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DEVELOPING OF QUALITY CONTROL SYSTEM FOR CEMENT MANUFACTURING USING SOFTWARE TECHNIQUES

(Case Study: ALSALAM Cement Factory)

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A thesis Submitted as Partial Fulfillment for the Requirements of a Master Degree in Mechanical Engineering (Production)

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ABSTRACT

The cement material is considered to be one of a great importance in different aspects of building development projects and as a commodity for export and investment. Accordingly, the product should be identical to the standard specification within manufacturing stages to ensure quality. Also, it is necessary to compete with other products of other factories spreading all over the world.

This research is focusing on creating a system that monitors and records daily readings of the cement physical tests at quality laboratories of cement factory and accordingly the control charts for each test were established.

The importance of control charts for the variables lies in the expression of the system status (inside or outside the control limits); normally the points which are located outside the borders indicate that the system is out of control. But in some cases, the points are within the control limits but took an abnormal distribution. These abnormal distribution cases can be classified into eight models include an increasing pattern, decreasing pattern, systematic pattern, stratification pattern, mixture pattern, freak pattern, gradual change pattern and the sudden shift pattern.

First, the system determines the style of pattern type, analyze and then find out the expected causes and suggest the solutions. The system was tested by inserting different records in different intervals of time; the results obtained were reasonable and had explained the effectiveness of the system.

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تعتَبَر مادّةَ الإسمنتَ ذات أهمية كبرى في المجالاتِ المختلفةِ مِنْ مشروعاتِ التنمية العمرانيةِ وكسلعة جاذبة للتصديرِ والإستثمارِ. وعليه يجب على المنتج ان يكون مطابقاً للمواصفات القياسية خلال مراحل الانتاج للتأكد من سلامة الجودة . أيضاً، تعتبر ضرورية للتَنَافُس مع المُنتَجاتِ الأخرى للعديد مِنْ المصانعِ المنتْشرةُ في جميع أنحاء العالم.

هذه الأطروحة تهتم بإنشاء نظام يعمل على رصد وتسجيل القراءات اليومية للتجارب الفيزيائية للأسمنت بمعامل الجودة، وعلى ضوء هذه القراءات يتم انشاء خرائط الرقابة لكل اختبار.

تكمن أهمية خرائط الرقابة للمتغيرات في التعبير عن حالة النظام (من حيث الحدود العليا والدنيا للرقابة)، في العادةِ النقاط التي تقع خارج الحدود تشير الى أن النظام خارج الرقابة . لكن هناك بعض الحالات تكون النقاط داخل حدود الرقابة ولكنها تأخذ توزيعاً غير طبيعياً. تم تصنيف هذه الحالات الى ثمانية نماذج تشمل نمط متزايد، نمط متناقص،نمط نظامي، نمط تطبقي ،نمط خليط، نمط ذو نزوات،نمط ذوتغير تدريجي ونمط ذو تغير مفاجئ.

في البدء يعمل النظام على تحديد نوع النمط و من ثم تحليله وتوقع اسباب حدوثه واقتراح الحلول. تم اختبار النظام بادخال سجلات مختلفة لفترات زمنية مختلفة ، و قد كانت النتائج التي تم الحصول عليها منطقية الى حدٍ كبير وأوضحت مدى فاعلية النظام.

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