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# Study on Fatigue Life Assessment of Offshore Platform Lattice Crane in Service

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***Abstract***

*In this paper, the hot spot stress method was applied to the life assessment of offshore platform lattice crane in service for the first time. The research of residual life of crane was carried out for the problems such as long service time and poor working condition. Taking a platform crane in Bohai Sea for example, the finite element analysis was carried out and drew a conclusion that the danger zone was at the bottom of A-frame and boom. The stress test was taken using strain gauge measuring method under different working conditions to acquire the hot spot stress of the danger zone. According to usage record on the spot, more accurate statistics has been gathered to obtain practical cycles of the crane. Using hot spot stress method and Miners linear accumulative theory to evaluate the residual life of the crane successfully. The residual life of the crane is 17 years.*

***Key words:*** *Lattice Crane hot spot stress method Fatigue Life Assessment*

## 1. Introduction

The role of offshore oil platform crane is lifting facilities or person from the supply ship to platform and lifting equipments on platform from one place to another place. It is indispensable important equipment for platform. Each platform is equipped with one or two crane. According to statistics, the number of the offshore platform crane in the sea of china is more than 200 now. For offshore platform lattice crane, weld fatigue crack is the main failure mode. Researching and evaluating the fatigue life of the girder crane is the important precondition for safety production. At present, the fatigue life analysis for offshore platform crane is limited to the factory design stage. According to the expected durable years and use frequency to determine the crane working level. Then check the fatigue strength of crane based on material type, change of the stress and the stress concentration level of the connection [1]. Marine crane, however, working all the year round in the marine environment, its structure may occurs corrosion or deformation, make its structural stress change. Furthermore, the practical work frequency and the expected working frequency is different, thus affecting its expected life span. How to accurately predict the residual life of crane in service is particularly important. In this paper, the structure stress will be obtained by the spot stress test and historical load records will be collected. Recommended by API SPECIFICATION 2C-2012 《Offshore Pedestal-mounted Cranes》, the hot spot stress method will be used to evaluate fatigue life of the crane [2].

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## 2. Evaluation Principles

Hot spot stress method is a means to evaluate component fatigue. Hot spot stress refers to the maximum structure stress or geometric stress [3]. The hot-spot stress approach, sometimes also called structural stress approach, considers the stress increase due to the structural configuration or in other words, the macro-geometry. The hot spot stress, As a kind of reference value, only consider stress concentration caused by macroscopic geometry structure, without consider the local nonlinear stress peak value caused by the weld shape. Hot spot stress present linear distribution at a certain distance away from the weld toe. Influenced by nonlinear notch stress, the hot spot stress of the weld toe cannot be directly measured. Hot spot stress is unaffected by the notch stress away a certain distance from the weld toe which depend on the plate or shell thickness. DNV recommend that the distance is 0.5 t and 1.5 t from the weld toe to get the hot spot stress using two linear extrapolation. National classification have done a large number of experiments combined with engineering projects in order to get the hot spot stress s-n curve. From those experiments toward a conclusion that FAT90 can be adopted as a general hot spot stress S-N curve when use linear extrapolation to get the hot spot stress [4]. The curve is shown in Figure 1.

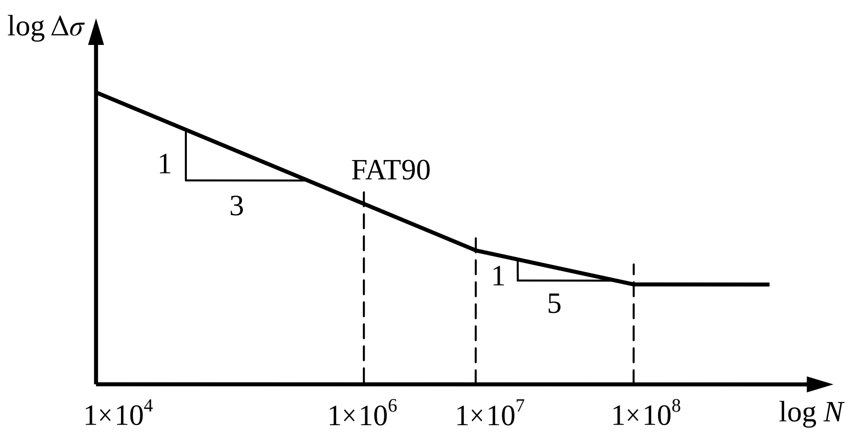


**Figure 1. Hot Spot Stress S-N Curve**

The curve has been applied in DNV specification. The curve can be expressed as follow:

$$\log N = a - b \times \log \Delta\sigma \tag{1}$$

When:

