

# Fueling your business - Bekaert & Shell:

## Pushing pressure limits to maximize oil output

The days of 'easy oil' are over. As conventional oil reserves are running dry, oil companies need to invest in new technology that enables them to operate in seemingly inaccessible environments. Shell and Bekaert partnered to test Bekaert's steel-cord based pipe reinforcement solution which would allow Shell to push pressure limits and go farther ...

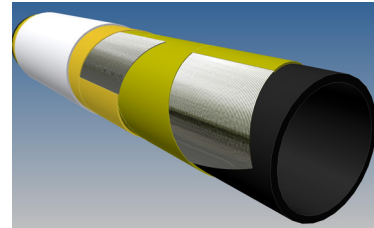
### Pushing the boundaries: exploring new materials

Shell was looking for an alternative pipe solution that could withstand pressures of up to 300 bar while offering excellent corrosion protection. This type of pipe was needed for subtracting oil by water injection, whereby water is injected under high pressure into the reservoir to sweep the remaining oil from the well. Existing solutions like traditional steel pipes or aramid-reinforced thermoplastic pipes fell short of meeting these needs. When Frans Janssen, senior researcher and polymer and composite specialist at Shell Global Solutions, found out about Bekaert's Armoform<sup>®</sup> steel cord reinforced thermoplastic strips (SC-RTP), he was interested to test it. Bekaert's solution combines the advantages of a light-weight material which enables flexible design and easy installment with high corrosion resistance. In addition it offers the high pressure performance Shell needed thanks to the particular performance of steel cords.

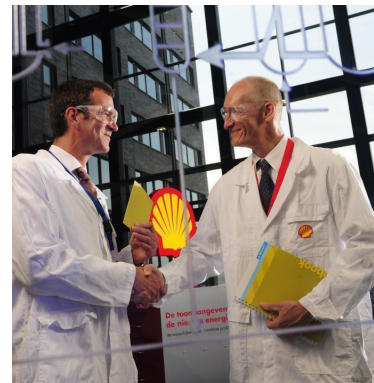
### Teaming up for *better together* results

As Shell learnt that Bekaert was an expert in steel cord corrosion protection research, the Shell team decided to set up a joint development project. Purpose of the project was to test the corrosion protection mechanism of the steel cord reinforced thermoplastic tapes based on a zinc coating, a combination which is new to the oil industry and for which there are no standard test results available. The research results had to reveal the amount of zinc needed to make sure that the solution warrants a lifespan of 20 years, which is critical to oil field operators.

Frans Janssen: "Shell was actively involved in defining the parameters of the test environment as these had to correspond with field conditions (temperature, pressure, exposure to CO<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>S, ...), whereas Bekaert designed the experimental set-up, provided the required measurement techniques and developed the strip samples. Bringing in these complementary competencies really speeded up the process. Based on the research results Bekaert developed an Armoform<sup>®</sup> SC-RTP corrosion model. This cleared the way for a first onshore field trial which was executed in Oman in March 2010. Given its success, opportunities for offshore testing are now being explored."



Two layers of Bekaert Armoform<sup>®</sup> allow a 4" pipe to reach a burst pressure of 500 bar.



Frans Janssen (left), Senior Researcher and polymer and composite specialist at Shell Global Solutions and Philippe Scheerlinck (right), Global Product Market Manager - Oil & Gas, Bekaert.