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Quality and process improvement using lean six-sigma methodology

تحسين جودة العمليات بلستخدام منهجية تقليل الهدر 6 سيجما

Thesis submitted in Partial fulfillment of the requirements for the master degree of science in mechanical engineering (production)

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DEDICTION

TO MY PARENT .....

TO MY FAMILY & MY FRENDS

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ABSTRACT

Lean Six Sigma method is recognized widely depend, basically on increasing the benefits without increase in cost and has been implemented predominately in manufacturing industry. This research draws attention to the adoption of Lean Six Sigma in the bullet factory standard (7.62×39)mm, in al shagara industrial complex with a case study. The combination of Lean tools and Six Sigma methodology is used on projects to improve the process by eliminating the variations and creating workflow in a process. Some important tools are used like Pareto chart , failure modes and effect analysis ,fish bone diagram , fault tree analysis and value stream mapping ,according to voice of process and voice of customer, A new modifications in Trimming stage was proposed and practically tested and successfully implemented in the stage . The first modification is adding cover to separate between chips and products the result indicate that the sorting time was reduced from 50min to 15 min. Also the other modification is adding bearing between knife holder and rod , this reduce the defect by 2.5%.

تجريد

يعتبر نظام تقليل الهدر نظام معترف به على نحو واسع ، إذ انه يعتمد بشكل أساسي على تحقيق زيادة في العوائد من غير زيادة التكلفة و تم تطبيقه على القطاع الصناعي بشكل سائد . و تم استخدام أدوات النظام بالعمليات بورشة إنتاج المقذوف للعيار (7.62×39)ملم بمجمع الشجرة الصناعي. ومجموعة الأدوات المرنة لنظام تقليل الهدر هي منهجية تستخدم في المشاريع لتحسين العمليات بإزالة العوائق التي تسبب الانحرافات و خلق انسيلب جيد للعمليات .ومن أهم الأدوات التي تم استخدامها في هذه الدراسة هي مخطط باريتو ، و تحليل تأثيرات نمط الفشل ، مخطط عظم السمكة ، تحليل شجرة الأعطال وجدول تحليل القيمة ، و استنادا على صوت العميل و صوت العمليات .وقد تم اقتراح و تنفيذ

تعديلين على مرحلة القطع ، و التعديل الأول هو إضافة حاجز في ماكينة القطع بحيث يفصل الرايش عن المنتج ومن نتائج هذه التعديلات تقليل زمن فرز المنتجات قبل مرحلة السلب من (50 إلى 15) دقيقة ، و التعديل الآخر هو إضافة حوامل بين حامل السكين و عمود حامل السكين قد أدى لتقليل التالف بنسبة 2.5 % .

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ABBREVATIONS

DMAIC	Define, Measure, Analyze, Improve and Control
SIPOC	Suppliers, Input, Process, Output, and Customers
CTQ	Critical To Quality
DPMO	Defects Per Million Opportunities
GE	General Electric
VSM	Value Stream Mapping
COPQ	Cost Of Poor Quality
RTY	Rolled Throughput Yield
FTY	First Time Right
FTA	Fault "Tree" Analysis
FMEA	Failure Mode Effect Analysis
DET	Detection
SEV	Severity

OCC	Occurrence
RPN	Risk of Priority Number
KPOV	Key Process Output Variables
KPIV	Key Process Input Variables
USL	Upper specification Limit
LSL	Lower specification Limit