COMPOSITE REPAIR SPECIALIST

- TYPE OF DEFECTS: Leaking crack & non-leaking crack
- PIPE DETAILS: 32” gas line – max. operating temp. 20°C – operating pressure 1160 psi (80 bar)
- LOCATION: MIDDLE-EAST
- 3X PRODUCT: REINFORCEKIT 4D SUBSEA (R4D-S)

OVERVIEW
The objective of the repair performed in August 2017 by 3X ENGINEERING (3X) and its local distributor was to seal 2 cracks and reinforce the pipe integrity at 70-meter depth.

SCOPE OF WORK
- According to ASME PCC-2 and 3X repair calculations, it has been decided to make 2 different repairs as shown in Figure 1. Eighty-eight composite layers of REINFORCEKit 4D SUBSEA (R4D-S) product have been determined to repair Defect No. 1 (external crack with through wall section) and 20 layers for Defect No. 2 (non-opened crack).
- Underwater, several preliminary operations have been performed prior to surface preparation to get a good surface roughness (between 60 μm and 100μm surface profile).
- 3X wrapping reinforcements have been performed following several stages. It is important to note that working at 70-meter depth requires saturation dive.
  1/ For both defects, F3XUW9 filler has been applied to fill the cracks and reshape the pipe geometry.
  2/ P3X32 primer applied under the composite plates and over the damaged areas (previously delimited on the pipe) to ensure good bonding.
  3/ Composite plates application on both defects recovered with F3XSS filler and strongly maintained with ratchet belts for curing.
  4/ P3X32 primer applied on the whole surface of the repair before wrapping.
  5/ Kevlar® tape pre-impregnated with R3X1050-S resin (using special devices developed by 3X) wrapped around the pipe. Eighty-eight layers were necessary to repair Defect No. 1 (i.e. 44 passes of 50% overlap for 1,85-meter length repair). For Defect No. 2, 20 layers were applied (i.e. 10 passes of 50% overlap for 0,82-meter length repair).

RESULTS
Pipeline has been re-pressurized a few days after repair without any problem known at the moment. This job was a great challenge because of the 70-meter depth. Even if 3X ENGINEERING is now experienced in subsea repairs this job is the first one performed at this depth.