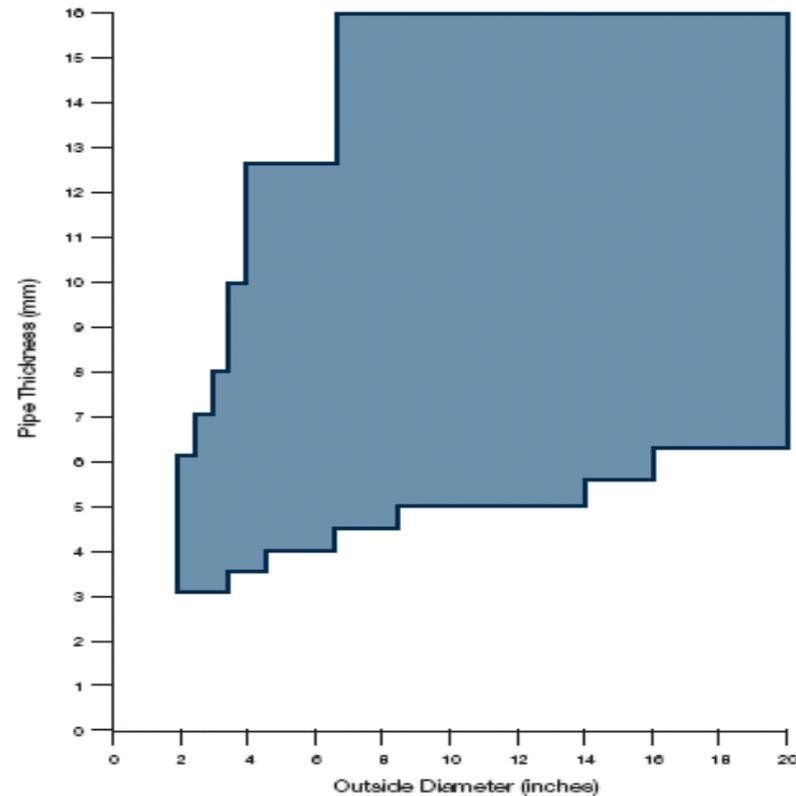


High frequency induction (HFI) mill

HFI mill

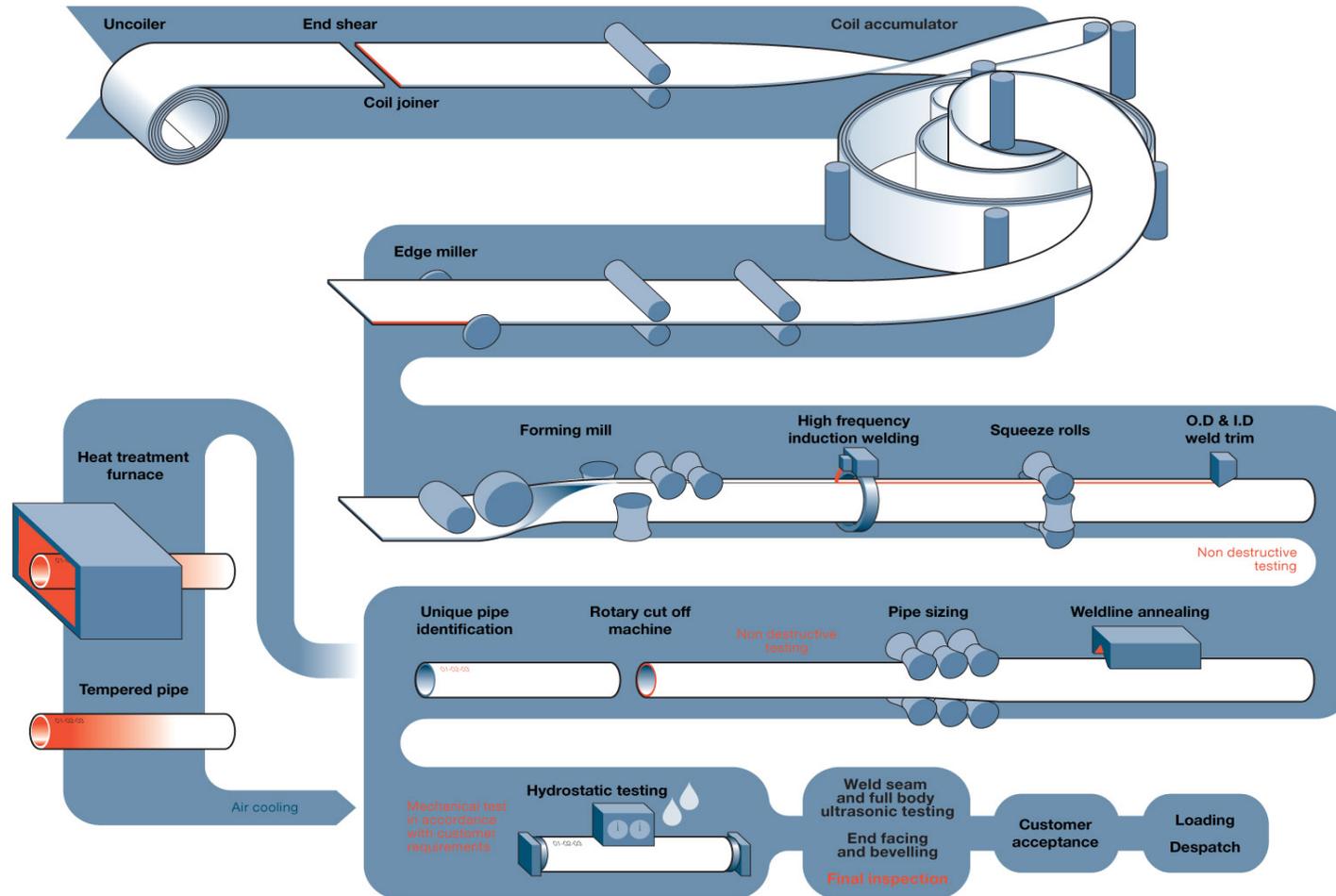
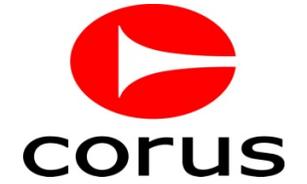


- Powerful HFI welder (1.8Mw)
- Significant onshore and offshore track record
- Corus steel supply route
- On site coating facilities
- Fast leadtimes
- Also a key supplier to the construction markets



HFI mill

Process diagram



HFI mill

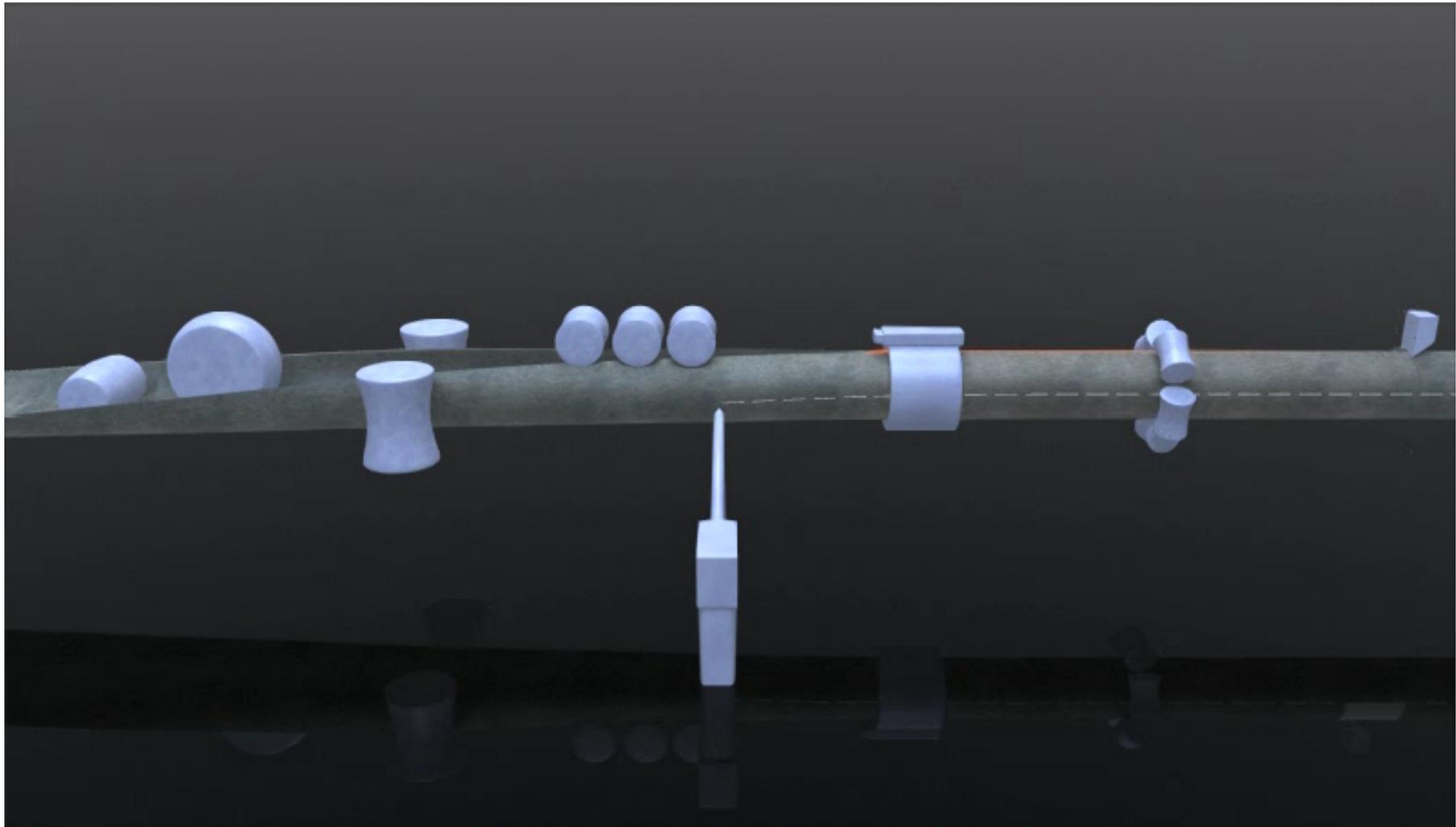


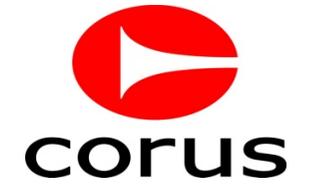
HFI Mill Benefits



- Tight tolerance control
 - Wall Thickness +/- 5% (weld +8%) to nearest 0.1mm
 - Ovality <0.75% nom OD
 - Diameter 0.5% of OD (219.1mm = 1.5mm, 508mm = 2.0mm)
 - Straightness 1:1000
 - Length -0/+100mm
- Sour Resistant (measured by NACE TM0284 test using the TM0177 (pH3) solution)
- Impact Test Temperatures down to -30°C (body), -20°C (weld line)