$N \leqslant 10^7$, a=12.164, b=3.0

$N > 10^7$, a=15.606, b=5.0

According to historical record of lifting load, the lifting load can be graded into five levels. Measuring the crane's maximal hot spot stress under different load levels, the numbers of theoretical cycles were obtained by contrasting the S-N curve. According to the filed usage record, the numbers of practical cycles were obtained. The last, we can use Miners linear accumulative theory to calculate damage degree and evaluate the residual life of the crane [5].

## 3. The Finite Element Analysis of a Lattice Crane in Service of a Fixed Platform in the Bohai Sea

The crane was put into operation by the end of 2005. Boom length is 35 m and the range of boom angle is from 15° to 82 °. When the radius of gyration is 16m, the safe working load is 20t. When the radius of gyration is 10m, the safe working load is 25t. When the radius of gyration is 38m, the safe working load is 5t. The purpose of the finite element analysis is to find the dangerous area of the crane and to guide spot stress test. The spot stress test stick strain gauge at the dangerous areas.

Using ANSYS software to establish the finite element model, we can carry on stress analysis to find the dangerous area. For the whole crane model analysis, we use four different element type. Boom chord，boom lacing and A-frame use beam188; all of the areas use shell181; base, pedestal, boom splices and hell pin use solid185; the wire rope use link10. The boom chord and boom splices are connected by beam element type and solid element type, in this case, we must establish contact pairs the form of binding [6]. The finite element model is shown in Figure 2.

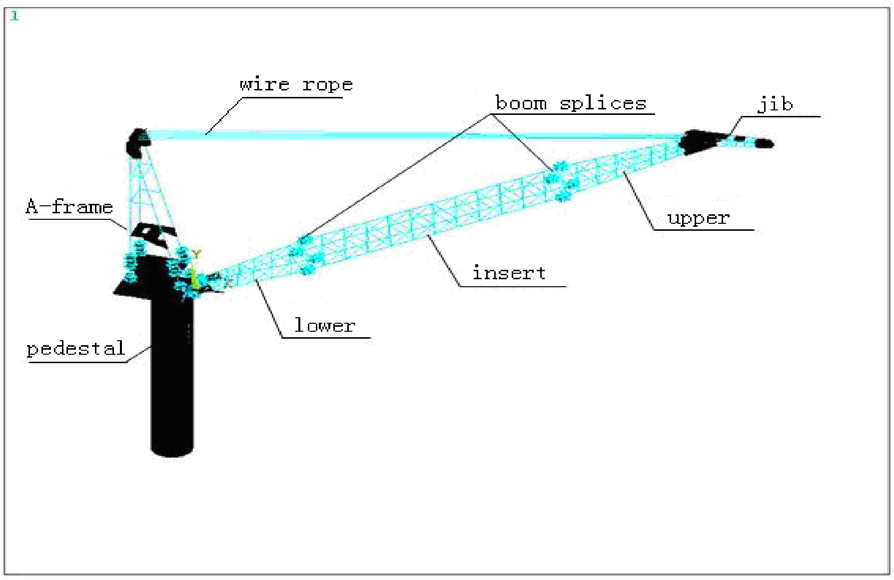


**Figure 2. The Finite Element Model of the Crane**

During use, the crane is subjected to loads due to its own weight, the lifted load, environment, motions of the platform and vessel, dynamic forces caused by movements (*i.e.*, hoisting) and, for off board lifts, motions of the supply vessel the load is being lifted from. According to API Spec 2C- 2012, Vertical Factored Loads and Horizontal Loads are calculated as shown in Table 1.

