Thermoplastic composite pipe benefits for SURF projects

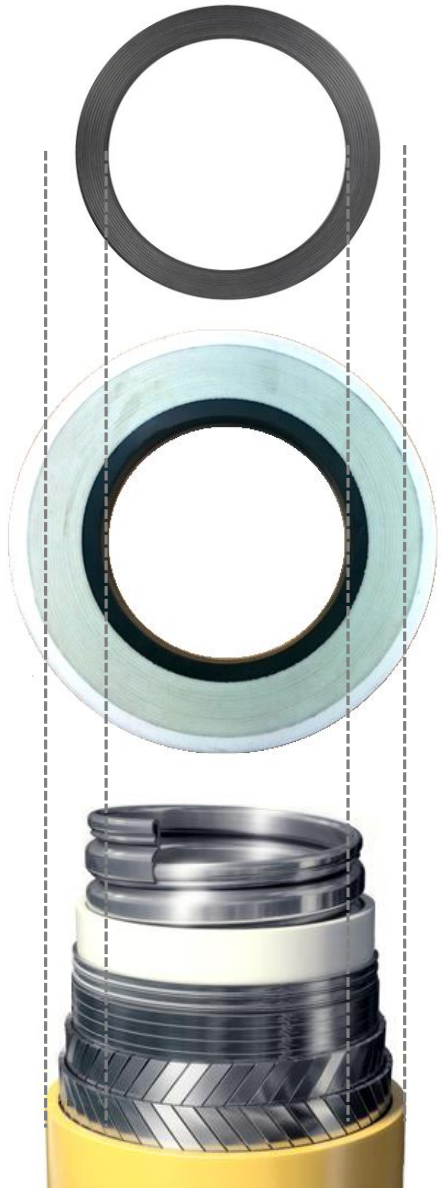
Charles Tavner
Magma Global Ltd

magma

Cost

One standard m-pipe® product is lower cost

- Stronger raw materials means thinner walls, less material and lower costs
- Better manufacturing and test data means tighter coefficient of variation, thinner wall and lower cost
- Integrated supply chain with Victrex means less wastage, volume discounts and lowest cost

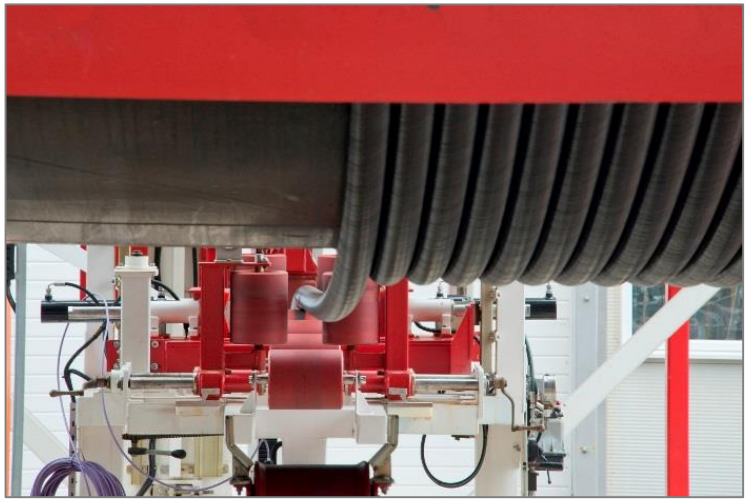


Adoption

One standard m-pipe® product has delivered permanent hydrocarbon, water and gas service

Product

One standard m-pipe® product has broad performance and operational benefits



Spoolable

180⁰C (360⁰F) operation

20ksi pressure

Qualification

One standard m-pipe® qualified to DNVGL-RP-F119 for TCP

- Magma has achieved third party approval for individual customer projects including Statoil hydrocarbon spools
- Working with BP, Shell and Statoil to extend qualification for large diameters, high safety classes and higher temperatures
- Magma also works directly with national regulators including BSEE & HSE

DNV·GL

ENDORSEMENT OF QUALIFICATION PLAN

No. 2017-1091

This is to endorse in accordance with the provisions of DNVGL-SE-0160 /1/ that the qualification plan /2/ for

Magma Global's Thermoplastic Composite Pipe Technology for Subsea Pumping Well Intervention Systems

has been developed in accordance with DNV-RP-A203 Technology Qualification /3/ and DNVGL-RP-F119 /5/ and that execution of the qualification plan can substantiate the target qualification state.