HFI mill



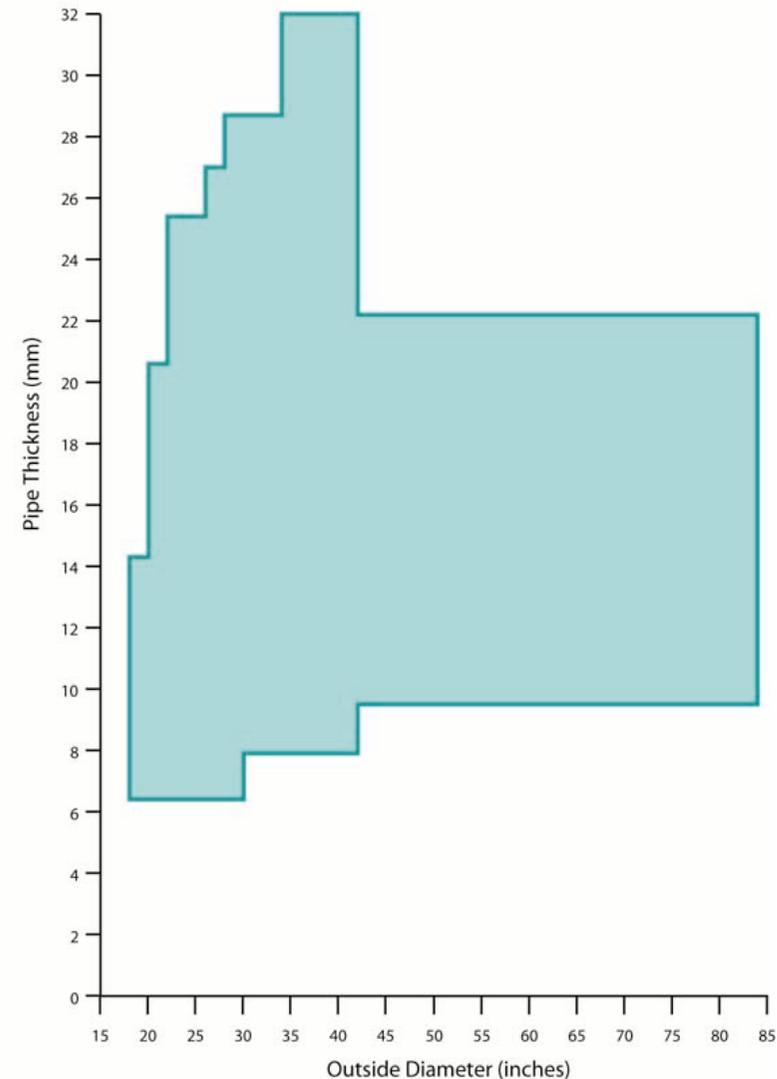


3 roll bend DSAW mill

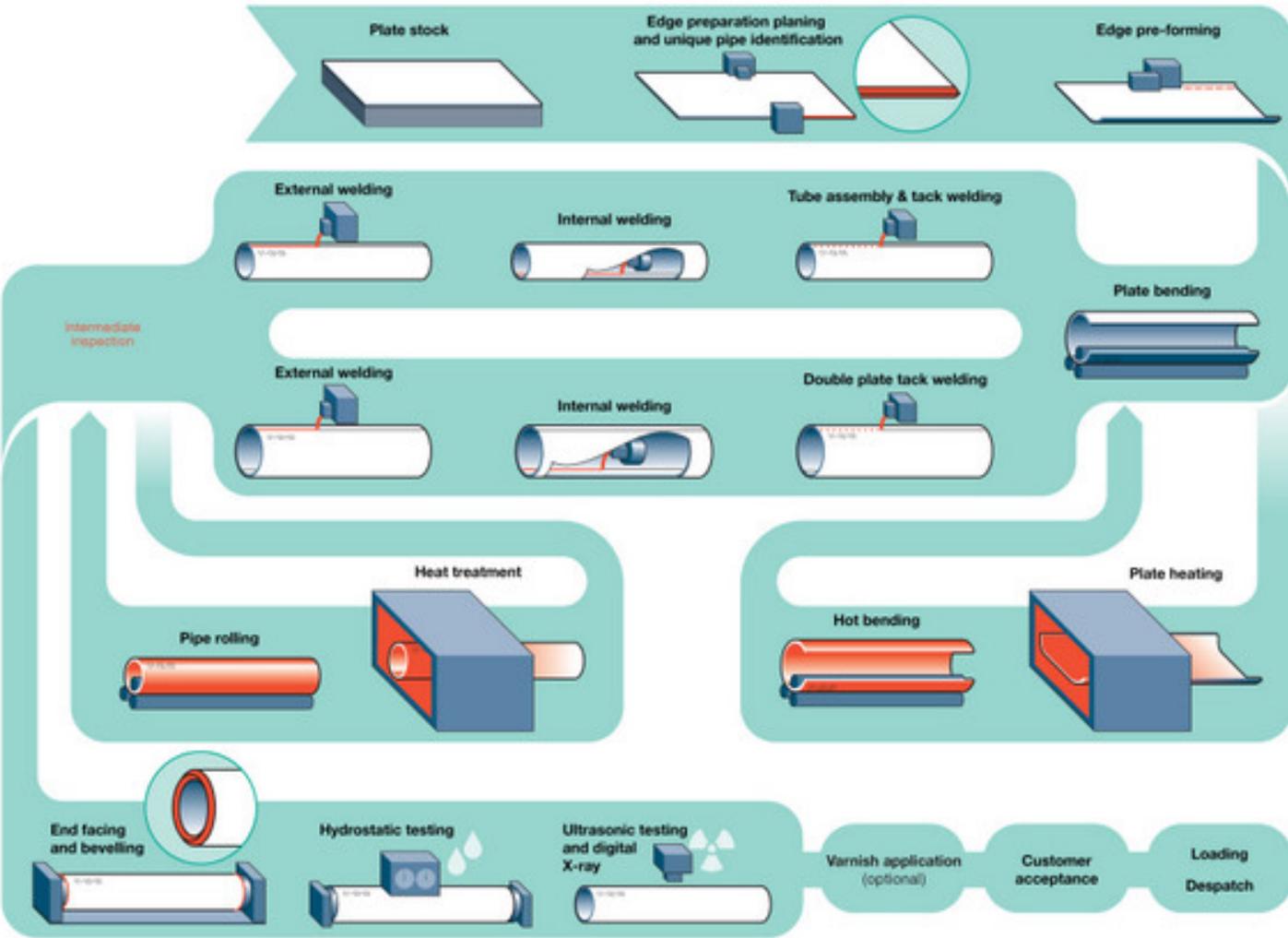
3 roll bend DSAW mill



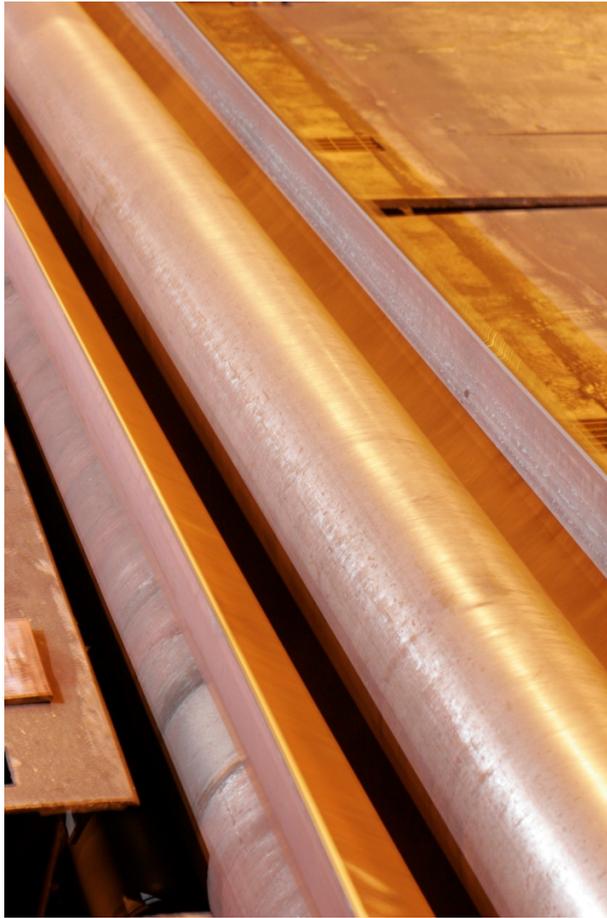
- Pipe diameters from 18" to 84"
- Significant offshore/onshore track record
- Small quantity flexibility
- Non standard OD's
- Full body heat treatment
- 5% Chrome
- Circ welding to 27m lengths
- On site coating facilities



