

A — General arrangement at the Ground Anchors  
B — At this anchorage the Anchor Plate in the 'Dead-man' can be seen to be out of line with the guy rope meaning that the force on the corresponding Link Plates is also offset.

We were able to significantly rectify this situation by linking the Guy Rope to the Ground Anchor using a Wire Rope Strop and a large Bow Shackle (Photograph G).

C, D E & F — All of the anchor bolts were severely affected by corrosion; by incorporating the arrangement shown in Photograph G it was possible to eliminate all of these at minimum cost.



#### INSTALLATION & ALIGNMENT OF WIRE ROPE GRIPS (DIN GRIPS)

Because of the nature of wire rope, both when new and after it has been in use for some time, it is difficult, in many cases, to make an acceptably neat termination using wire rope grips.

Photographs H, I and J show our method of making both an efficient termination but one which is also 'neat & tidy' and fairly quickly made.



Before the grips can be fitted it is necessary to close the 'live' and 'dead' or tail part of the wire rope around the thimble; in this case the thimble is on the end of a rigging screw.

This is most readily done using a 'two bolt' rope clamp which has very long fastening bolts.

The clamp can be fitted, without too much manual effort being required to bring together the two parts of the rope, and hold them whilst the clamp is secured.

The clamp allows the rope to be tightened around the thimble and the first wire rope grip fitted close to the neck of the thimble.



The required number of wire rope grips can now be fitted to the rope using a Ropetech 'Alignment Board'.

The board is forked at one end so that it aligns with the thimble and it has the required number of slots, correctly spaced for the particular rope diameter and which also match the dimensions of the wire rope grips.

Photograph (I) shows the 'U' part of the grips neatly aligned and correctly spaced on the 'live' part of the rope and Photograph (J) the alignment of the 'bridge' parts.

Once the grips are correctly tightened the Alignment Board can be removed.



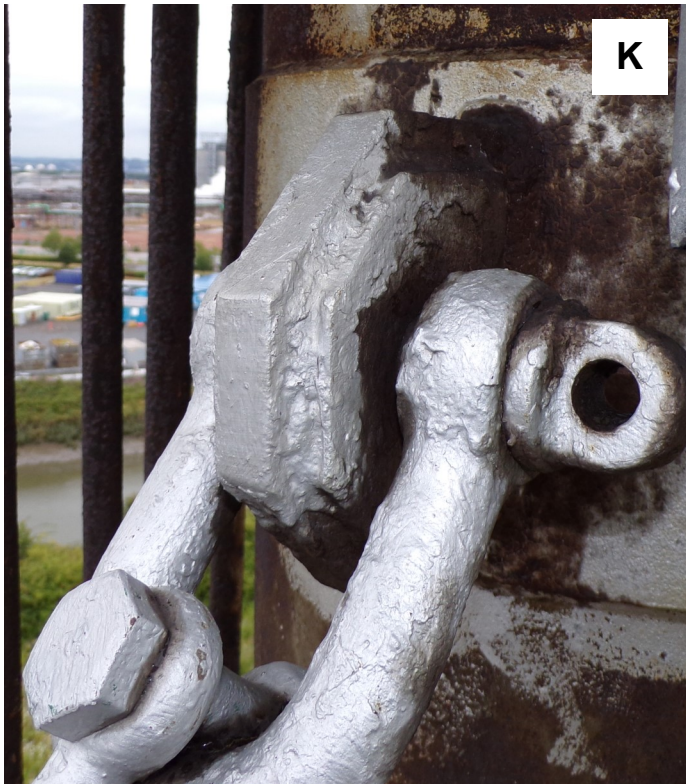
#### UPPER ANCHORAGES:

*This flare stack was also suffering from the effects of : 'Unstable Ground Conditions on Guy Rope Tensions and Stack Verticality'. For more details refer to our LinkedIn page.*

At the same time as replacing the Ground Anchor connections it was felt prudent to take the opportunity to replace all of the Upper Anchor Shackles.

The condition of these is shown in Photographs (K) and (L) and one of the new connections in Photograph (M).

NDT of the welds securing the Anchor Lugs to the stack was completed by 'others'.



#### UNUSUAL MECHANICAL DAMAGE

The ladder in **Photograph (N)** had always been in close proximity to the adjacent guy rope but, it had never been in actual contact.

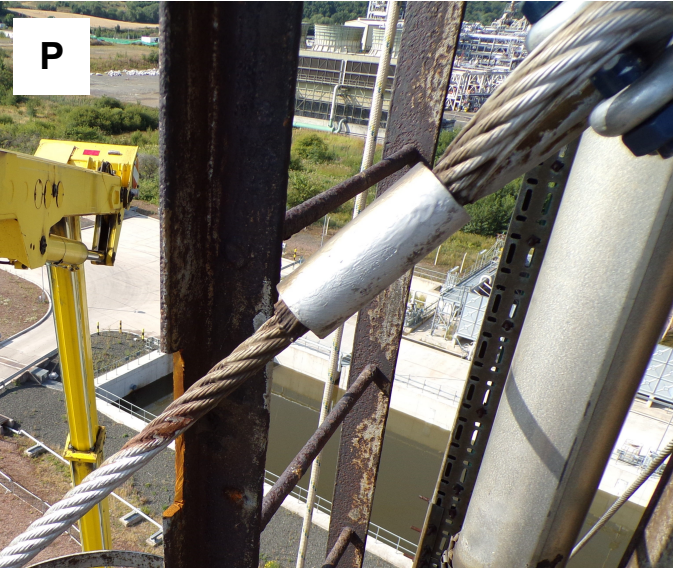
In July 2019 we observed that the ladder and guy rope were in contact and as can be seen in **Photograph (O)**, the ladder had become worn by the 'rubbing' action of the rope.

The rope itself had also become worn, **Photographs (P, Q and R)**.

The 'rust' on the guy rope Photographs (P) & (Q) was the first sign that there was contact. After the rope was cleaned Photograph (R), the extent of the abrasion became very clear.

In our experience this situation **is not usual**, but it is a warning that it is necessary to be prepared for the unexpected and that if serious incidents are to be prevented, persons with wire rope knowledge should be making guy rope inspections and that this work should not be just 'lumped-in' with the work carried out by 'steeplejacks'.

Whilst the degree of abrasion here is not sufficient to warrant changing the rope, it is significant and, if gone undetected, would have continued to the point at which, an unplanned shut-down would have been needed to change the rope.



Notes: (a) The rope was rotated to expose the worn section.

(b) The client requested that the ladder section be cut out to prevent further abrasion.



After all works were completed the guy ropes were dressed with Elaskon SK-A and the Upper Anchor Shackles also protected from corrosion attack.