**Table 1. Load under Different Angles**

| Angle φ/° | 15 | 30 | 45 | 55 | 65 | 75 | 82 |
|---|---|---|---|---|---|---|---|
| Turning Radius R/m | 35 | 31.5 | 26 | 21.3 | 16 | 10 | 6.35 |
| Vertical Factored Load/N | 110400 | 130300 | 172200 | 232100 | 345200 | 546300 | 554600 |
| Horizontal Load/N | 7695.6 | 9056.4 | 11898.4 | 15940.5 | 23530.8 | 36958.9 | 37496.9 |

 

When the model subjected to the load as shown in the table above, the maximum stress of each member as shown in Table 2.

**Table 2. The Maximum Stress of each Member (Units：MPa)**

| Location / Angle | The upper chord | Boom splices | Bottom of boom chord | Bottom of A-frame | Pedestal |
|---|---|---|---|---|---|
| 15° | 89 | 72 | 148 | 172 | 53.8 |
| 30° | 94 | 79 | 151 | 179 | 56.9 |
| 45° | 96 | 63 | 131 | 193 | 58.7 |
| 55° | 118 | 132 | 151 | 210 | 64.3 |
| 65° | 155 | 180 | 186 | 227 | 72.5 |
| 75° | 168 | 118 | 193 | 181 | 63.2 |
| 82° | 155 | 124 | 185 | 116 | 48.8 |

It can be seen from the Table 2 that the stress at the bottom of A-frame and boom chord is higher. It's the dangerous areas. The welds at these zones are more likely to be crack. So the stress test should concentrate on these areas.

## 4. The Spot Stress Test

The finite element analysis shows that the stress at the bottom of A-frame and boom chord is higher then other areas. So the stress test should stick strain gauges on these areas. According to the research of the pioneers, for seam-welded joints of pipe, higher stress areas are always distributing at crown point and saddle point [7]. Therefore, the strain gauges will be sticked on crown point and saddle point.

At the bottom of A-frame has four member bars described with A1~A4. Each of them were arranged of four measuring point. Each measuring point needs two strain gauge, remembered to gauge A and gauge B. This enabled the hot spot stress to be evaluated approaching the weld toe based on linear extrapolation. The distribution of strain gauges shown in Figure 3 and Figure 4.

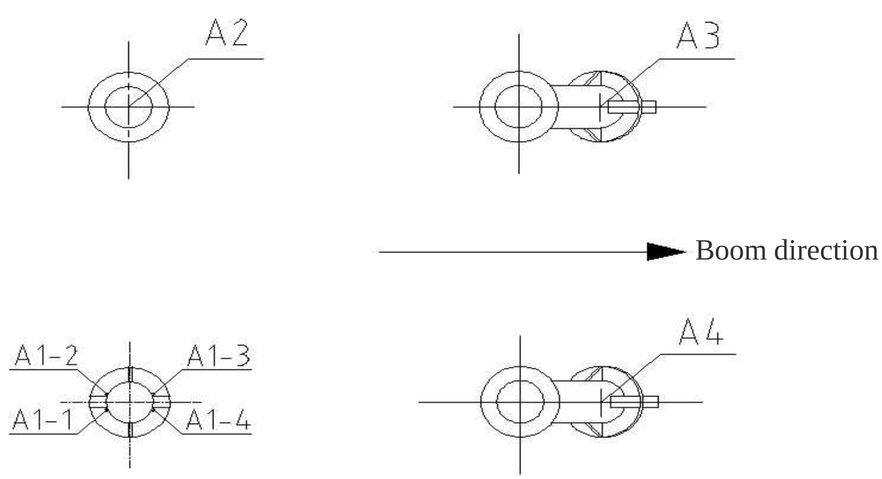


**Figure 3. The Number of Member Bars and Measuring Point at the Bottom of A-frame**

 