3 roll bend DSAW mill Process diagram



3 roll bend DSAW mill



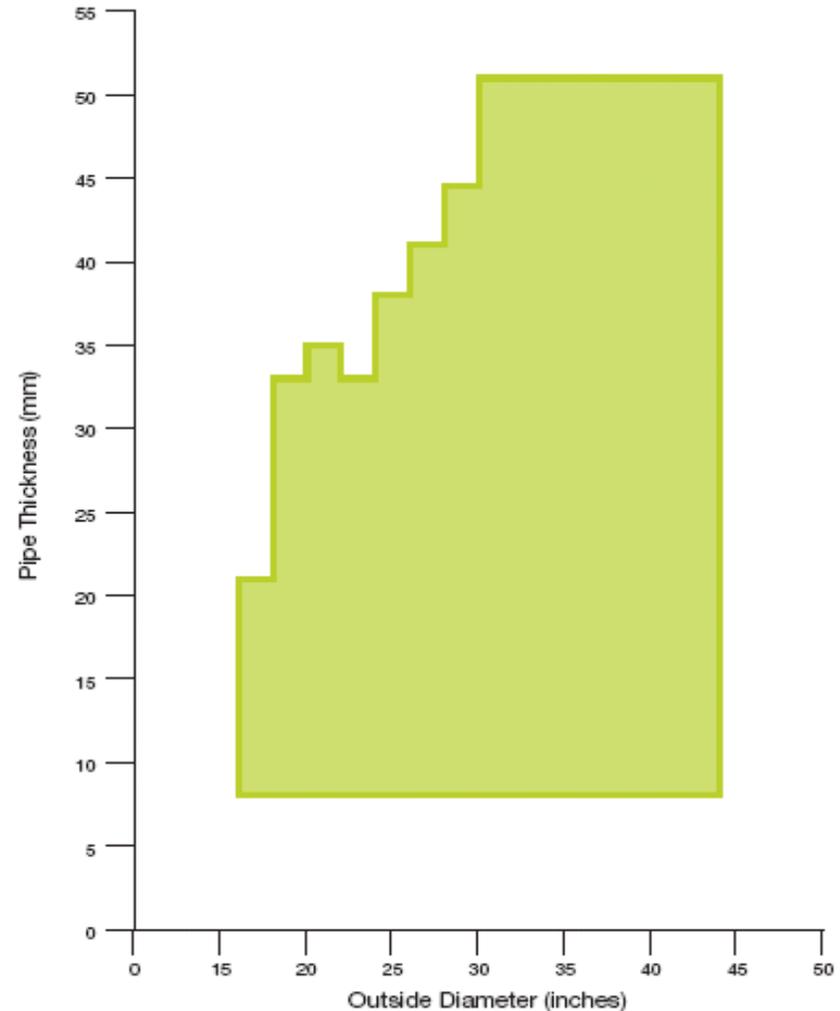


UOE DSAW Mill

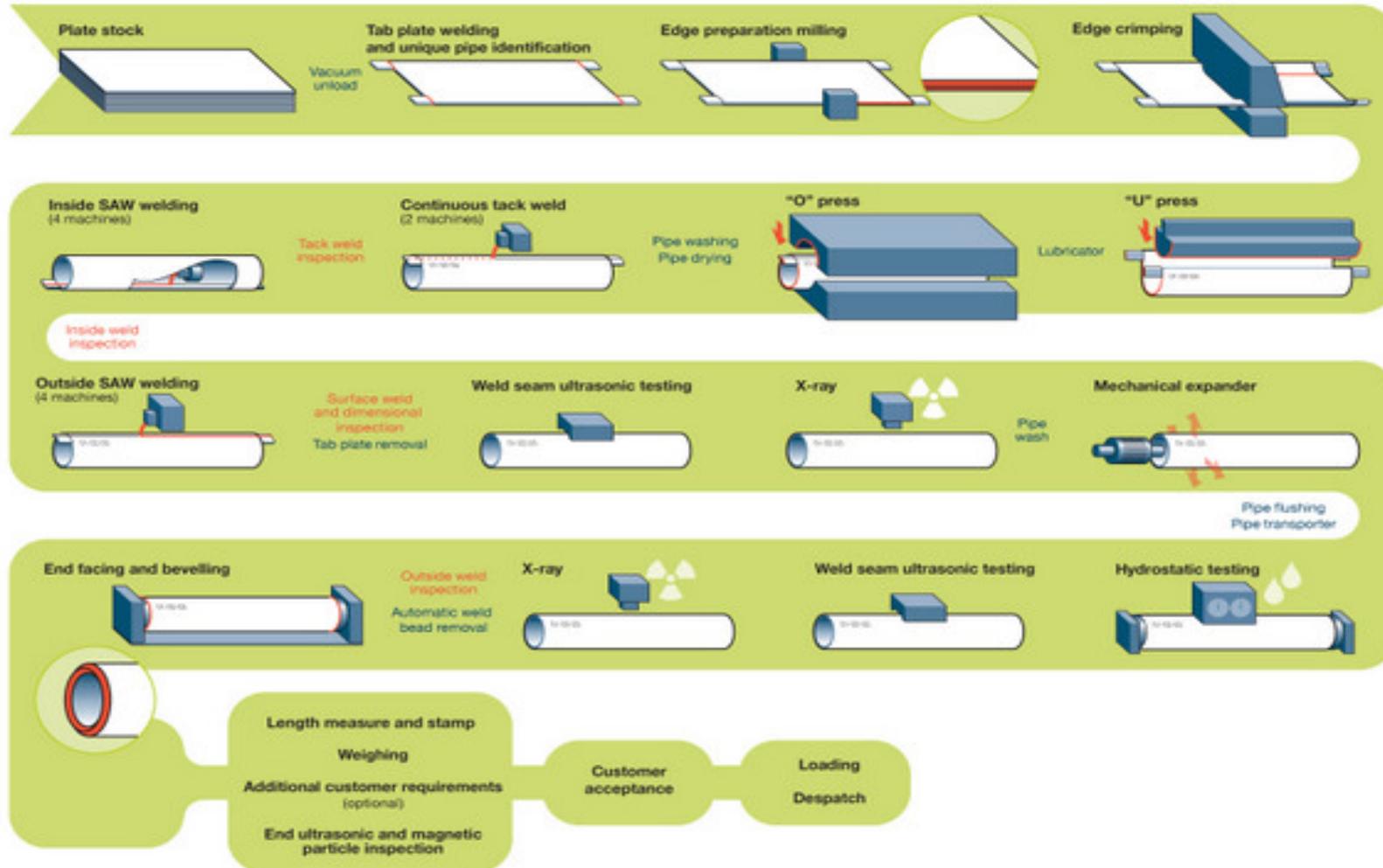
UOE DSAW Mill



- Only European manufacturer of 16" and 18" OD DSAW
- Production commenced in 1993
- Extensive Track Record Onshore & Offshore
- On site coating facilities
- Specialist in deepwater, challenging projects

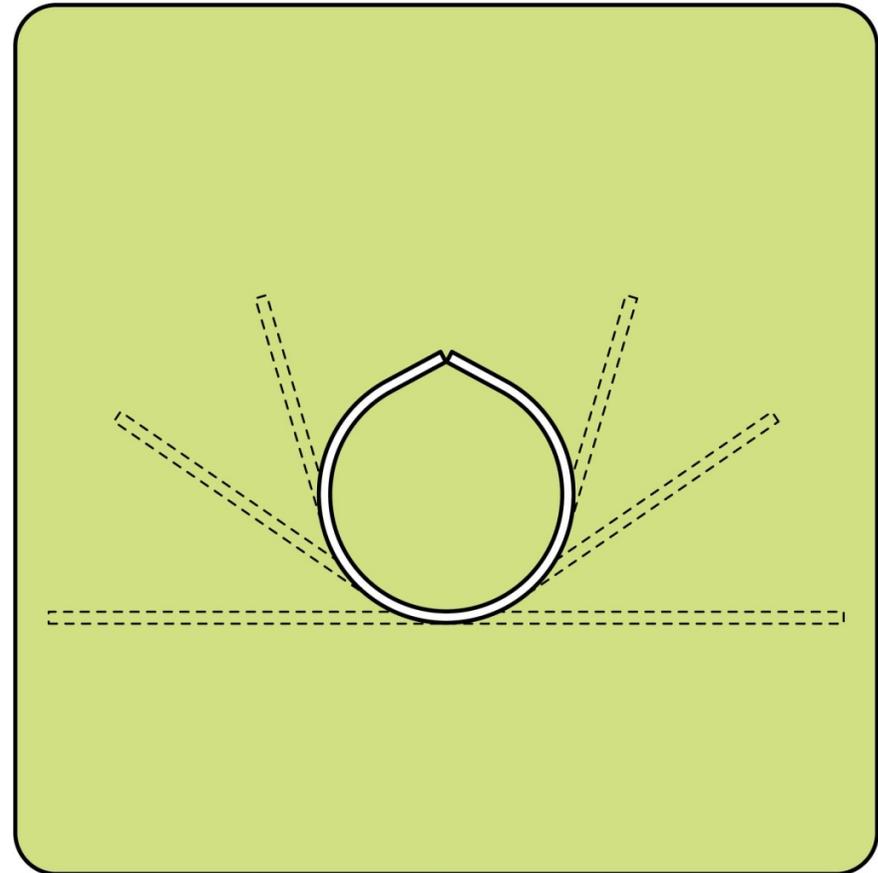
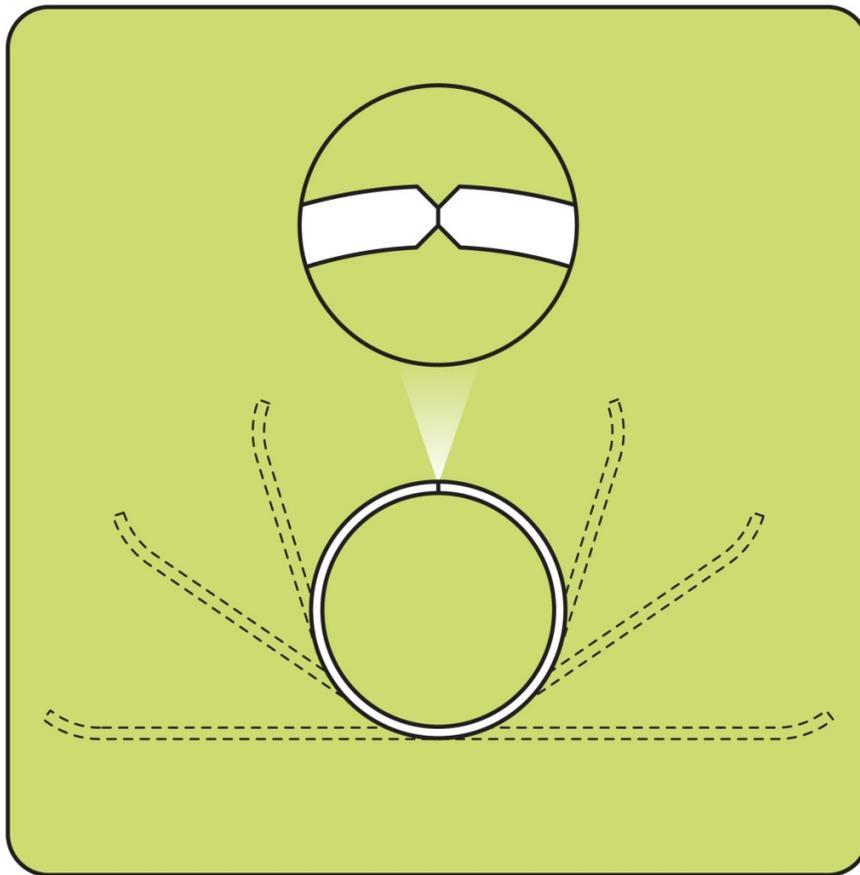
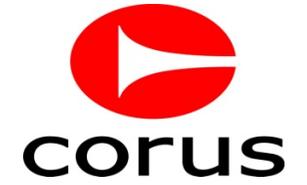


