

Rejuvenation Project

Making a Difference

Mossmorran Column Refurbishment

The Nine Fractionation Columns are a key part of the process here at FNGL Plant. The refurbishment of the Columns was included as part of the Rejuvenation Project Scope and started in 2007. The scope was completed early 2010 with the dismantle of the scaffold from the final Column 3-C1001.



Module 2 & 3 Columns before refurbishment.

During the refurbishment the columns 100% of the external surfaces of all nine columns were inspected, the coating system, insulation and cladding were all upgraded. The coating system was upgraded from a paint system to Thermally Sprayed Aluminium (TSA). The Insulation from Rockwool to Closed Cellular Glass and the Cladding from Galvanised steel sheeting to Stainless Steel.

Most trades on site were involved at some point in the refurbishment of the columns. A total of **92,732 manhours** were expended on the program. This is equivalent to 50% of the total manhours the Project plan to expend this year.

Over the three year period there were no serious injuries or incidents on this job. We had one Restricted Work Case (RWC), two First Aid Cases (FAC) and two Near Misses (NM). Room for improvement but an excellent HSE record by anyone's standard when you take into consideration the nature of the activities involved.

Scaffolding

The column scaffolds were the tallest scaffold structures ever built on site. As they were higher than any other structure in the Module area they had to be fitted with lightening conductors.



Column scaffolds being erected.

The total weight of scaffold materials used for column access was 156 tonnes including boards and fittings. That's equivalent to 2 ½ Boeing 737's. There was also 20,880m² sheeting used for the encapsulations, enough to cover three International size football pitches.

Coating System

Thermally Sprayed Aluminium (TSA) was used in place of a conventional paint system. This was applied by specialist vendor, GCG Shotblast Services Ltd, with Cape providing the P.A's and support.

TSA has the advantage over a conventional paint system of providing cathodic protection to the column as well as a barrier to corrosion.



TSA being applied

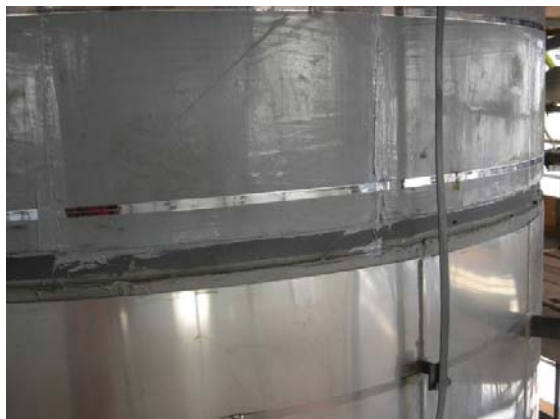
TSA is supplied as a wire and is applied by a spray gun, with a small propane flame melting the wire. This was the first large scale application of TSA to vessels in live process areas in Shell. It has raised a

great deal of interest from Shell (and other operators) sites worldwide.

Insulation

The Insulation specification for the Columns was upgraded from Rockwool and Galvanised steel cladding to Closed Cellular Glass with Terostat on the outer layer and Stainless Steel Cladding.

The original galvanised steel cladding had broken down allowing water into the Rockwool. In places the water was trapped and the Rockwool acted like a sponge retaining water inside the insulation and causing corrosion of the column.



Insulation being applied, showing the Terostat coated Cellular Glass above Stainless Cladding.

The Closed Cellular Glass, Terostat and Stainless Cladding provide additional barriers to prevent the ingress of water, preventing future corrosion.

Approximately 250m² of double ply Cellular Glass was fitted to each of the nine columns, this is a total of 4,500m², an area larger than a football pitch. 2,500m² of stainless steel cladding, 16,500 linear meters of stainless steel banding and approximately 20,000 pop rivets were used.

Inspection

100% of the external surfaces of all nine columns were inspected. Additionally all of the associated column pipework was inspected, painted and re-insulated at the same time, making use of the scaffold erected for the columns.

A total of 19 areas of corrosion were found on the columns. All were assessed as fit for continued service by Shell Mechanical Engineers (TA's).

As a result of the inspections carried out and the upgrade of the coating and insulation systems the columns will not need inspected again for 16 years.

Mechanical

Modifications were required to structural attachments to the columns, to prevent water being trapped at these points, leading to corrosion. Also mechanical support was required, i.e. to remove

insulation support rings for inspection.

Electrical

As the column scaffold structures became the highest points on the site lightening conductors needed to be fitted to them. The scaffold were earthed to allow electrical tools and lighting to be used safely on them. The electricians also provided lighting for nightshift working, and earthed all temporary equipment (i.e. TSA equipment) required for the refurbishment.



Module 1 showing 1-C1002 & 3 encapsulated.

Services and Support

Over the course of the last three years most people on site have been involved in some way supporting the refurbishment of the nine Fractionation Columns. By providing the facilities, meals (also nightshifts), order and movement of materials, etc.



2-C1002 & 3 - Completed

Completing this scope on the live plant introduced a number of challenges. We needed to carry out some of the work during shutdowns to meet process safety requirements. We introduced new methods and processes that needed to be managed safely through our site standards and PTW system. You have successfully met all challenges to complete this work safely, ensuring the integrity of these key parts to the process.