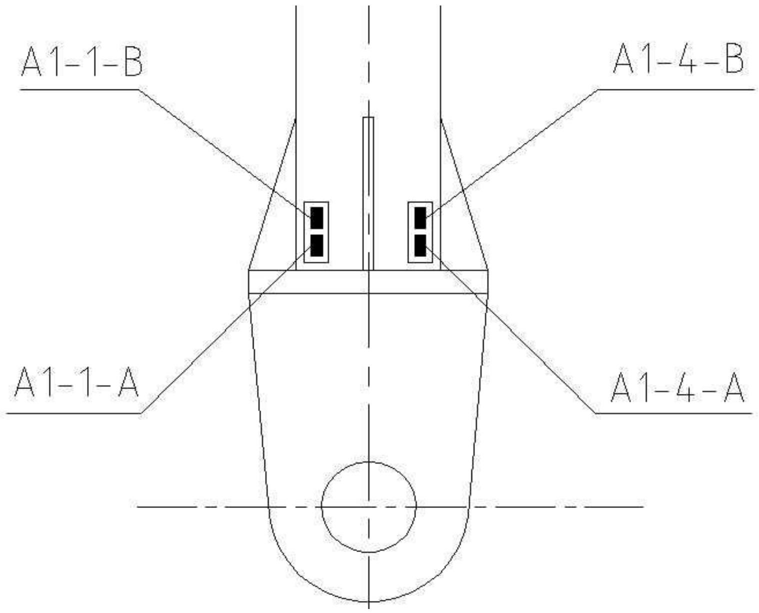


**Figure 4. The Distribution of Strain Gauges**

At the bottom of boom has four chords described with D1~D4. Each of them were arranged of three measuring point. Each measuring point also needs two strain gauges. The distribution of strain gauges at the bottom of boom chords shown in Figure 5. The number of strain gauges at each measuring point is the same as A-frame. The strain gauge near the weld marks for gauge A and away from the weld marks for gauge B.

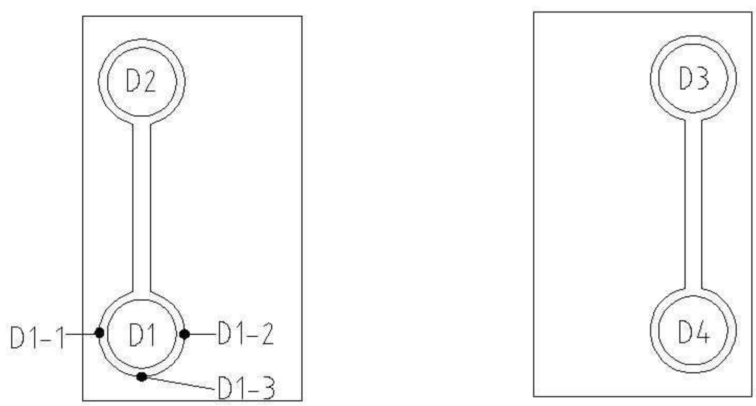


**Figure 5. The Number of Member Bars and Measuring Point at the Bottom of Boom Chord**

According the load record, hook load is mainly concentrated under 8 t and the number of lifting large tonnage load is very few. So large tonnage load is little impacted on the fatigue. According to the field test condition, the hook load is divided into 1t, 2t, 3t, 5t, 6.7t and 8.2t. The strain value of strain gauge is obtained according to the stress test. Based on linear extrapolation, hot spot stress at each point was instrumented with two strain gauges at distance 0.5t and 1.5t from the weld toe., where t is the thickness [8]. The test value of hot spot stress is summarized in Table 3.

 