Process diagram



UOE DSAW Mill

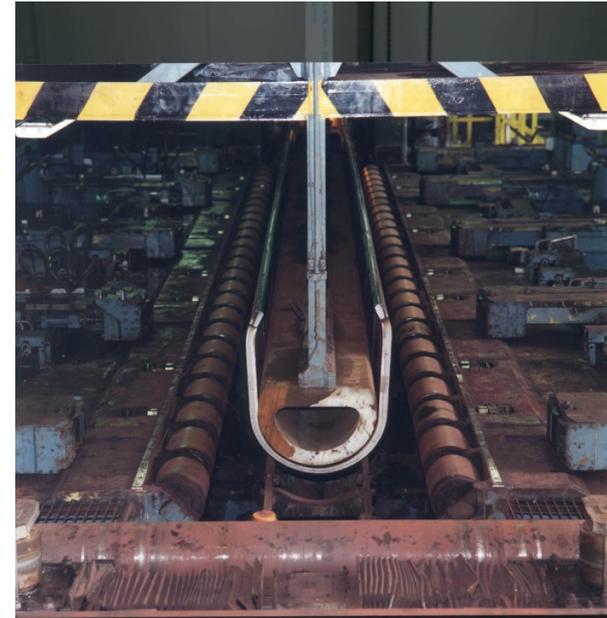
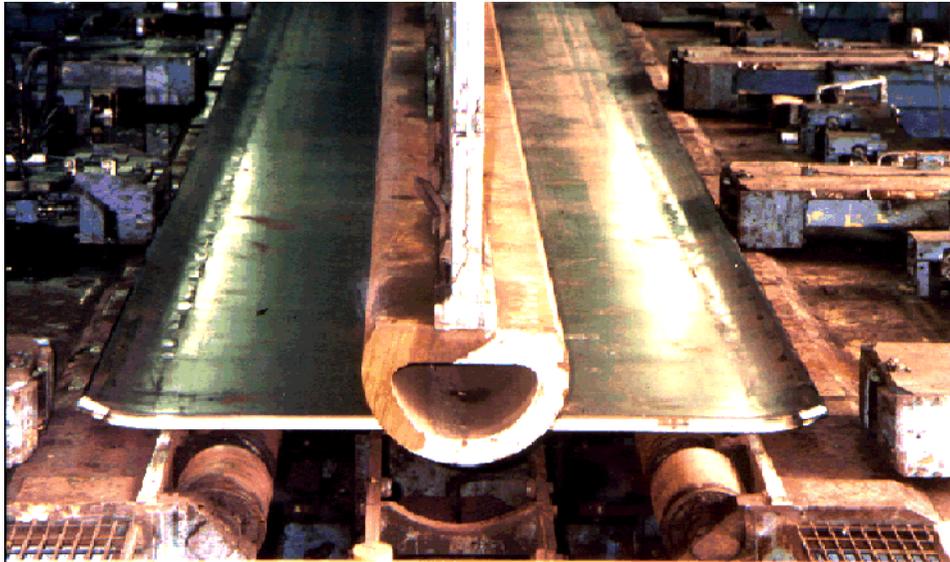
Crimping press



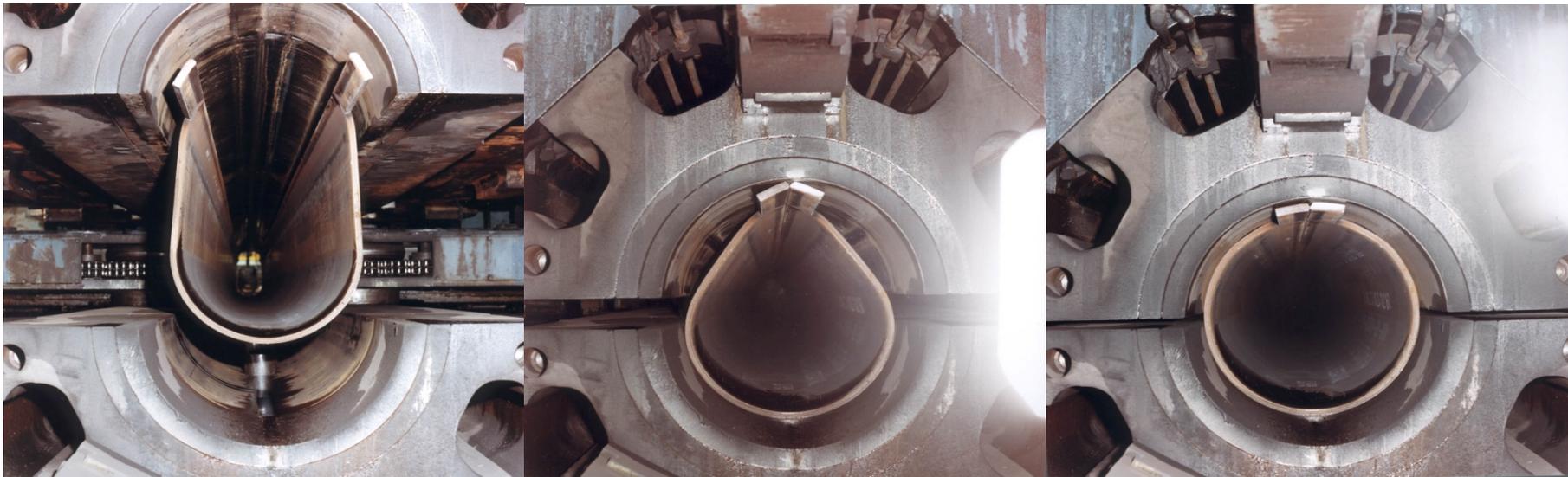
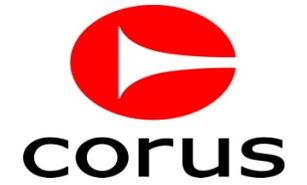
Edge crimping significantly enhances final pipe shape during forming

UOE DSAW mill

U Press

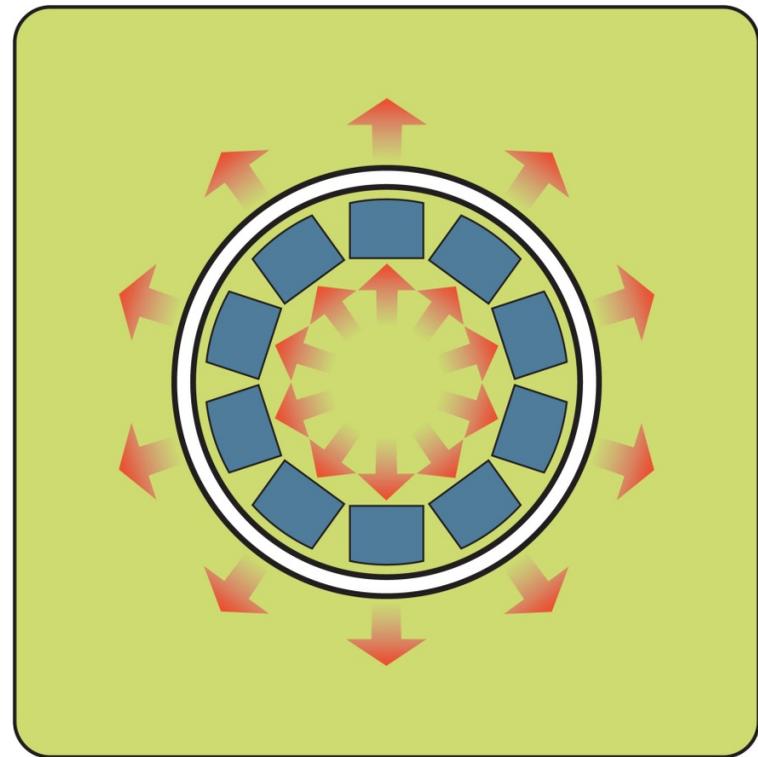
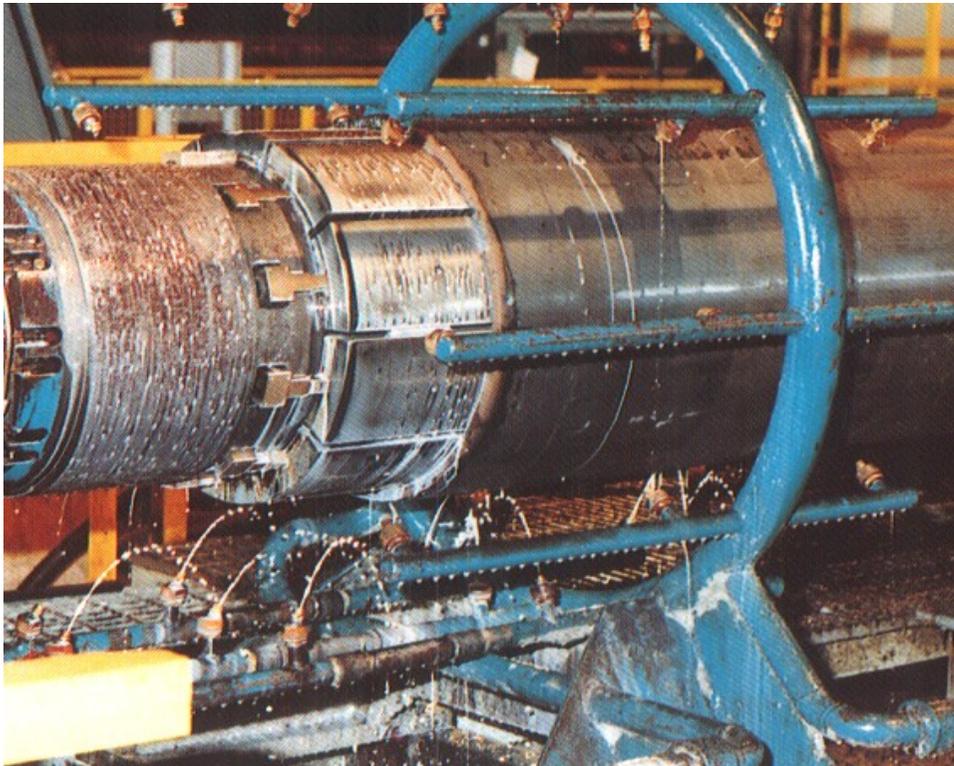


