	Construction Plant-hire Association Tower Crane Interest Group	
	Tower Crane Technical Information Note	
TIN 018	**Tower Crane Life**	

Concern is sometimes expressed in the construction industry that some tower cranes are “too old” and should not be used on construction sites.

Unfortunately this is a misconception. A tower crane’s age alone is not an adequate indication of its structural condition and fitness for purpose. There are a number of factors that must be taken into account such as :-

- History of use
- Intensity of use
- Load spectrum history
- Maintenance history
- Operational and storage environment history

The majority of tower cranes manufactured in Europe are designed to the FEM standard *FEM 1.001: 1998 – Rules for the design of hoisting appliances*. This standard requires designers to select a suitable classification for the crane they are designing, taking into account the number of lifting cycles the crane is expected to carry out in its life and the average percentage of the crane’s rated capacity that will be lifted (the load spectrum). This determines the maximum permissible stresses in the crane structure for structural problems to be avoided.

The result of this is that tower crane structures have finite design lives which are dependant on the usage of the crane. An example of this is to take two identical cranes, one subjected to intensive use and lifting at its rated capacity for most of the time, whilst the other is used far less intensively at well below its rated capacity. The differing rates of use and load spectrums mean that the structural life of the second crane will be significantly longer than the first crane.

The environment in which the crane operates is also an important factor. A crane operating in salt laden air in a marine environment will be much more susceptible to corrosion than one operating inland well away from pollutants. High utilization and high load spectrum will use up the fatigue life of the structure, whilst corrosive atmospheres may well lead to corrosion and thinning of structural members, with the consequent increase in stresses. The combination of all three is likely to lead to accelerated stress corrosion, where the structural strength loss resulting from the combination of stress and corrosion is greater than the effects of stress and corrosion acting separately.

The consequence of all these factors is that the likelihood of structural problems will increase if a crane is not adequately maintained and thoroughly examined throughout its life. It also means that as a tower crane structure ages, thorough examinations will require more frequent application of non-destructive testing techniques to detect possible fatigue cracking, and material loss through corrosion.

“Old” tower cranes are not less structurally reliable than “new” cranes, providing that they are maintained effectively, thoroughly examined at appropriate intervals and any defects discovered quickly rectified. Tower crane suppliers should have in place robust maintenance and thorough examination procedures, together with effective records that will enable them to demonstrate the structural competence of each crane.

TIN 042 *Selection of Tower Cranes - Anticipated Utilization* addresses the high utilization of top-slewing tower cranes, which may lead to structural issues.

Note: Clause **18.2** of British Standard BS 7121-5:2006 *Code of practice for the safe use of cranes – Tower cranes* also refers to this matter.