**Table 3. The Test Value of Hot Spot Stress (Units: MPa)**

| | *1t* | *3t* | *5t* | *6.7t* | *8.2t* |
|---|---|---|---|---|---|
| A1-1 | 82.74 | 102.43 | 126.18 | 146.65 | 156.38 |
| A1-2 | 81.96 | 101.45 | 124.61 | 146.63 | 159.48 |
| A1-3 | 90.49 | 117.7 | 137.74 | 161.28 | 171.73 |
| A1-4 | 91.31 | 98.15 | 106.05 | 152.11 | 165.03 |
| A2-1 | 78.9 | 96.86 | 123.79 | 143.37 | 146.88 |
| A2-2 | 94.02 | 111.53 | 126.41 | 152.34 | 158.57 |
| A2-3 | 103.14 | 121.79 | 133.39 | 163.44 | 166.91 |
| A2-4 | 86.56 | 110.64 | 135.38 | 164.26 | 171.92 |
| A3-1 | 72.77 | 89.31 | 116.22 | 139.64 | 136.57 |
| A3-2 | 89.56 | 113.65 | 146.74 | 175.69 | 173.62 |
| A3-3 | 90.38 | 114.69 | 148.07 | 162.19 | 161.19 |
| A3-4 | 77.26 | 98.59 | 133.29 | 161.42 | 156.6 |
| A4-1 | — | — | — | — | — |
| A4-2 | 92.93 | 138.93 | 183.06 | 167.88 | 163.55 |
| A4-3 | 89.69 | 138.95 | 180.8 | 173.51 | 171.89 |
| A4-4 | 90.51 | 140.22 | 182.44 | 175.09 | 173.45 |
| D1-1 | 71.06 | 85.14 | 97.72 | 112.35 | 110.04 |
| D1-2 | 48.80 | 51.72 | 59.27 | 71.10 | 62.00 |
| D1-3 | — | — | — | — | — |
| D2-1 | 99.75 | 107.58 | 114.49 | 141.99 | 140.27 |
| D2-2 | 104.70 | 110.15 | 113.59 | 145.35 | 140.56 |
| D2-3 | 93.02 | 92.42 | 100.12 | 161.08 | 169.73 |
| D3-1 | 97.75 | 103.18 | 111.19 | 137.59 | 136.09 |
| D3-2 | 102.50 | 110.59 | 114.00 | 143.10 | 140.56 |
| D3-3 | 88.62 | 94.62 | 104.52 | 163.33 | 172.59 |
| D4-1 | 71.50 | 87.34 | 98.16 | 111.43 | 108.72 |
| D4-2 | 47.04 | 51.96 | 59.27 | 75.50 | 59.75 |
| D4-3 | 97.72 | 111.43 | 120.65 | 144.63 | 139.06 |

NOTE: "—" represent date missing

According to the filed usage record, more accurate statistics has been gathered to obtain practical cycles of the crane. The practical cycles of lifting load at all levers of the crane in service is presented in Table 4.

**Table 4. The Practical Cycles of Lifting Load at All Levers**

| tonnage | 1t | 3t | 5t | 6.7t | 8.2t |
|---|---|---|---|---|---|
| times | 14692 | 38325 | 17688 | 2379 | 2169 |

Theoretical cycles of the crane can be calculated by formula (1) according to the data of Table 3. The fatigue accumulating damage at each measuring point can be calculated by the theory of Miners linear accumulation. The fatigue accumulating damage of A-frame is shown in Table 5. And the fatigue accumulating damage of chords at the bottom of boom are shown in Table 6.