UOE DSAW mill O Press

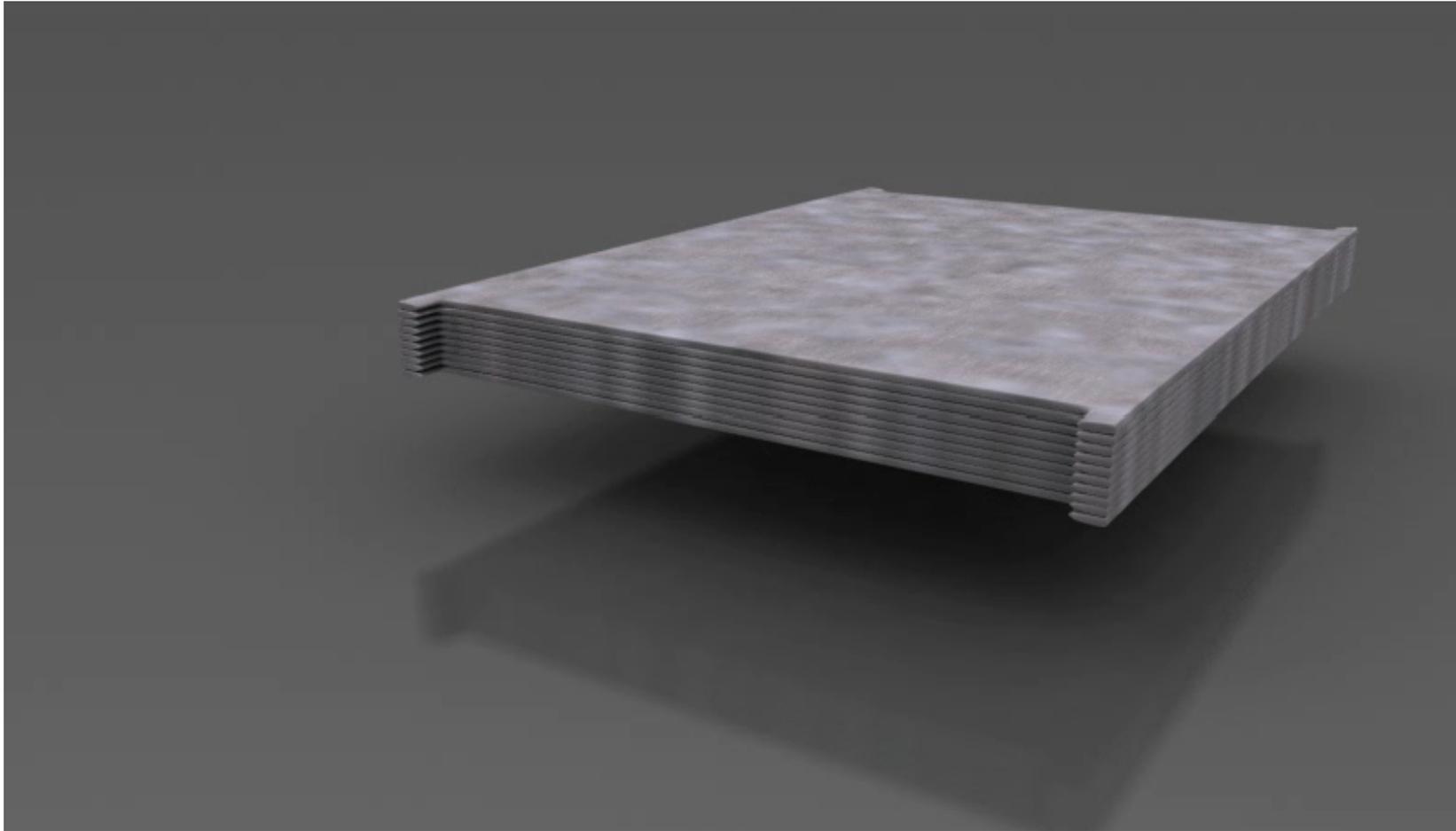


World Strongest “O” Press
Max Pressure force : 50,000t

UOE DSAW mill Expansion



UOE DSAW mill



UOE DSAW mill

Benefits



- High collapse resistance for deepwater applications
- Excellent fit up for weldability providing significant cost savings – particularly offshore
- Tight tolerance control
 - Ovality <1% (end), <1.5% (body)
 - OD +/- 5%
 - Thickness +/- 1mm
- Charpy impacts down to –40 deg C
- Battelle drop weight tear test down to –10 deg C
- Sour resistance as measured by NACE TM0284 test using the TM0177 (ph3) solution

Coating Facilities



- 50:50 Joint venture operation between Corus and Ramco
- Celebrates 20 years in operation this year
- Significant Track Record in both onshore and offshore projects
- Same Site as Corus pipe mills in Hartlepool

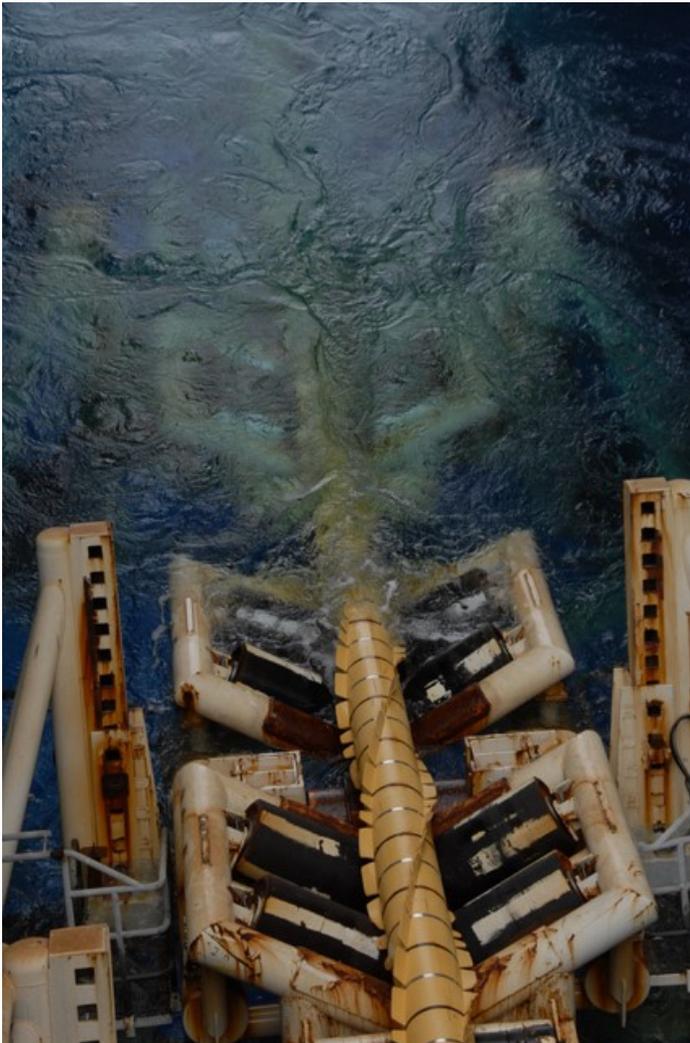


Logistics & supply management



- Single point of contact
- Multi item product sourcing
 - Bends
 - Coatings
 - Inspection services
- Package approach reduces risk and interfaces for client

