

Manufacturing Engineering Processes

أختيار العمليات الهندسيه للتصنيع

By

Dr Ali M Al Samhan

(Prof, Industrial Engineering Department, KSU),

and

Dr. Saied Darwish

(Prof, Industrial Engineering Department, KSU)

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King Saud University,

College of Engineering, Industrial Engineering Department, P.O.Box 800, Riyadh 11421, Saudi Arabia.
Tel 00966-1-4673367 – Fax 00966-1-4678657

PREFACE

In industrial production a considerable number of different processes or manufacturing methods are used to manufacture a product. For example, bolt production requires cold drawn rod as raw material for screw making machineries, which is the product output of cold drawn rod process. Furthermore, bolt head is formed to hexagonal shape then thread forming the bolt body by screw making machinery. Zinc plating or black coating process is processed on the bolt to provide corrosion resistance. Hence, a number of processes are involved to get out the bolt product. This production procedure is common for any product available in the market. Furthermore, bolt material can be metallic (e.g. carbon steel, stainless steel, brass, etc.) or non metallic materials like plastics.

The processes selection and material for any product is assigned by engineer (e.g. industrial engineer). For example, stainless steel bolt can be used to assemble product subjected to corrosion media e.g. water pump product. High carbon steel bolts can be used to assemble machinery subjected to high load e.g. mechanical presses. Hence, to be able to select technical and economical best manufacturing processes sequence and assigning the suitable material for a given product, it is necessary to have a broad fundamental knowledge of the possibilities and limitations of various manufacturing processes and materials.

Furthermore, different machine capacities can be used to manufacture a product. Selecting the suitable machine capacity requires estimating the manufacturing load, which is part job of industrial engineers. Moreover, load estimation is also required by mechanical engineer to design the production machinery.

This book will try to provide a broad knowledge of different manufacturing processes and load estimation for common metal forming processes. It also provide introduction on welding and casting process technologies. The present book is intended for undergraduate students at engineering colleagues as well as practicing engineers.

ملخص عربي

في الإنتاج الصناعي هناك عدد لا يستهان به من العمليات المختلفة أو طرق التصنيع التي يمكن استخدامها لتصنيع منتج معين. فعلي سبيل المثال فإن إنتاج مسمار يتطلب استخدام عمود مسحوب علي البارد (ناتج عن عملية سحب الأعمدة علي البارد) كمادة أولية لماكينة تصنيع القلاووظ. واثناء عملية التصنيع تشكل راس المسمار بالشكل السداسي لعد ذلك يتم قطع أسنان القلاووظ علي ماكينة تصنيع القلاووظ. بعد انتهاء عملية التصنيع يتم دهان المسمار باللون الأسود أو تغطيته بطبقة من الزنك لحمايته من الصدأ. وبذلك نري انه قد تم استخدام عدد من العمليات لإنتاج المسمار. واكثر من ذلك فان مادة المسمار قد تكون من الصلب الكربوني ، او الصلب الذي لا يصدأ أو من مادة غير معدنية مثل البلاستيك وهذا التسلسل الإنتاجي يعتبر طبيعي لأي منتج متوفر في الأسواق.

ان اختيار مواد التصنيع وعمليات التصنيع لأي منتج يقوم بها المهندس الصناعي. فمثلا يختار المهندس الصناعي مسمار من الصلب الذي لا يصدأ لتجميع منتج يعمل في وسط يؤدي إلى الصدأ مثل مضخة مياه. ويختار مسمار من الصلب عالي الكربون لتجميع ماكينة معرضة للأحمال العالية مثل المكابس الميكانيكية. وبالتالي لكي يستطيع المهندس الصناعي اختيار افضل طريقة للتصنيع بناء علي النواحي الفنية والاقتصادية وتحديد افضل تسلسل لعمليات التصنيع و اختيار انسب المواد لتصنيع المنتج فمن الضروري لهذا المهندس امتلاك قاعدة واسعة من المعلومات عن مزايا وواجه القصور لعمليات التصنيع والمواد المختلفة. بالإضافة الي ذلك تتوفر ماكينات التصنيع بقدرات مختلفة لإنتاج منتج معين. أن اختيار الماكينة ذات القدرة المناسبة يتطلب تقدير مبدئي للحمل المطلوب وهذا العمل من واجبات المهندس الصناعي أيضا. كذلك يحتاج المهندس الميكانيكي تقدير الأحمال حتى يتثني له تصميم الماكينات.

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