

ENHANCING PIPELINE WELDING WITH EXTRUDABLE PLUGS

PPSA Seminar, November 2018, Aberdeen

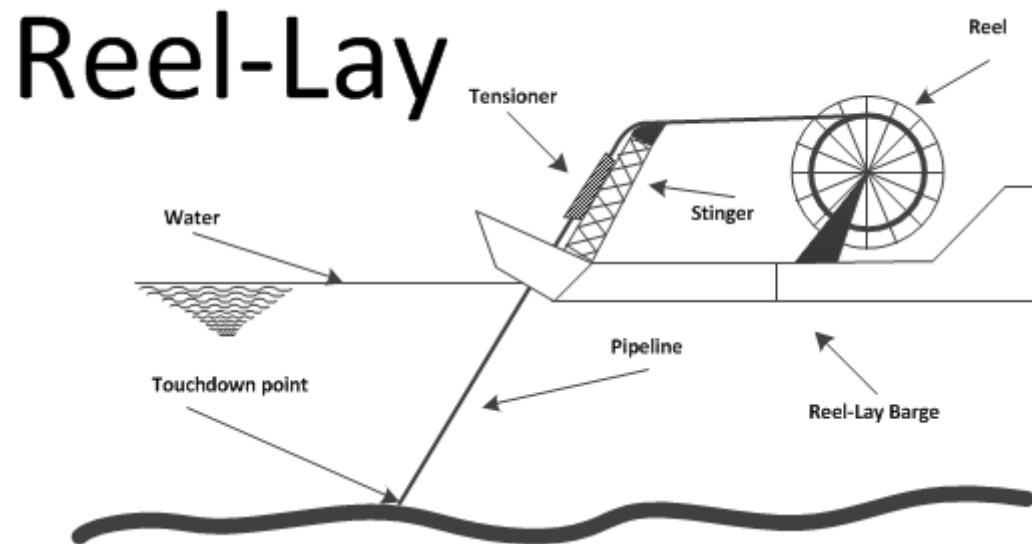
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Aubin Group



INTRODUCTION

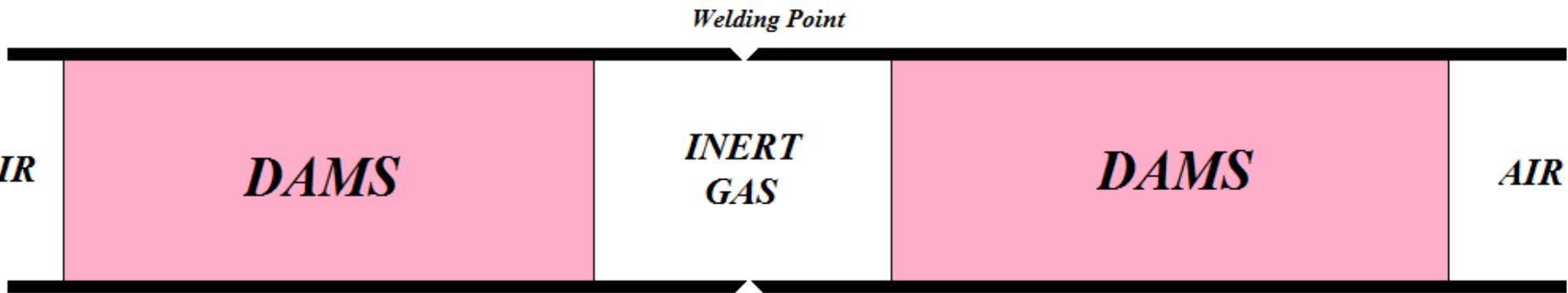
- North Sea 2016
- 2" Duplex Service flowline – Not piggable
- Solution to suck and blow effect during pipeline Reel-Lay



INTRODUCTION



Good quality weld between duplex pipes can be achieved in an environment free of atmospheric gases.