Offshore pipelines



Onshore pipelines

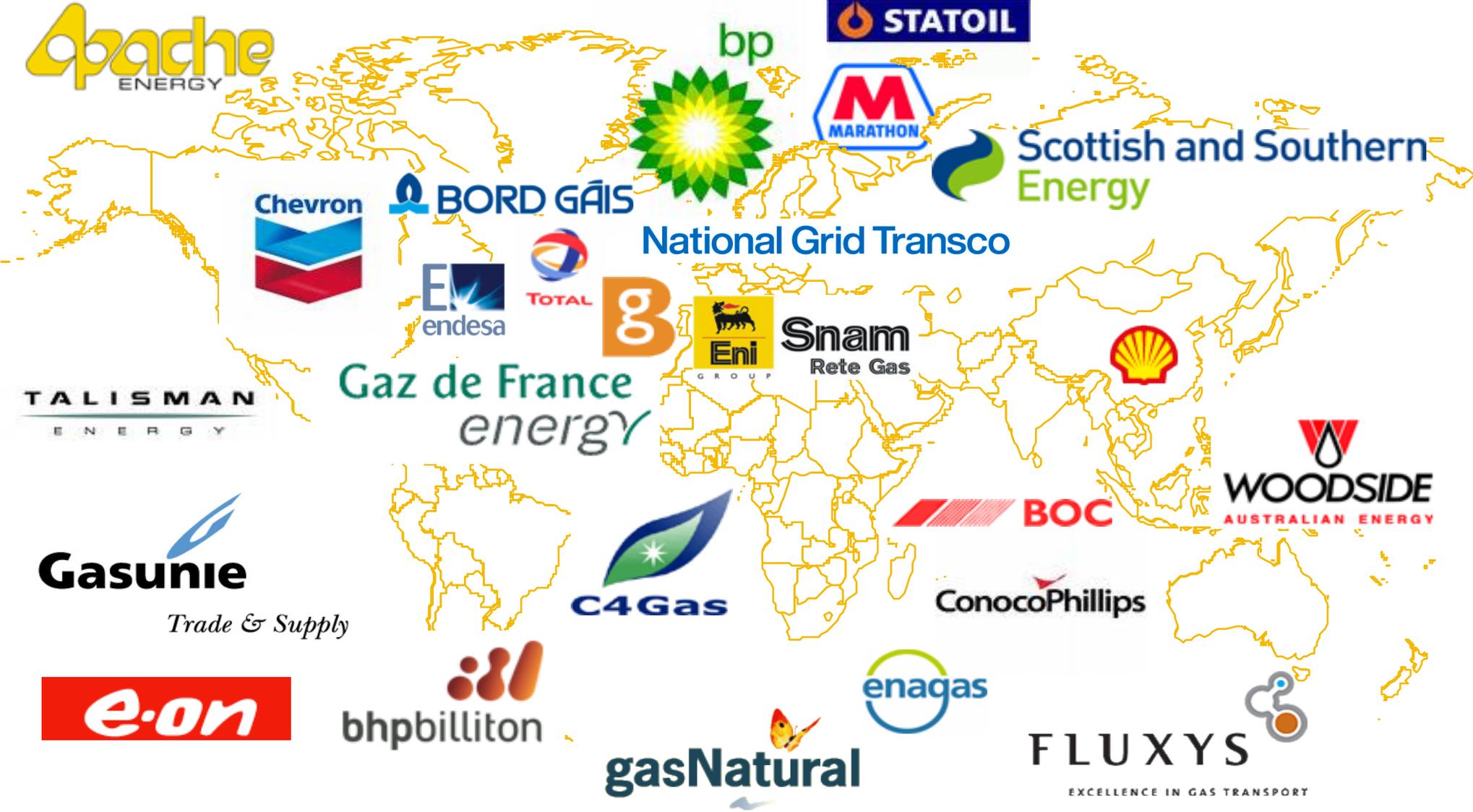




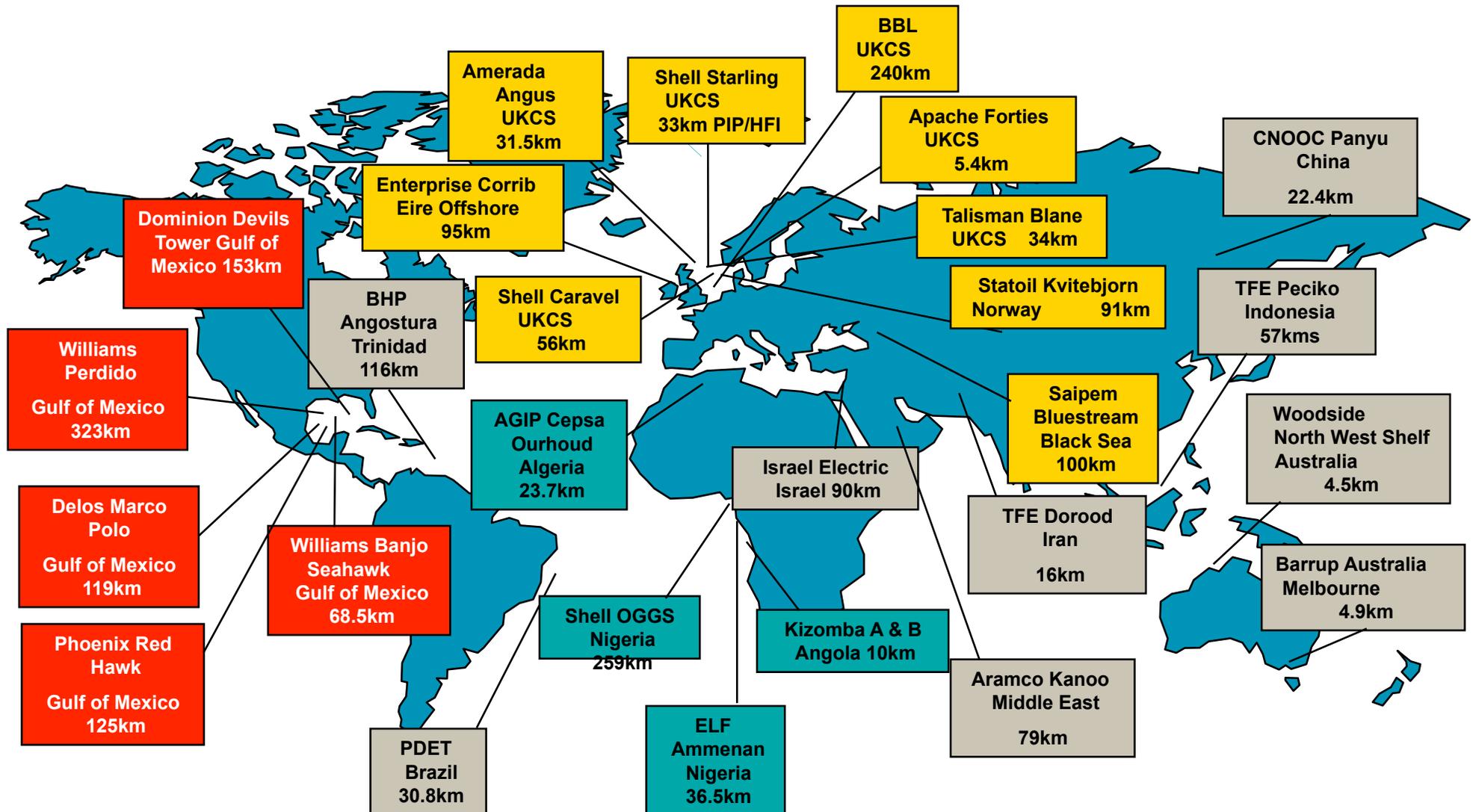
Corus Tubes

Proven capability in the world's harshest environments

The world-wide adoption of Corus Linepipe



Extensive track record worldwide



Current / Recent Projects

BBL (UK – Holland Interconnector)



Major interconnector between UK and Europe securing future gas supplies

**240kms 36" OD x 20.9 – 25.4mm thk
Asphalt enamel and concrete weight coating**

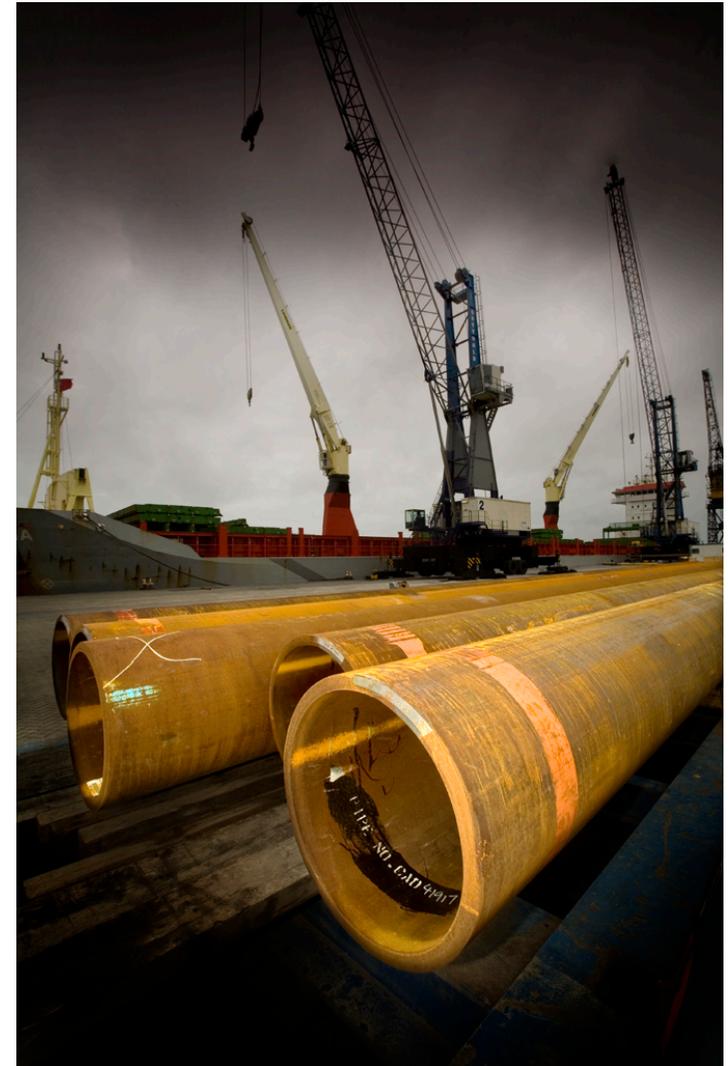


Current / Recent Projects

Perdido (Gulf of Mexico)



World's deepest pipeline - 2,784msw
Scope: 312kms 18" OD x 19.1 – 27mm thk



Current / Recent Projects

Shell Starling (UK North Sea)



Scope: 33kms 20" and 12" OD Pipe in pipe
Project team presented with a Safety Award
by Shell in recognition of excellent safety
record on the project



Current / Recent Projects

Malongo (Angola)



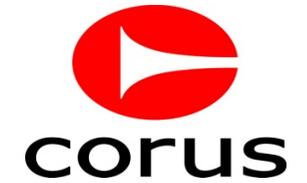
32.5kms 36" and 42" OD x 22.2mm thk

Steel linepipe and FBE coating in Hartlepool UK

Concrete weight coating in Angola

Current / Recent Projects

Apache Forties field (UK North Sea)

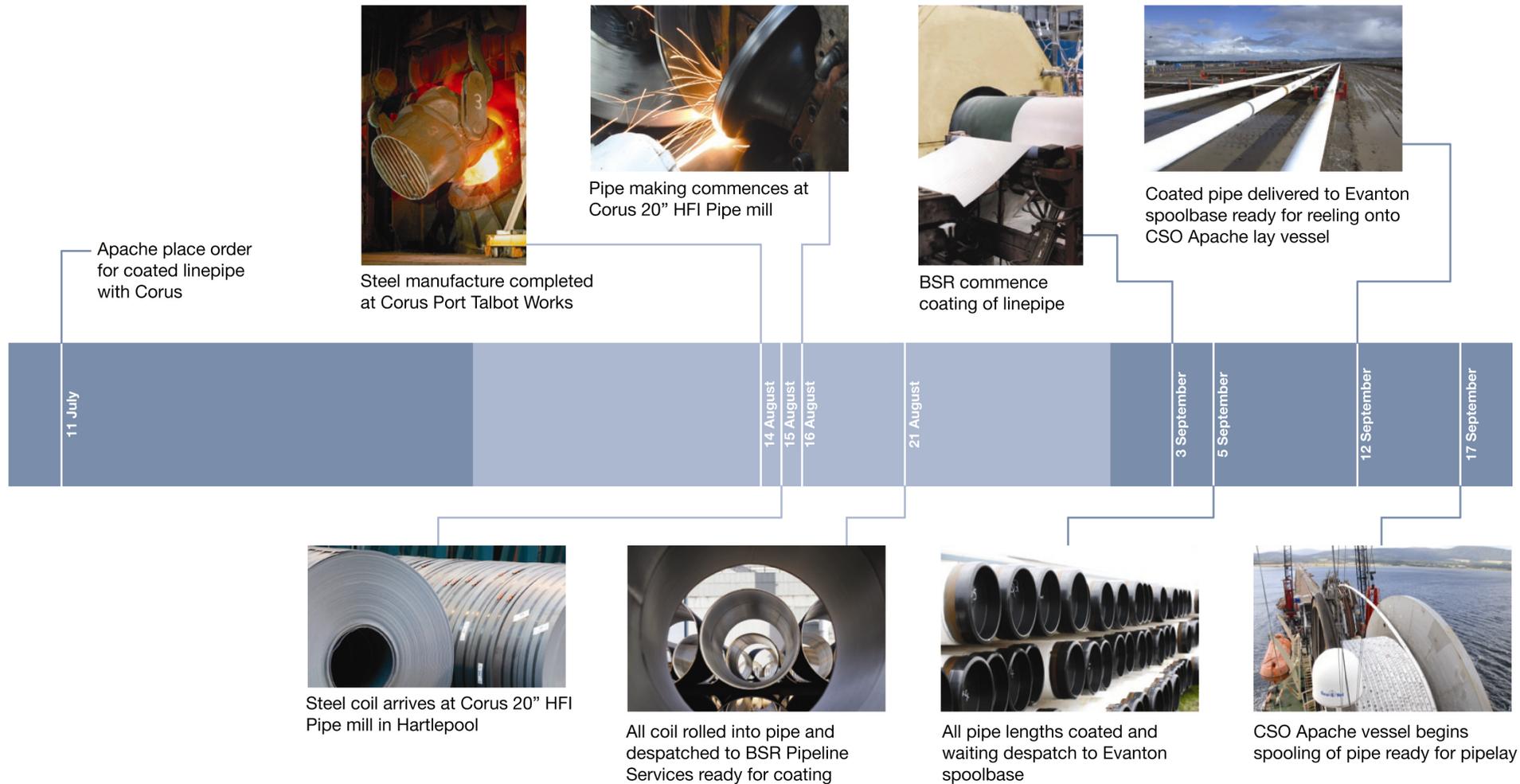


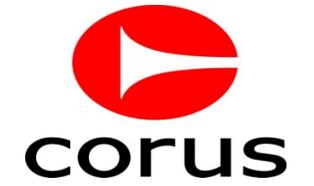
**5.4kms 14" OD x 16mm thk
Steel linepipe and FBE
coating in Hartlepool UK**