**Table 5. The Fatigue Accumulating Damage of A-frame**

| *point* | *Tonnage (t)* | *Hot spot stress (MPa)* | *practical cycles* | *Theoretical cycles* | *damage* | *accumulating damage* |
|---|---|---|---|---|---|---|
| A1-1 | 1T | 82.74 | 14692 | 2.575E+06 | 0.006 | 0.069 |
| | 3T | 102.43 | 38325 | 1.357E+06 | 0.028 | |
| | 5T | 126.18 | 17688 | 7.262E+05 | 0.024 | |
| | 6.7T | 146.65 | 2379 | 4.625E+05 | 0.005 | |
| | 8.2T | 156.38 | 2169 | 3.815E+05 | 0.006 | |
| A1-2 | 1T | 81.96 | 14692 | 2.650E+06 | 0.006 | 0.068 |
| | 3T | 101.45 | 38325 | 1.397E+06 | 0.027 | |
| | 5T | 124.61 | 17688 | 7.539E+05 | 0.023 | |
| | 6.7T | 146.63 | 2379 | 4.627E+05 | 0.005 | |
| | 8.2T | 159.48 | 2169 | 3.597E+05 | 0.006 | |
| A1-3 | 1T | 90.49 | 14692 | 1.969E+06 | 0.007 | 0.096 |
| | 3T | 117.7 | 38325 | 8.947E+05 | 0.043 | |
| | 5T | 137.74 | 17688 | 5.582E+05 | 0.032 | |
| | 6.7T | 161.28 | 2379 | 3.477E+05 | 0.007 | |
| | 8.2T | 171.73 | 2169 | 2.880E+05 | 0.008 | |
| A1-4 | 1T | 91.31 | 14692 | 1.916E+06 | 0.008 | 0.059 |
| | 3T | 98.15 | 38325 | 1.543E+06 | 0.025 | |
| | 5T | 106.05 | 17688 | 1.223E+06 | 0.014 | |
| | 6.7T | 152.11 | 2379 | 4.145E+05 | 0.006 | |
| | 8.2T | 165.03 | 2169 | 3.246E+05 | 0.007 | |
| A2-1 | 1T | 78.9 | 14692 | 2.970E+06 | 0.005 | 0.061 |
| | 3T | 96.86 | 38325 | 1.605E+06 | 0.024 | |
| | 5T | 123.79 | 17688 | 7.690E+05 | 0.023 | |
| | 6.7T | 143.37 | 2379 | 4.950E+05 | 0.005 | |
| | 8.2T | 146.88 | 2169 | 4.604E+05 | 0.005 | |
| A2-2 | 1T | 94.02 | 14692 | 1.755E+06 | 0.008 | 0.081 |
| | 3T | 111.53 | 38325 | 1.052E+06 | 0.036 | |
| | 5T | 126.41 | 17688 | 7.222E+05 | 0.024 | |
| | 6.7T | 152.34 | 2379 | 4.126E+05 | 0.006 | |
| | 8.2T | 158.57 | 2169 | 3.659E+05 | 0.006 | |
| A2-3 | 1T | 103.14 | 14692 | 1.330E+06 | 0.011 | 0.101 |
| | 3T | 121.79 | 38325 | 8.075E+05 | 0.047 | |
| | 5T | 133.39 | 17688 | 6.147E+05 | 0.029 | |
| | 6.7T | 163.44 | 2379 | 3.341E+05 | 0.007 | |
| | 8.2T | 166.91 | 2169 | 3.137E+05 | 0.007 | |
| A2-4 | 1T | 86.56 | 14692 | 2.249E+06 | 0.007 | 0.087 |