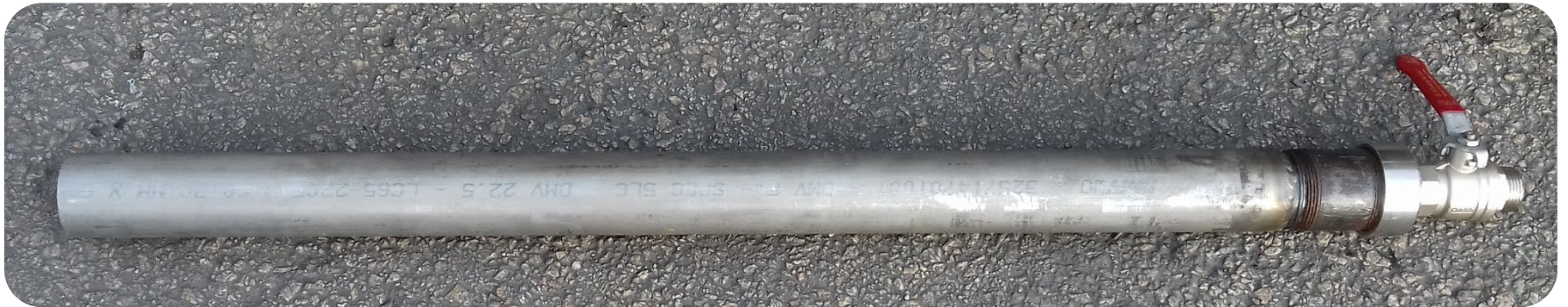


Pipe purging dams (plugs) are the most commonly used.
Extrudable DAMS are new on the market.



PLUG DESIGNING CRITERIA

1. Possible to extrude through the existing 1" valves.



PLUG DESIGNING CRITERIA

2. To hold 0.5 bar for 24 hours.
3. Additional requirements for inserting method:
 - Plugs being quick and easy to insert mechanically
 - Without a flanged connection
 - No contact between the duplex pipe and metallic loading tool.

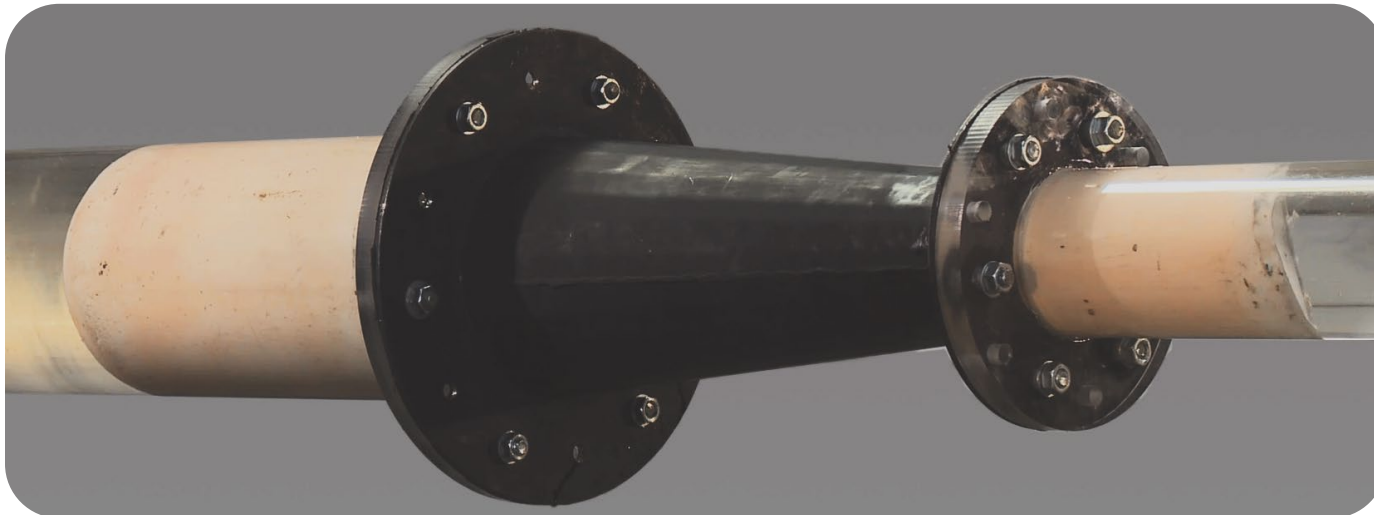


Pipe above was provided by client, for testing purposes.