**Coated pipe delivered within 9
weeks of order placement**



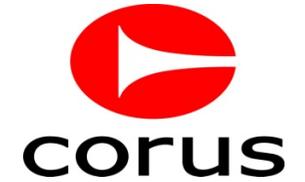
Apache project timeline





Product Developments

Developing innovative solutions for tomorrow's challenges



**9% Ni for LNG
offloading lines**



**4 layer insulation coating
for flow assurance**

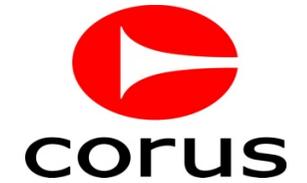


**Metallurgically clad
UOE linepipe for
highly corrosive oil
and gas**

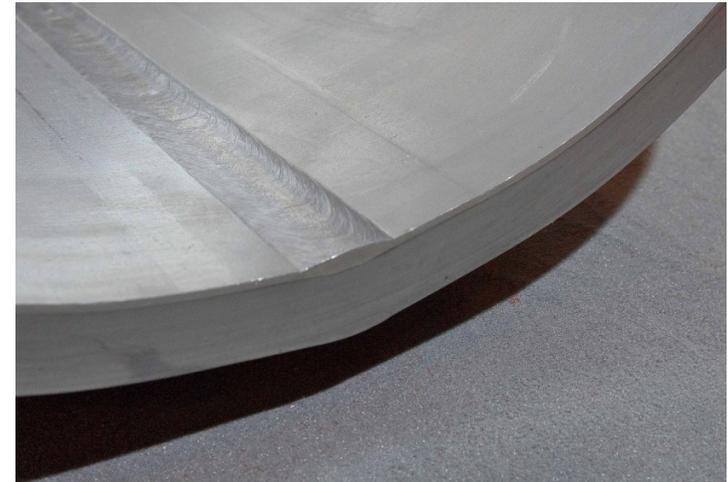


Clad Linepipe

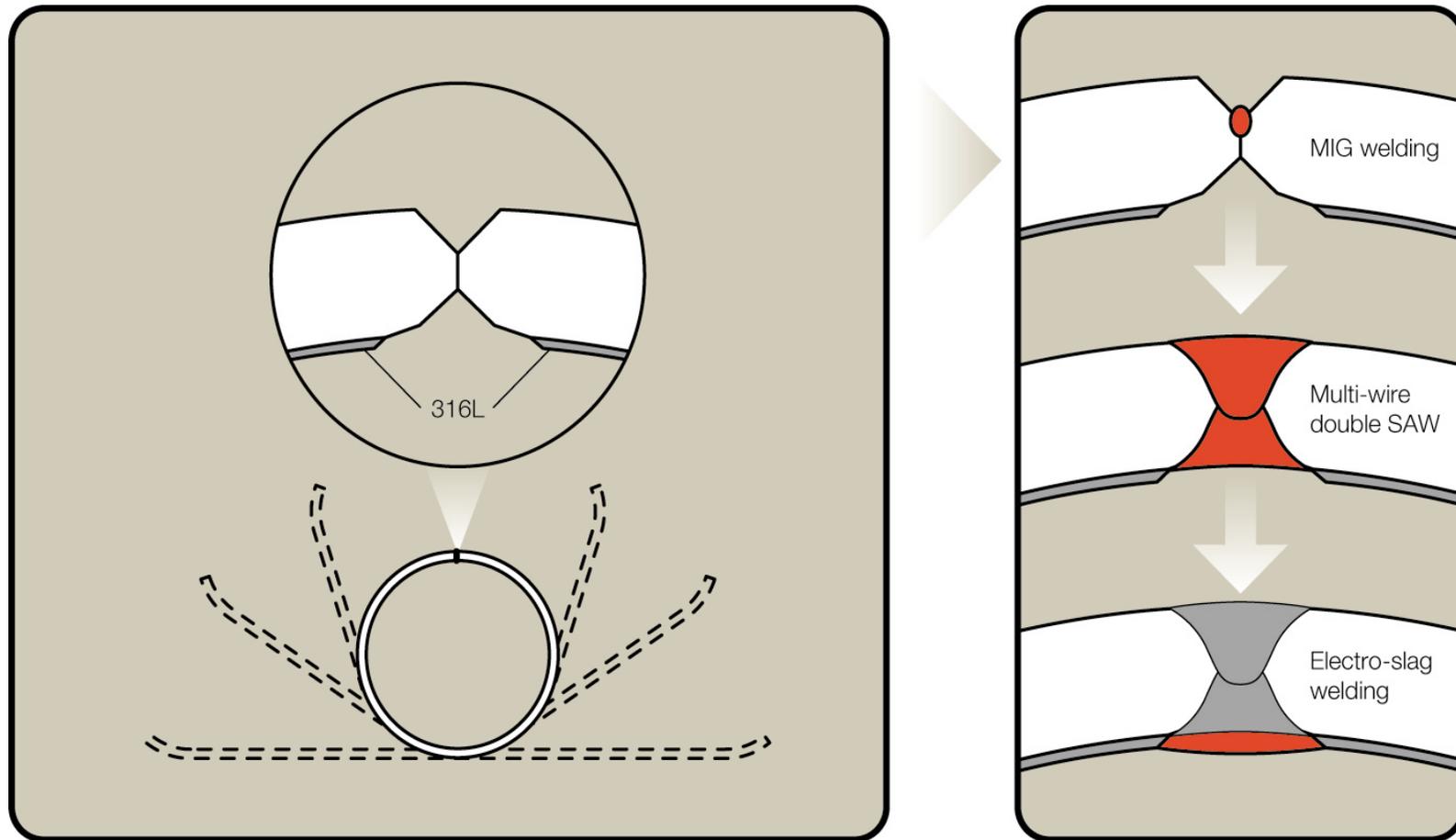
Clad linepipe



- Corus process route
- Capability 16"+ diameters
- Corus key benefits
 - Pipe shape
 - Production speed and volume
 - Package, risers, linepipe, coating,
 - Pipe in pipe
 - Clad plate benefits - collapse



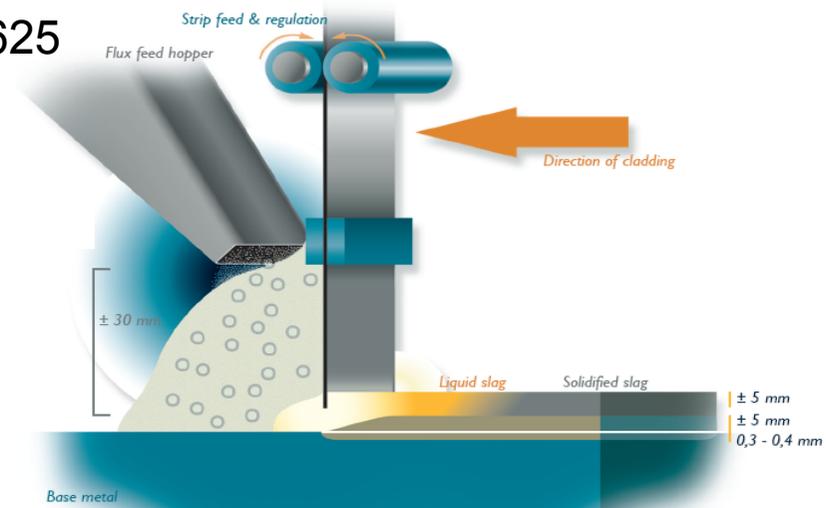
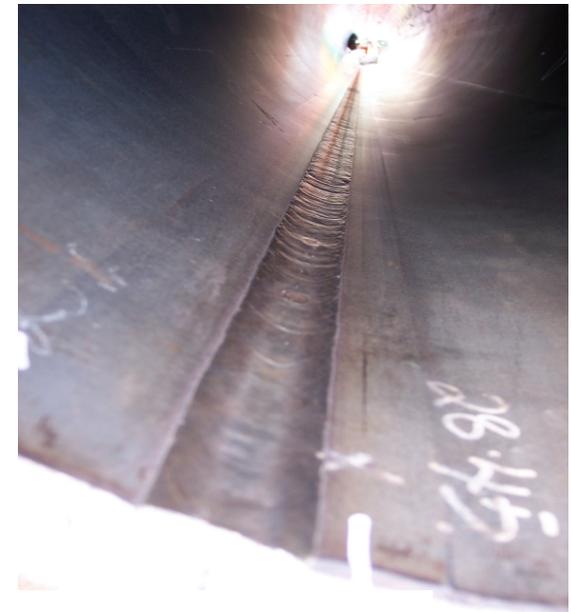
Welding process



Welding – Deposition of CRA



- Electro-slag
- Optimised welding speed
- Single pass for 316L and 825
- Dilution less than 10%
- Best bead shape
- Ferrite level in weld metal is less than 10%
- Consumables available for 316L, 825, 625
- No spatter
- Minimal oxidation of weld bead





Structural pipe-in-pipe systems

Polyurethane foam insulated

Polyurethane foam pipe in pipe

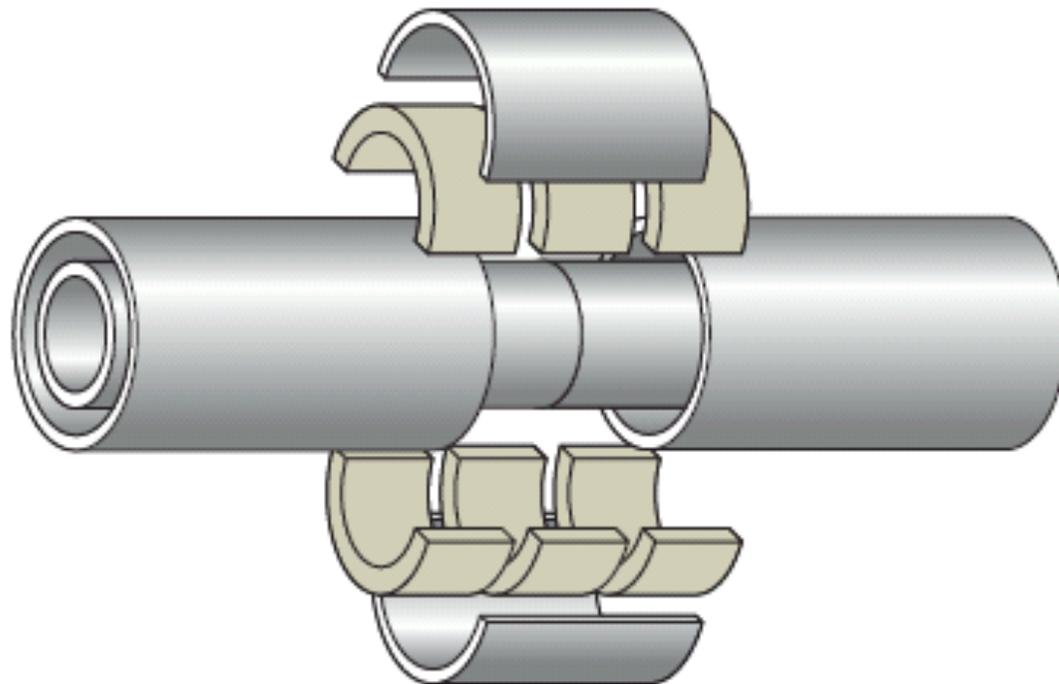


- Polymer (Polyol), Isocyanate
- Bubbles in Polymer matrix
- Injected
- Thermal ageing
- OHTC $< 1.0 \text{ W/m}^2\text{K}$
- Structural integrity
- 'Work Horse' for industry



