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MODIFIED SHORT RUN CONTROL CHARTS APPLIED TO EQUIPMENTS CONTROL IN EARLY LIFE CYCLE

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ABSTRACT

An online monitoring could be a support to condition based maintenance system. On online monitoring two stages can be considered: at first we should decide which equipment or component are important to study and the system of data collection, and at second stage the methodology for the data treatment should be established. Because there is lack of data for the equipment under study the non-dimensional Quensenberry (Q) Modified Control Charts will be applied. The equipment under study is a diesel generator engine. A parameters database will be built with the temperature of cool water and lube oil data collection. This technique will allow knowing the equipment state online and at the instant of observation. So it will allow an early detection of a probable failure even with the lack of data.

Keywords: control charts, Quensenberry, condition maintenance, online monitoring.

INTRODUCTION

There are various maintenance management systems that can be applied to preserve the equipment operability. In this article condition based maintenance (CBM) based on an online equipment monitoring will allow the right intervention at the right moment. The Statistical Equipment Control (SEC) can be used to control equipment stability. In this article a modified Quesenberry control chart (Q), or short run control chart, will be used to put in practice an online equipment monitoring. When the data is insufficient to estimate the equipment parameters, because the results are not reliable, we propose the Q charts to condition monitoring considering the X characteristic continuous which is transformed on Q.

METHODOLOGY AND RESULTS

The Q characteristic on instant r is:

$$Q_r(X_r) = \Phi^{-1}\left(G_{r-2}\left(\sqrt{\frac{r-1}{r}}\left(\frac{X_r - (T_L)_{r-1}}{S_{r-1}}\right)\right)\right),\ r = 4,5,\ldots \tag{1}$$

Because the equipment under study was in good functioning condition when the data was collected, we will simulate data with anomaly on MATLAB and then apply the modified Q control chart. A possible methodology using the Q charts can be as shown in figures 1 and 2.

Applying the described methodology, observing the Q chart we can see that on observation nr 20 we need an investigation on the system, because 5 consecutives observations were above the AL, and on 25 observation we need and intervention procedure.

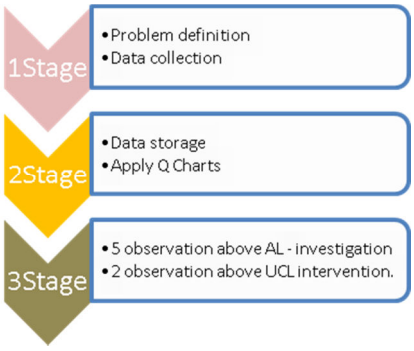

Fig. 1 - Methodology to apply Q charts

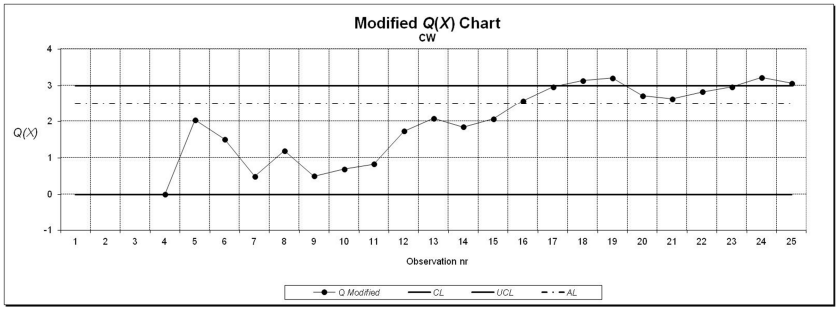

Fig. 2 - Modified Q Charts apply to diesel generator - cool water sensor

CONCLUSION AND RECOMMENDATION

By applying these charts we can monitor the system or equipment sense the first moment. This study shows that online condition is probably possible to be applied to diesel generators using the short run control charts to data statistical treatment. By applying this statistical methods may allow the cost maintenance decrease. Applying these charts can be considered a first method, when it is possible, charts with two phases should be applied.

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