SOLUTION - EVO-PIG

1. Solid body, similar to foam pig, but not filled with air.
2. Deformable.
3. Extrudable.
4. Cast from 2 liquids which cure and form a “memory”.
5. Designed to be over-size.
6. Hugs contours of pipe wall always providing effective hydraulic seal.



SOLUTION - EVO-PIG (CONT.)



After a few weeks (depending on the temperature) this EVO-Pig LG will deform permanently to the internal dimension of the pipe and will require much less pressure to remove from pipeline.

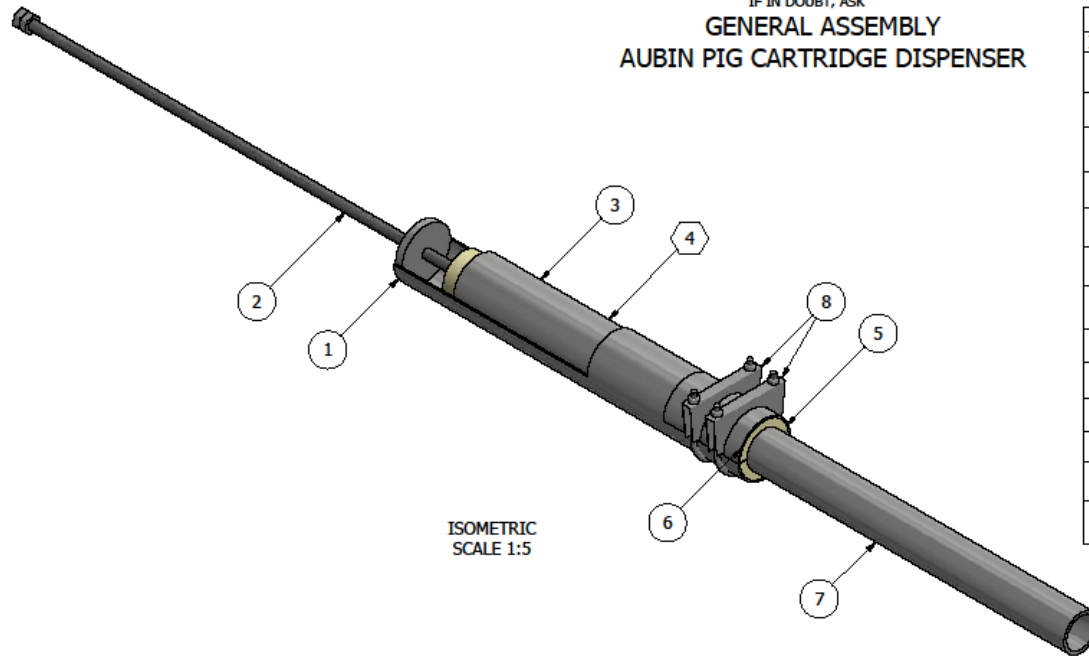


CANISTER AND PIG DISPENSER

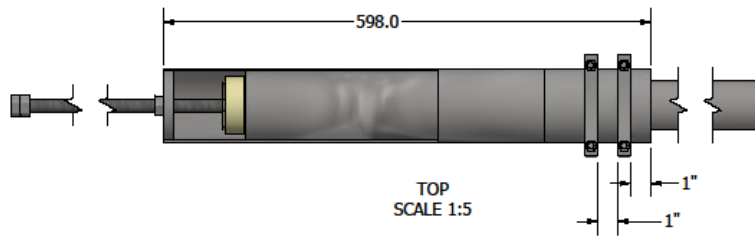


IF IN DOUBT, ASK
GENERAL ASSEMBLY
AUBIN PIG CARTRIDGE DISPENSER

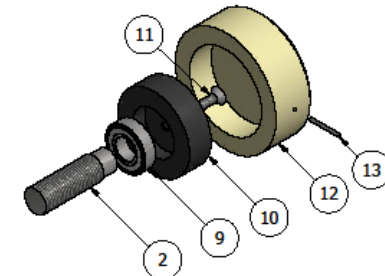
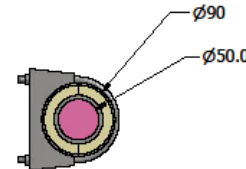