Half shell connection

- Pre-assembled joints – stick-out
- Simple Construction
- Multiple off-shore welds
- Mechanical continuity
- Thermal integrity



Hybrid pipe in pipe High temperature applications



- Lower U values
- Smaller annulus
- Lower foam temperature
- High levels of load transfer

Hybrid pipe in pipe High temperature applications



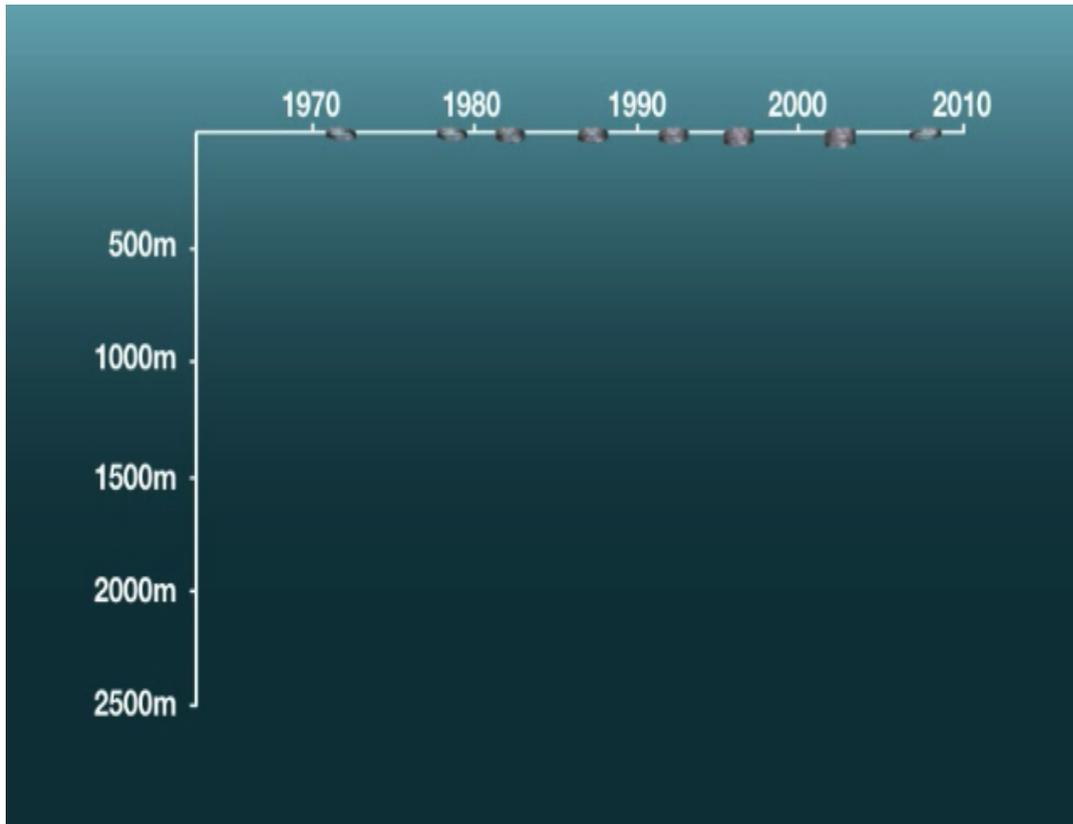
- Ultra-low conductivity - twice the thermal performance of polyurethane foam
- No performance degradation over time
- Maintains low conductivity under compression
- Performs across a wide range of HPHT systems
- Hydrophobic material doesn't absorb water





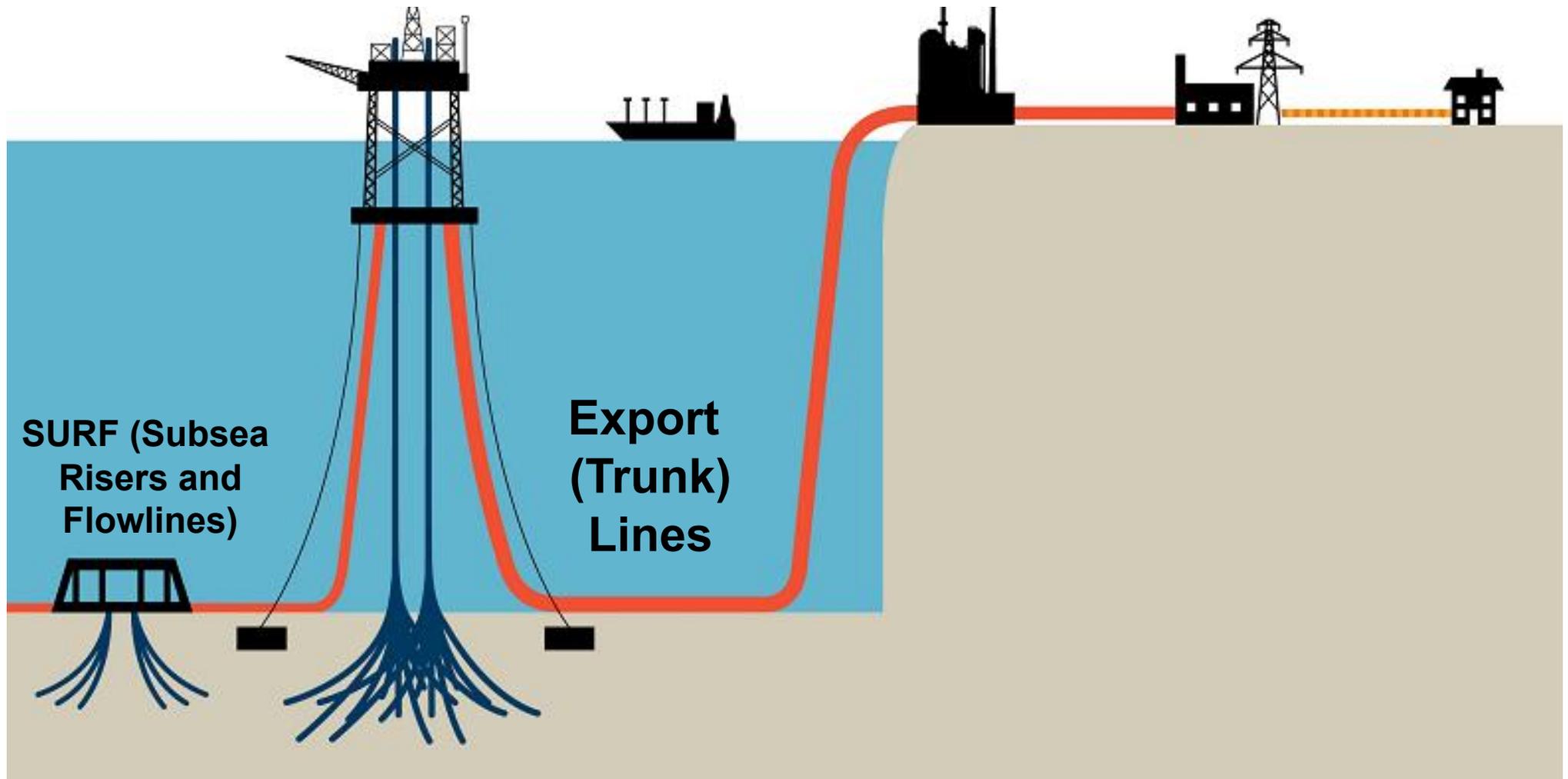
Deepwater Technology

Continuing to support deepwater expertise



- Corus Tubes is already a proven supplier of deepwater pipeline solutions
 - World's strongest crimp and O press combination
 - Access to leading quality plate suppliers to achieve best pipe results
 - Expertise gained through decades of experience supplying ultra deep pipelines
- Technical team are currently working with designers for the next generation of ultra-deepwater pipelines

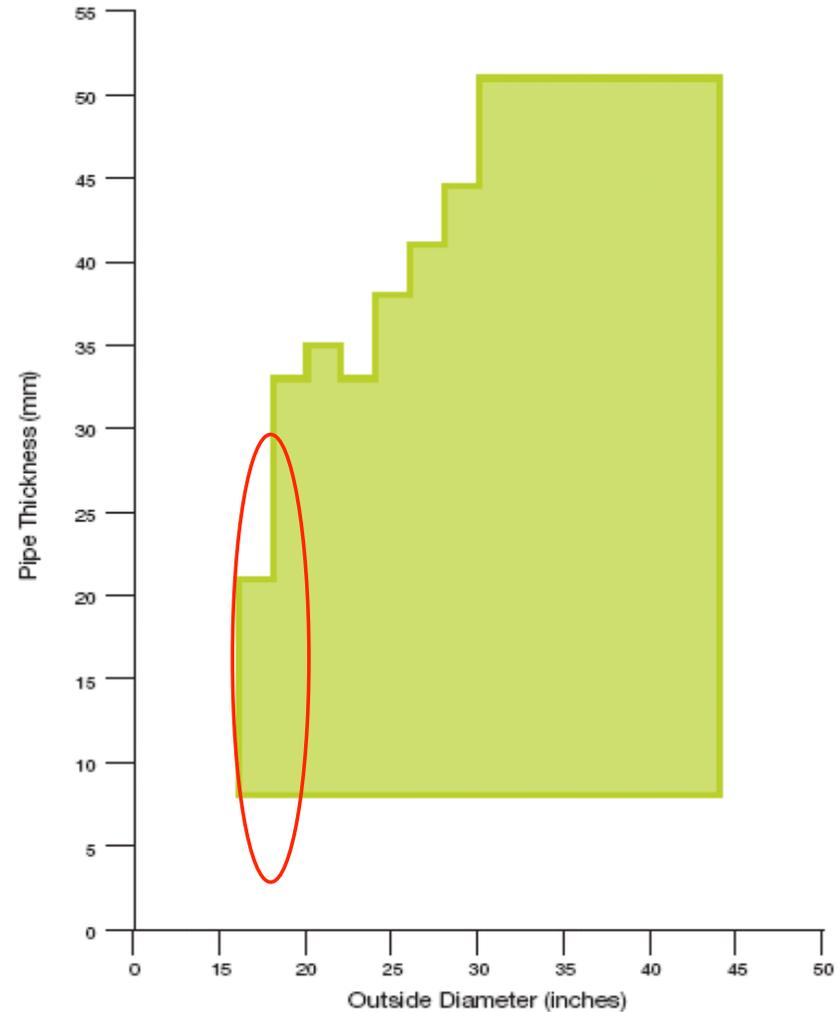
Deepwater Pipeline Infrastructure



UOE DSAW Mill



- Only European manufacturer of 16" and 18" OD DSAW
- Unattractive sizes for competitors
- Good shape in these sizes



Deepwater – Summary



- Only European manufacturer of 16” UOE DSAW
- 10 years of research into optimising collapse performance
- Higher compressive strength and lower ovality
 - Excellent dimensional control
 - Strongest O and Crimp presses in the world over 12m



Thank you

Any questions?