Owner:	**Magma Global Ltd.**
Description:	A Thermoplastic Composite Pipe manufactured from hybrid carbon/glass fibre laminated with a PEEK matrix, to be used as a flying lead or vertical fluid conduit for Subsea Pumping Well Intervention Systems (further details in /4/).
Designated service:	Offshore service as a flying lead or vertical fluid conduit for well intervention with incidental temperatures up to 80°C and operating temperature up to 35°C as detailed in /4/.
Involvement:	DNV GL has been involved in the qualification process as required according to /1/.
Main uncertainties:	Technology qualification shall develop and validate acceptance criteria for the flying lead and vertical fluid conduit designs.

logy qualification, products may be verified per validated of the products may be verified per validated limits to

hnology qualification management and verification, 2016
gma Global Report 20074-30532-5, 2017
ology Qualification, 2013
agma Global Report 20074-29895-6, 2017
rmoplastic Composite Pipes, December 2015

ncertainty; failure mechanisms or threats may be discovered the iterative nature of the technology qualification process

R.Mosh

Ramin Moslemian
Senior Engineer

Lloyd's Register LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Management System of:

Magma Global Ltd
Magma House, Trafalgar Wharf, Hamilton Road, Portsmouth, Hampshire
United Kingdom

has been approved by Lloyd's Register Quality Assurance to the following Quality and Safety Management System Standards:

ISO 9001:2008
BS OHSAS 18001:2007

The scope of this approval is applicable to:

Activities associated with the design, manufacture, assembly and testing of monolithic fibre reinforced thermoplastic pipe and associated end fittings used in the transfer of gas and liquids in offshore oil and gas developements.

Approval Certificate No: LRQ 4006573

Original QMS Approval: 23 June 2011
Original SMS Approval: 23 June 2011
Current Certificate: 23 June 2014
Certificate Expiry: 22 June 2017

DEvans

Issued by: Lloyd's Register Quality Assurance Limited

UKAS 001

Hiumford, Middlemarch Office Village, Siskin Drive, Coventry, CV3 4FJ, United Kingdom

Reducing riser cost

CALASH
Energy Sector Specialists

Calash research shows m-pipe® is lower cost riser solution

Ultra-deep water SLOR cost summary and comparison – Steel versus m-pipe® riser system

System of 8 x SLORs in 3,000m Water Depth	Steel SLOR (US$)	m-SLOR (US$)	Steel SLOR oncost (%)	Steel SLOR oncost (US$)
Riser, jumper and pipe materials	224,855,400	226,126,208	-1 %	-1,270,808
Equipment – buoyancy and connectors	67,298,000	36,269,501	86 %	31,028,499
Fabrication – piles, rigging and logistics	51,590,000	17,055,500	202 %	34,534,500
Engineering and Project Management	27,720,000	16,632,000	67 %	11,088,000
Offshore Construction	177,092,300	17,560,620	908 %	159,531,680
Construction all risks insurance	16,456,671	9,420,699	76 %	7,088,640
Total Cost for 8 x SLOR Riser System	**565,012,371**	**323,053,144**	**75 %**	**241,959,227**
Typical total project field development cost	**2,500,000,000**	**2,258,040,773**	**11 %**	**241,959,227**