| | 3T | 110.64 | 38325 | 1.077E+06 | 0.036 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 5T | 135.38 | 17688 | 5.879E+05 | 0.030 | |
| | 6.7T | 164.26 | 2379 | 3.292E+05 | 0.007 | |
| | 8.2T | 171.92 | 2169 | 2.871E+05 | 0.008 | |
| A3-1 | 1T | 72.77 | 14692 | 3.786E+06 | 0.004 | 0.050 |
| | 3T | 89.31 | 38325 | 2.048E+06 | 0.019 | |
| | 5T | 116.22 | 17688 | 9.293E+05 | 0.019 | |
| | 6.7T | 139.64 | 2379 | 5.358E+05 | 0.004 | |
| | 8.2T | 136.57 | 2169 | 5.727E+05 | 0.004 | |
| A3-2 | 1T | 89.56 | 14692 | 2.031E+06 | 0.007 | 0.101 |
| | 3T | 113.65 | 38325 | 9.938E+05 | 0.039 | |
| | 5T | 146.74 | 17688 | 4.617E+05 | 0.038 | |
| | 6.7T | 175.69 | 2379 | 2.690E+05 | 0.009 | |
| | 8.2T | 173.62 | 2169 | 2.787E+05 | 0.008 | |
| A3-3 | 1T | 90.38 | 14692 | 1.976E+06 | 0.007 | 0.100 |
| | 3T | 114.69 | 38325 | 9.670E+05 | 0.040 | |
| | 5T | 148.07 | 17688 | 4.494E+05 | 0.039 | |
| | 6.7T | 162.19 | 2379 | 3.419E+05 | 0.007 | |
| | 8.2T | 161.19 | 2169 | 3.483E+05 | 0.006 | |
| A3-4 | 1T | 77.26 | 14692 | 3.163E+06 | 0.005 | 0.071 |
| | 3T | 98.59 | 38325 | 1.522E+06 | 0.025 | |
| | 5T | 133.29 | 17688 | 6.160E+05 | 0.029 | |
| | 6.7T | 161.42 | 2379 | 3.468E+05 | 0.007 | |
| | 8.2T | 156.6 | 2169 | 3.799E+05 | 0.006 | |
| A4-2 | 1T | 92.93 | 14692 | 1.818E+06 | 0.008 | 0.167 |
| | 3T | 138.93 | 38325 | 5.440E+05 | 0.070 | |
| | 5T | 183.06 | 17688 | 2.378E+05 | 0.074 | |
| | 6.7T | 167.88 | 2379 | 3.083E+05 | 0.008 | |
| | 8.2T | 163.55 | 2169 | 3.335E+05 | 0.007 | |
| A4-3 | 1T | 89.69 | 14692 | 2.022E+06 | 0.007 | 0.165 |
| | 3T | 138.95 | 38325 | 5.438E+05 | 0.070 | |
| | 5T | 180.8 | 17688 | 2.468E+05 | 0.072 | |
| | 6.7T | 173.51 | 2379 | 2.793E+05 | 0.009 | |
| | 8.2T | 171.89 | 2169 | 2.872E+05 | 0.008 | |
| A4-4 | 1T | 90.51 | 14692 | 1.967E+06 | 0.007 | 0.170 |
| | 3T | 140.22 | 38325 | 5.291E+05 | 0.072 | |
| | 5T | 182.44 | 17688 | 2.402E+05 | 0.074 | |
| | 6.7T | 175.09 | 2379 | 2.718E+05 | 0.009 | |
| | 8.2T | 173.45 | 2169 | 2.796E+05 | 0.008 | |

