Resources | Solutions

# CLASSIFICATION OF OVERHEAD TRAVELING CRANES

***Application:*** Various standards exist to rate the "service class" of a crane and/or hoist. The Crane Manufacturers Association of America (CMAA) classifies bridge cranes according to average load intensities and number of cycles. On the other hand, the International Organization for Standardization (ISO), European Federation Standard (FEM) and Hoist Manufactures Institute (HMI) all classify hoists according to more rigorous requirements, which include number of starts and maximum running time per hour.

***Purpose:*** Two cranes with the same rated capacity and span may differ in their Average Load Intensity and/or Expected Loading Cycles, hence will likely differ in their design.
Crane components experience the following loading conditions:

1. Short-Term Affects- This area of design verifies that the crane and its components will function under a full lift condition with sufficient safety and function as it is intended. When designing structural components both strength and rigidity must be considered. The rated capacity is considered a "quasi-static" load for the purpose of this design. This simply means that a dynamic load (ex. acceleration and deceleration of bridge or hoisting motion) is converted into an equivalent magnified static load.

2. Long-Term Affects- The durability of the crane and it components are essential in assuring safety and proper function throughout its entire life. Durability is assured by selecting components (structural, mechanical and electrical) considering the working load (average load intensity) and number of load cycles. It is important to note that the working load is often less than the rated load as it denotes an average probable expected lifted load during the life of a Bridge Crane.

As the second point above describes, crane loading is considered "cyclic" at a long-term scope, as the applied load is not permanent but rather cycles between load intensities. Fatigue and durability of all components under such cyclic loading is a very important issue and must be addressed during the design phase. It is for this reason that Crane Classifications exist. This classification helps describe the average load intensity and load cycles as outlined in the 2nd point above. Therefore, before design, crane class must be clearly identified.

***Method:*** The chart below (an excerpt from CMAA) helps determine a Class of Crane:

| **LOAD CLASSES** | **LOAD CYCLES** | | | |
|---|---|---|---|---|
| | **N1** | **N2** | **N3** | **N4** |
| **L1** | A | B | C | D |
| **L2** | B | C | D | E |
| **L3** | C | D | E | F |
| **L4** | D | E | F | F |

L1= Cranes which hoist the rated load exceptionally, and normally hoist very light loads

L2= Cranes which rarely hoist the rated load, and normally hoist loads about 1/3 the rated capacity

L3= Cranes which hoist the rated load fairly frequently, and normally hoist loads between 1/2 and 2/3 or the rated capacity

L4= Cranes which are regularly loaded close to the rated capacity

N1= 20,000 to 100,000 cycles
N2= 100,000 to 500,000 cycles
N3= 500,000 to 2,000,000 cycles
N4= Over 2,000,000 cycles

***General Comparison Between Various Standards:*** **(*Machinery class)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CMAA** | **A** | **B** | **C** | **D** | **E** | **F** | |
| **FEM** | **1** | **2** | **3** | **4** | **5** | **6** | |
| **FEM*** | **1Bm** | **1Am** | **2m** | **3m** | **4m** | **5m** | ***Based on 63% mean effective load** |
| **ISO*** | **M3** | **M4** | **M5** | **M6** | **M7** | **M8** | |
| **HMI*** | **H2** | **H3** | **H4** | **H4+ to** | **H5** | | ***Based on 65% mean effective load** |