BILL OF MATERIALS			
ITEM NUMBER	DESCRIPTION	MATERIAL	QTY
1	Cartridge Dispenser Base	Carbon Steel	1
2	M16 Threaded Rod	Carbon Steel	1
3	Pig cartridge	SS 316 (Seamless)	1
4	Aubin Pig	EvoPig LG	1
5	Pig Funnel	White Nylon	1
6	Funnel Clamp plate	Carbon Steel	1
7	Sample Pipe	Duplex	1
8	90mm Exhaust Clamp	Carbon Steel	2
9	6001Z Bearing	Carbon Steel	1
10	Sample Pipe Plunger	Black Nylon	1
11	M6 Countersunk Screw	SS 316	1
12	Cartridge Plunger	White Nylon	1
13	5mm Grab screw	Carbon Steel	1



ISOMETRIC
SCALE 1:5



TOP
SCALE 1:5



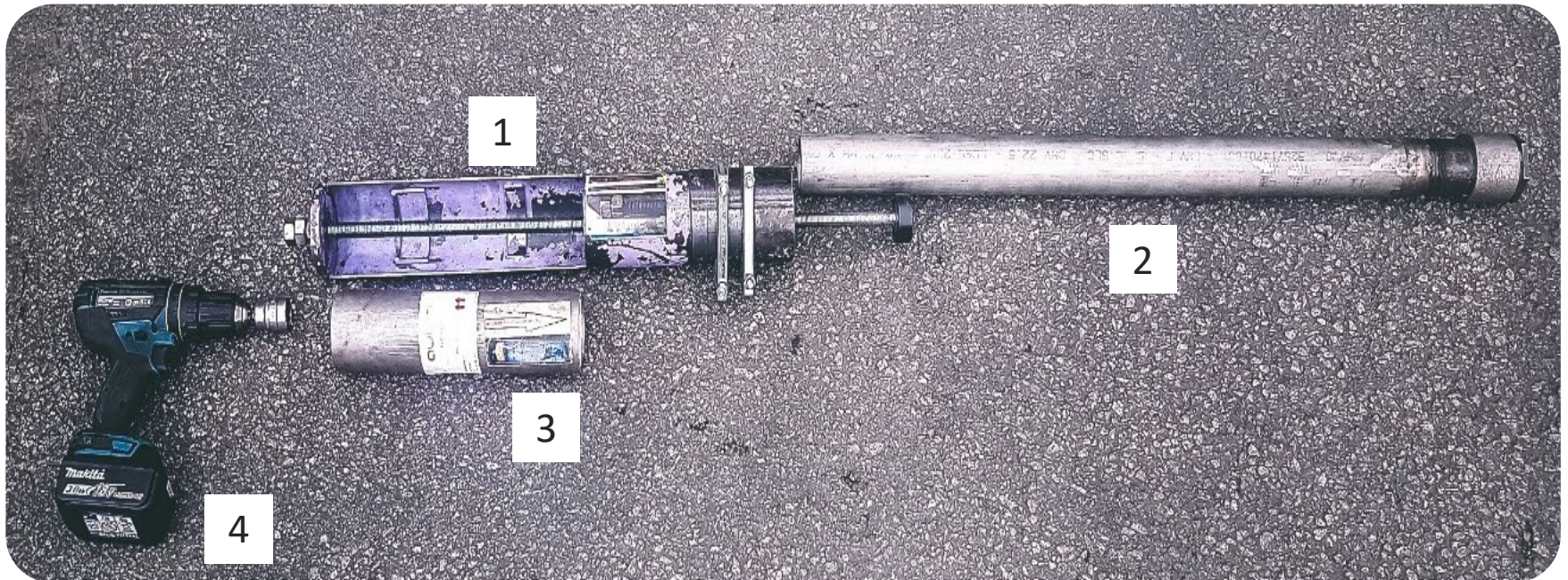
PLUNGER (EXPLODED)
SCALE 1 : 2

- NOTES
1. REMOVE ALL BURRS AND SHARP EDGES
 2. ALL DIMENSIONS IN MM UNLESS OTHERWISE STATED
 3. HEXAGONAL BALLONS SHOW LOCATION OF INTERIOR PART

