Summary

Holland counts about 10,000 high power pylons. The framework of the cables is quite different, but they all use dozens of galvanised steel bolts and nuts. All nuts are locked with a split pin from bronze. It is the case that 40 years after installation in the pylon highly corroded nuts are found; sometimes bolts are found without nuts anymore. The bolts are hardly damaged by corrosion.

This phenomenal could be explained as follows. Both bolt and nut are corroded, because of atmospheric corrosion. But the nut is also damaged by galvanic corrosion, because it is in contact with the split pin from bronze. This increases the corrosion process. Further has the nut in comparison with the bolt a zinc layer, which is thinner at installation. Also is the configuration of the nut quite suitable for the establishment of fought and dirt. All in all is the zinc layer of the nuts earlier gone than the zinc layer of the bolts. After this the underlying steel will corrode. As a rule of thumb this will go 10 times faster as the corrosion of zinc. From a statistical analysis becomes clear that the nuts in a urban/industrial environment need to be replaced. Statistics shows that after 40 years about 20% of the nuts are lost in this environment, because of corrosion.

When the nut is gone and the split pin is neglected, there is an unlocked bolt. The chance that this bolt vibrates out of the construction is very small, but not excluded. When there is a combination of ice coating and a strong wind, the cables could come into an un-damped vibration. In this case the bolt is not continually radial forced and could come out of the construction. If this happens, the transmission lines fall down; this can cause millions of damage. This risk needs to be balanced with the cost of accelerated maintenance.

When replacing the current bolts and nuts it is profitable to use stainless steel. This material has a much longer lifetime than galvanised steel. So, on longer period the higher material price of stainless steel will be paid itself back.