

Case Study:

Cracked Oil Tanks Investigations

Intertek

Valued Quality. Delivered.

Company

Borealis and their insurers

Industry

Legal & Insurance
Manufacturing

Region

United Kingdom

Intertek Role

Independent technical investigation

- Characterization of Failures
- Mechanism of failures
- Cause of failures

Coordination of technical experts and laboratories

Contribution of expert reports and oral testimony in court

"...You have played a pivotal role in both cases; and have enhanced [Intertek] CAPCIS' reputation immeasurably"

**David Appleton -
Integra Technical
Services (Loss Adjusters)**

For more information:

Adrian Wright
Intertek CAPCIS
Tel: +44 161 933 4000
Email: capcis.enquiry@intertek.com
intertek.com

www.intertek.com

Intertek Scientists and Engineers provided independent technical investigation services with respect to two separate claims brought by two oil tank manufacturers against one of the world's largest polymer manufacturers, Borealis, and their Insurers. The claims alleged deficiencies in a metallocene polyethylene, Borecene, following failure (cracking) of several thousand rotationally moulded oil tanks. The Defendants and their Solicitors, Kennedys, chose Intertek to coordinate, manage and carry out forensic studies working with a team of Experts in the fields of Polymer properties, Rotomoulding Processing, and UV stabilization. Both claims were heard in the London Commercial Court and both were dismissed in their entirety. The successful defence of these two claims represents a total saving in damages, interest and fees approaching a quarter of a billion pounds.



Tanks undergoing testing

Background

Borealis manufactured a metallocene polymer, Borecene, which was used to manufacture domestic heating oil tanks. Two different oil tank manufacturers took successive legal actions against Borealis, alleging that deficiencies in the polymer had caused the failure of several thousand rotationally moulded oil tanks.

The challenge for the clients was to establish the facts and the true causes of the failures. They had critical demands upon the suppliers chosen to manage and conduct the investigations:

- Independence
- Breadth of capability to conduct a wide variety of tests and analyses
- Expertise
- Reputation
- Ability to liaise with and manage all the consulting parties

The challenge for Intertek CAPCIS was to manage an independent and wide ranging

programme of investigations, over a long period of time, and deliver clear and easily understandable findings and opinions, that could be relied upon in court.

The Solution

Intertek was able to provide the client with essentially a one-stop-shop. We managed and provided comprehensive testing, measurements and analyses over the course of the technical study, which included the following:

Physical examination and measurement of oil tanks and tank samples

- On-site visual examination
- Characterization of damage
- Corner diameter testing (radius measurement)
- Manual measurement of tank wall thicknesses
- Measurement of tank dimension changes



Crack at corner of a tank

“The entire Borealis Defence team, from David Appleton [Integra], all of the Barristers, to all of us at Kennedys, can only express our enormous gratitude to, respect for, and admiration of each and every one of you for your individual and collective contributions to this victory.”

**Anthony Greenwood/
Leanna Mailer -
Kennedys Solicitors**

For more information:

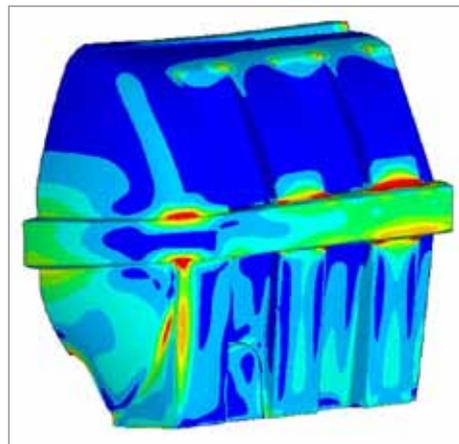
Adrian Wright
Intertek CAPCIS
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Email: capcis.enquiry@intertek.com

www.intertek.com

- Temperature measurements (data logger and hand held)
- Ultrasonic thickness profiling of plastic tank sections

Microscopy of oil tank specimens

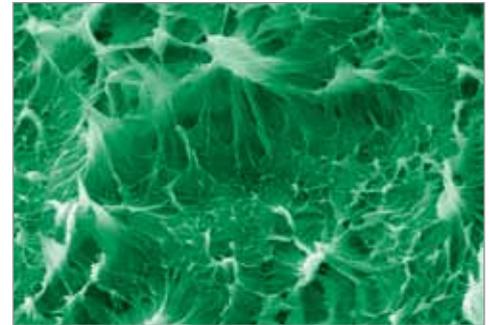
- Stereomicroscopic examination and analysis
- Polarised light microscopy
- SEM (Scanning Electron Microscopy)
- Fractography (crack surfaces)
- Microscopy and measurement of specimen notches
- Light analysis of microtomed samples



Stress analysis (FEA model) of a tank

Physical and mechanical testing of oil tank specimens

- GPC (Gel Permeation Chromatography)
- Crystallinity determination via DSC (Differential Scanning Calorimetry)
- Stress relaxation testing
- Tensile testing
- Gloss determination
- Gel content determination
- Notched sample stress regression testing
- PIAT (Peak Internal Air Temperature) analysis
- Rheometer testing



Scanning electron microscope (SEM) image

Chemical analysis of oil tank and pigment specimens

- XPS (X-Ray Photoelectron Spectroscopy) analysis
- EDX (Energy-Dispersive X-ray spectroscopy) analysis
- NMR (Nuclear Magnetic Resonance) analysis
- OIT (Oxidative-Induction Time) analysis
- Auto fluorescence studies
- FITR-ATR (Fourier Transform Infrared Spectroscopy-Attenuated Total Reflectance) investigation using diamond crystal detector

The Result

Both the oil tank manufacturers' claims against Borealis failed in their entirety. The Court, on both occasions, found that the oil tank failures were not due to any problems with the Borealis polymer material, but essentially were due to a combination of factors including:

- Tank design
- Failure to optimise processing
- Tank wall thickness/thinness variations
- Quality control procedures

- Intertek inspected more than 500 cracked oil tanks on-site in Eire and UK
- Intertek selected and conducted laboratory investigation of 70 whole oil tanks, and over 300 tank sections and samples.