



December 2013

**Position Paper**  
**FEM Product Group Cranes and Lifting Equipment -**  
**Sub-Group Tower and harbor Cranes**

**Regarding: "Lifetime of Tower Cranes"**

*Legal Note: This publication is only for guidance and gives an overview regarding the assessment of "lifetime of Tower Cranes". It neither claims to cover any aspect of the matter, nor does it reflect all legal aspects in detail. It is not meant to, and cannot, replace own knowledge of the pertaining directives, laws and regulations. Furthermore the specific characteristics of the individual products and the various possible applications have to be taken into account. This is why, apart from the assessments and procedures addressed in this guide, many other scenarios may apply.*

**FEM**

Created in 1953, the European Materials Handling Federation ([www.fem-eur.com](http://www.fem-eur.com)) represents, defends and promotes European manufacturers of materials handling, lifting and storage equipment including cranes and lifting equipment and particular tower cranes."

The FEM Product Group Cranes and Lifting Equipment's - Subgroup Tower and Harbor Cranes - mission is to represent the interest of tower crane manufacturers in Europe."

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Tower cranes for construction work are mainly designed to most updated European Standards (EN14439<sup>i</sup>, FEM 1.001<sup>ii</sup>), and, generally, complies with the standard crane group utilization according to FEM 1.001 class A3. This utilization class defines the expected design lifetime for which the crane design is based on.

Focusing on the steel structure of the cranes, this design lifetime class A3 is defining the expected number of hoisting load cycles to be performed by the crane during its life, with consideration of a representative average hoisting load. As for any steel structure, the lifetime effectively observed for the crane will be highly dependent of the characteristic load hoisted by the crane in average during its life, named "load spectrum": average light hoisting loads (compared to the crane capacity chart) will authorize high number of hoisting cycles, when high loads will lead to reduced number of cycles governing the lifetime.

Based on the class A3, the expected design number of hoisting cycles is defined combined with an average hoisting load. Considering a typical standard use of, for example 12000 hoisting cycles per year (1 shift 8h, 5 days a week), it leads to a design lifetime of approx. 20 years.

Attention shall be paid to the fact that the crane operation regime (related to the number of cycles per year or to the average characteristic hoisting load) will directly involve significant reduction or increase of the expected design lifetime.

For example

- A regular crane operation in 2 shifts 10h, 6 days a week, will decrease the expected lifetime by factor 3
- Also, an increase of 25% of the average hoisting load will decrease the expected lifetime by factor 2
- On opposite, a decrease of 25% of the average hoisting load leads to increase this lifetime by factor 2.

This is why you can see Tower cranes aged more than 30 years still in operation, being used as planned, maintained and repaired in time when required.

Due to the important effect of the crane operation to its real lifetime, it is essential to perform, as it is generally requested in the instruction manual and recommended in international standards related to tower crane maintenance and inspection, for instance FEM1.007 (also ISO 9927-3<sup>iii</sup>), regular inspection of the structures before each erection and at least once a year if the crane is erected for long time.

Due to many influent parameters conditioning the real lifetime of structure (condition of crane operation, transport, erection, also lack of maintenance, or possibly local weld imperfection), local structural damage (mainly local crack weld as it constitutes the weakest areas for any welded steel structures subjected to stress cycles) can be observed time to time during this regular inspection, allowing to proceed in time to proper repair, in order to continue to use the crane in good and safe conditions for long time.

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<sup>i</sup> EN14439 +A2 (07.2009): Cranes – Safety – Tower cranes

<sup>ii</sup> FEM 1.001 (10.1998): Rules for the design of hoisting appliance

<sup>iii</sup> ISO 9927-3 (07-2005): Cranes – Inspections-Part 3 Tower cranes