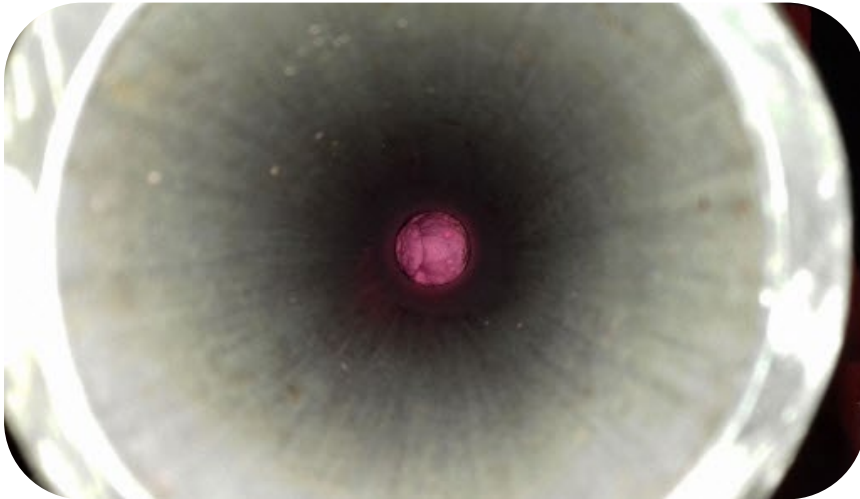
Designed by Michal Szczegolski	Checked by J. Mamoch	Approved by Joseph Collins	Date	Date 29/02/2016
			GA - AUBIN PIG CARTRIDGE DISPENSER	
			Edition	Sheet 1 / 1

CANISTER AND PIG DISPENSER (CONT.)

