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Amplitude inspection of the large crawler crane without the marker of turning center

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Abstract

According to the inspection requirement of monitoring and management system for large lifting machinery in the national safety technical specification, safety monitoring and management system should be installed for crawler crane with a capacity of more than 100 tons. There is an inspection requirement for the amplitude accuracy of the crawler crane. It requires that the sensors should be tested accurately during operation and within the allowable range of the operation instructions. However, it is difficult to find the turning center of the crane without the marker of turning center on the spot. The revolving center is covered by the end cover, etc. because the crawler crane has been installed. Therefore, it is necessary to consider other ways to test the relevant parameters. In this paper the method is to make the best of the technical and precision advantages of the total station, and give priority to select the instrument for on-site testing, so as to obtain the key amplitude plane and turning center level. The amplitude is calculated by MATLAB programming, and more accurate measurement values are obtained. This method is universal in use, which can thoroughly solve the problem that the amplitude of large equipment cannot be detected, and the accuracy is relatively high.
Keywords: Slewing Cranes, Safety Monitoring and Management system, Amplitude inspection

Fig. 1. the crawler crane

Fig. 2. Determining the measuring points of the crawler crane

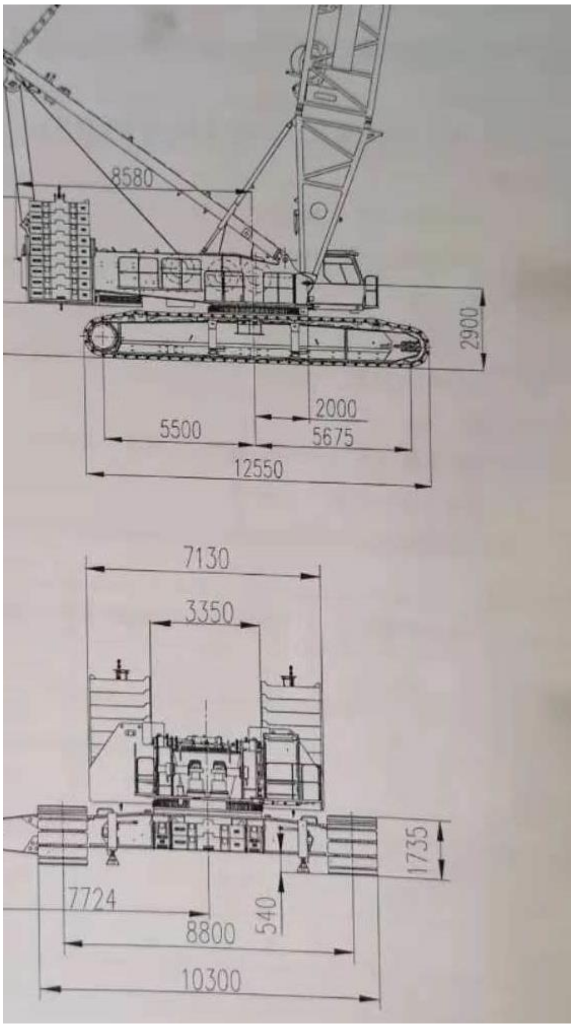

Fig. 3. Geometric dimension data of side steel structure of the crawler crane

1. Obtaining geometric dimension data of side steel structure based on instructions.

2. Determining the measuring points of ①,②,③,④.

3. Gauging data of measuring points ①,②,③,④ & Lifting point with total station.

A=[14.0748,36.4558,5.2339] of point ①

B=[14.0740,36.4562,5.6192] of point ③

C=[13.4379,37.4143,5.2236] of point ②

4.From the content of spatial analytic geometry, we know that the determinant of D equals zero, which is a plane equation, D=[ones(4,1),[[x,y,z];①;②;③]].

5. Creating a symbolic matrice

detd=det(D);

6. Getting the coefficients of geometric equation

G = coeffs(detd);

7. Coefficient assignment

a=G(4)

b=G(3)

c=G(2)

d=G(1)

8. Solving the Normal Vector of a Plane Passing Points of ① & ③

a1=[(A(1)-B(1)) (A(2)-B(2)) (A(3)-B(3))]

b1=[a b c]

c1=cross(a1,b1);

9. Solving the amplitude from point to plane by Point of ① & the Normal Vector.

References

1 **https://www.mathworks.com/help/matlab/index.html**.

2 **Leica Total Station User's Manual.**