It can be seen from the table above that the fatigue accumulating damage of A4-4 is 0.170 higher than other points.

**Table 6. The Fatigue Accumulating Damage of Chords**

| *point* | *Tonnage (t)* | *Hot spot stress (MPa)* | *practical cycles* | *Theoretical cycles* | *damage* | *accumulating damage* |
|---|---|---|---|---|---|---|
| D1-1 | 1T | 71.06 | 14692 | 4.066E+06 | 0.004 | 0.035 |
| | 3T | 85.14 | 38325 | 2.364E+06 | 0.016 | |
| | 5T | 97.72 | 17688 | 1.563E+06 | 0.011 | |
| | 6.7T | 112.35 | 2379 | 1.029E+06 | 0.002 | |
| | 8.2T | 110.04 | 2169 | 1.095E+06 | 0.002 | |
| D1-2 | 1T | 48.80 | 14692 | 1.256E+07 | 0.001 | 0.008 |
| | 3T | 51.72 | 38325 | 1.054E+07 | 0.004 | |
| | 5T | 59.27 | 17688 | 7.007E+06 | 0.003 | |
| | 6.7T | 71.10 | 2379 | 4.058E+06 | 0.001 | |
| | 8.2T | 62.00 | 2169 | 6.122E+06 | 0.000 | |
| D2-1 | 1T | 99.75 | 14692 | 1.470E+06 | 0.010 | 0.070 |
| | 3T | 107.58 | 38325 | 1.172E+06 | 0.033 | |
| | 5T | 114.49 | 17688 | 9.721E+05 | 0.018 | |
| | 6.7T | 141.99 | 2379 | 5.096E+05 | 0.005 | |
| | 8.2T | 140.27 | 2169 | 5.286E+05 | 0.004 | |
| D2-2 | 1T | 104.70 | 14692 | 1.271E+06 | 0.012 | 0.074 |
| | 3T | 110.15 | 38325 | 1.091E+06 | 0.035 | |
| | 5T | 113.59 | 17688 | 9.955E+05 | 0.018 | |
| | 6.7T | 145.35 | 2379 | 4.750E+05 | 0.005 | |
| | 8.2T | 140.56 | 2169 | 5.253E+05 | 0.004 | |
| D2-3 | 1T | 93.02 | 14692 | 1.813E+06 | 0.008 | 0.055 |
| | 3T | 92.42 | 38325 | 1.848E+06 | 0.021 | |
| | 5T | 100.12 | 17688 | 1.453E+06 | 0.012 | |
| | 6.7T | 161.08 | 2379 | 3.490E+05 | 0.007 | |
| | 8.2T | 169.73 | 2169 | 2.983E+05 | 0.007 | |
| D3-1 | 1T | 97.75 | 14692 | 1.562E+06 | 0.009 | 0.063 |
| | 3T | 103.18 | 38325 | 1.328E+06 | 0.029 | |
| | 5T | 111.19 | 17688 | 1.061E+06 | 0.017 | |
| | 6.7T | 137.59 | 2379 | 5.601E+05 | 0.004 | |
| | 8.2T | 136.09 | 2169 | 5.788E+05 | 0.004 | |
| D3-2 | 1T | 102.50 | 14692 | 1.355E+06 | 0.011 | 0.073 |
| | 3T | 110.59 | 38325 | 1.078E+06 | 0.036 | |
| | 5T | 114.00 | 17688 | 9.846E+05 | 0.018 | |
| | 6.7T | 143.10 | 2379 | 4.978E+05 | 0.005 | |
| | 8.2T | 140.56 | 2169 | 5.253E+05 | 0.004 | |
| D3-3 | 1T | 88.62 | 14692 | 2.096E+06 | 0.007 | 0.058 |
| | 3T | 94.62 | 38325 | 1.722E+06 | 0.022 | |
| | 5T | 104.52 | 17688 | 1.278E+06 | 0.014 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 6.7T | 163.33 | 2379 | 3.348E+05 | 0.007 | |
| | 8.2T | 172.59 | 2169 | 2.838E+05 | 0.008 | |
| D4-1 | 1T | 71.50 | 14692 | 3.991E+06 | 0.004 | 0.037 |
| | 3T | 87.34 | 38325 | 2.190E+06 | 0.018 | |
| | 5T | 98.16 | 17688 | 1.542E+06 | 0.011 | |
| | 6.7T | 111.43 | 2379 | 1.054E+06 | 0.002 | |
| | 8.2T | 108.72 | 2169 | 1.135E+06 | 0.002 | |
| D4-2 | 1T | 47.04 | 14692 | 1.402E+07 | 0.001 | 0.008 |
| | 3T | 51.96 | 38325 | 1.040E+07 | 0.004 | |
| | 5T | 59.27 | 17688 | 7.007E+06 | 0.003 | |
| | 6.7T | 75.50 | 2379 | 3.389E+06 | 0.001 | |
| | 8.2T | 59.75 | 2169 | 6.838E+06 | 0.000 | |
| D4-3 | 1T | 97.72 | 14692 | 1.563E+06 | 0.009 | 0.076 |
| | 3T | 111.43 | 38325 | 1.054E+06 | 0.036 | |
| | 5T | 120.65 | 17688 | 8.307E+05 | 0.021 | |
| | 6.7T | 144.63 | 2379 | 4.822E+05 | 0.005 | |
| | 8.2T | 139.06 | 2169 | 5.425E+05 | 0.004 | |

It can be seen from the table above that the fatigue accumulating damage of D4-3 is 0.076. it's higher than other points of the chord. But it's lower than the point of A4-4. So A4-4 measure point is the most dangerous place.

Which means that the crane's largest fatigue accumulating damage reached 0.170 in the past 7 years. Therefore, the fatigue life of crane is 7/0.170 = 41 a. According to the rule of API RP 2A, the design fatigue life of each joint should be at least twice the intended service life of the structure (*i.e.,* Safety Facter = 2.0) [9]. So the residual life of the crane is（41-7）/2=17 a.

## 5. Conclusion

(1) The dangerous zone of the offshore platform lattice crane is the weld at the bottom of A-frame and boom chord. These areas are most easy to produce fatigue crack. The stress test should stick strain gauges on these areas. Daily maintenance should also focus on these parts of the crane.

(2) This paper provides a method to evaluate fatigue life of offshore platform lattice crane. And successfully applied to one crane at the Bohai Sea. The residual life of the crane is 17 years.

## Reference

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