1. Pig Dispenser
2. 2" duplex pipe
3. Pig canister
4. Cordless drill



TESTS IN 2" PIPE

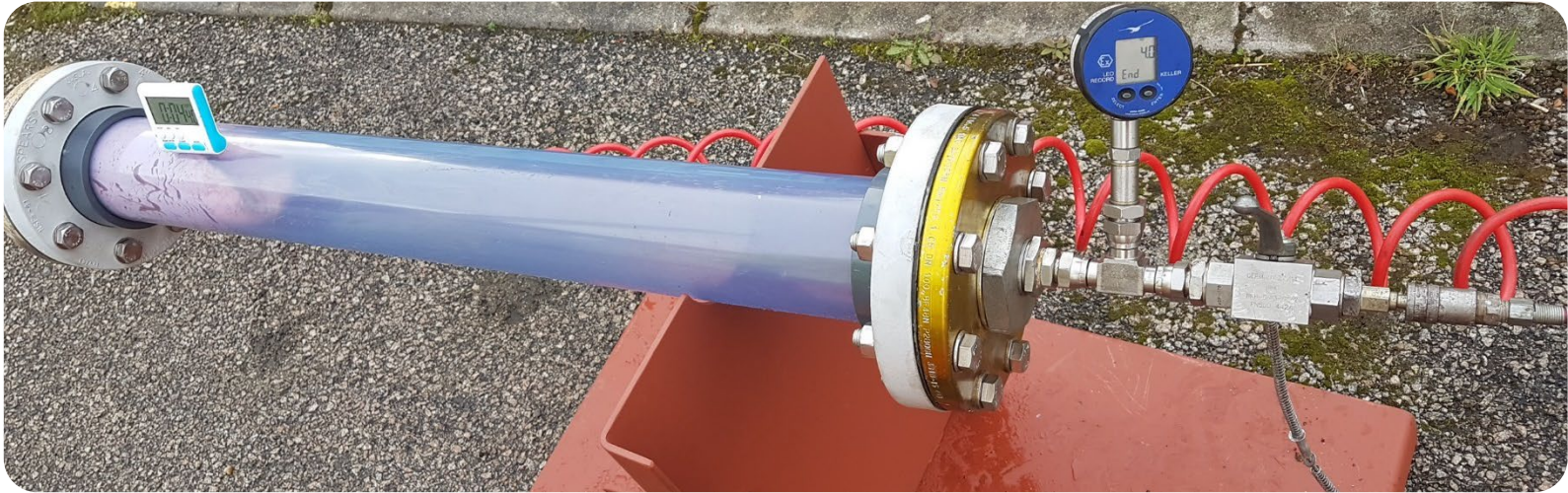


2" diameter, 18" long plug (41% oversized plug)

- Held 1 bar DP for 24 hours
- Held 2.5 bar of pulse pressure
- Extruded with 7 bar



TESTS IN 4" PIPE



4" diameter, 48" long plug (80% oversized plug)

- Held 2 bar DP for 48 hours
- Held 4 bar of pulse pressure
- Extruded with 10 bar (1" port)



EXTRUSION OF 4" DAM MADE OUT OF EVO-PIG LG



PIPE INSPECTION AFTER EXTRUSION OF 4" DAM MADE OUT OF EVO-PIG LG



4" EVO-PIG plug was extruded 100% throughout 1" valve

TEST IN 6" PIPE WITH EVO-PIG XT



6" diameter, 38" long plug (33% oversized plug)

- Held 0.6 bar DP continually for over 30days
- Held 1.2 bar of pulse pressure



TEST IN 8" PIPE



8" diameter, 38" long plug (56% oversized plug)

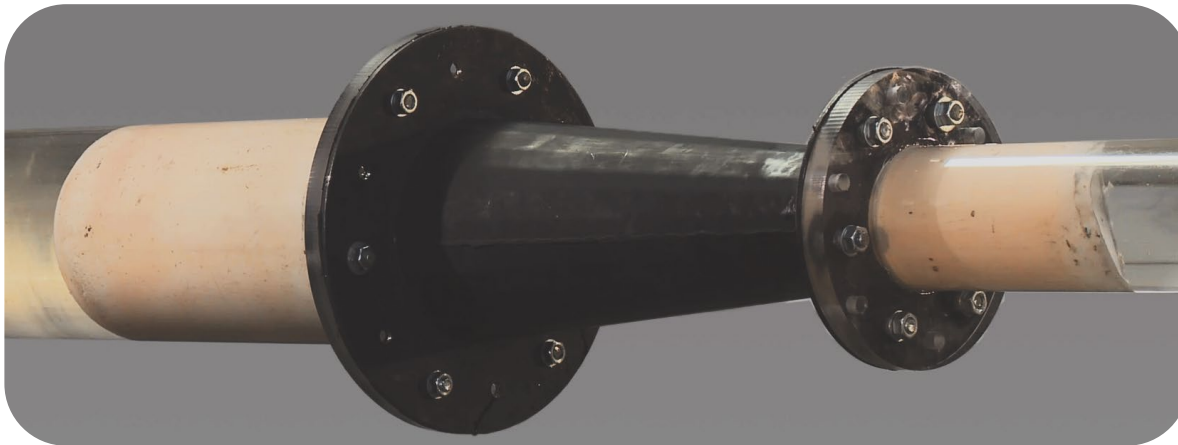
- Held 0.6 bar DP for 24 hours
- Held 1.4 bar of pulse pressure



SUMMARY

- We developed extrudable welding plug using existing technology.
- Plugs were inserted quickly under (4 minutes) and efficiently.
- Field results identical to testing results.
- Extruded through a 1" subsea port

The client is now considering using these plugs in other welding and plugging operations in 10"ID and 11"ID pipes, particularly where extrusion is the only method of exiting the pipe.



ACKNOWLEDGEMENTS

Thanks to:

Daniel Molyneux

Joseph Collins

Daniel Young

Aubin

PPSA



<https://joeleriksson.com/17-best-images-about-scrap-metal-on-pinterest-sculpture.html#gallery-48>



THANK YOU

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Welding plug extrusion video:

<https://youtu.be/uUlhATdAhsU>