Downline case study

Challenge

- Lower cost pumping and well intervention

Solution

- Magma IDP hydraulic pumping system

Benefits

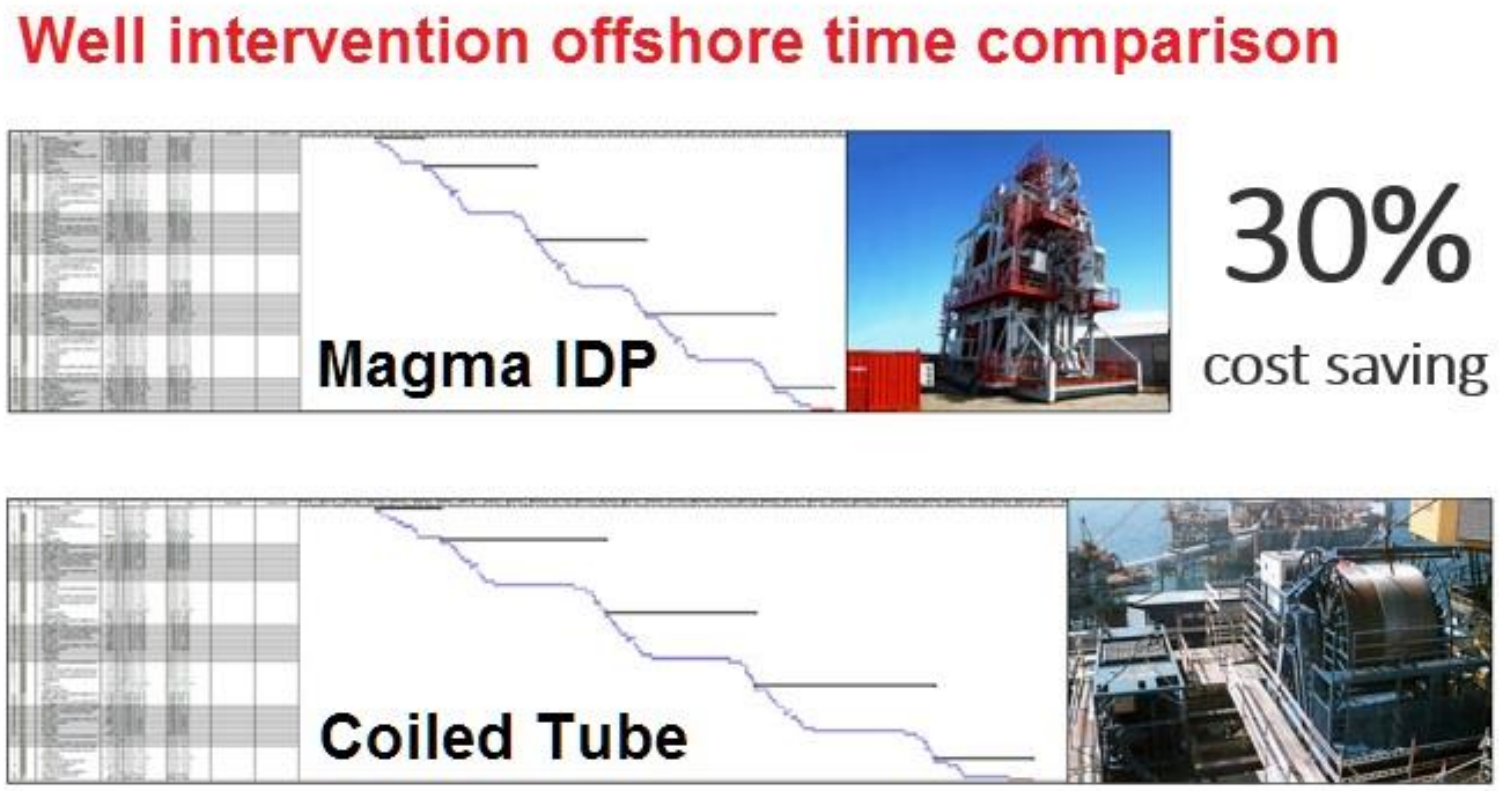
- Faster offshore pumping operations
- High pressure and high flow rate
- 3,000m (10,000ft) of 3in m-pipe
- Low cost operation on day-rate rental

"A lot of steps have been taken with the IDP to make troubleshooting easy, to make operation easy and to make it almost foolproof. Everything works as it was designed to do. Magma has taken a lot of time and effort to put safeguards in, the automation, the shut-down systems, and the diagnostics. It's really first class.

Chris Ruester – VP Cross Group

Reducing downline cost

Analysis shows Magma integrated downline package lowers cost



Jumper case study

Challenge

- Simpler kicker line with faster connections

Solution

- Light weight, m-pipe® **‘flex**-to-**fit’ jumper**

Benefits

- Simplify connection structure
- Remove all buoyancy
- Remove rock berm requirement
- Lower cost pipe and far lower cost installation

Eni GROUP Saipem

“What impressed Saipem was the ease and low load that was required when connecting up the hot stab to the PLET, with one man easily able to direct in the stab in seconds.”

Reducing jumper cost

Subsea7 research shows m-pipe® is a lower cost jumper solution