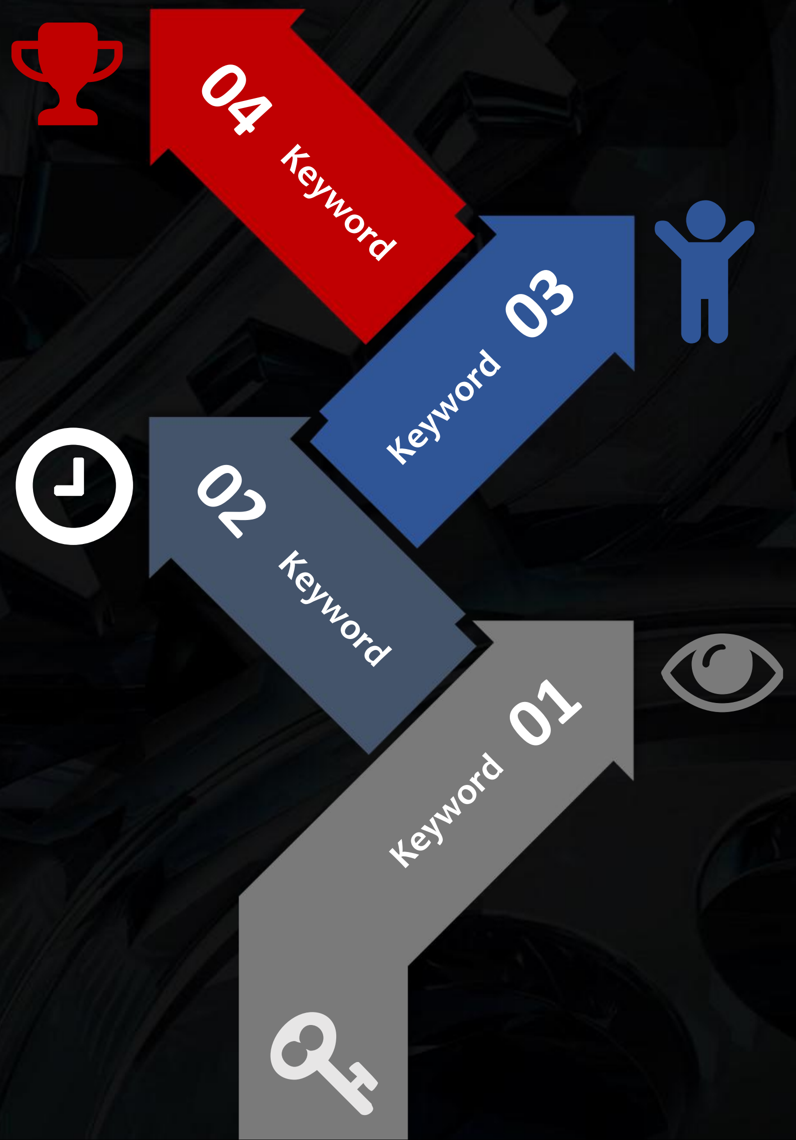
BULK FORMING PROCESSES

TULIS JUDUL DISINI

Sub Judul Disini



Introduction

Klasifikasi Proses Deformasi

Bulk Deformation Processes

Case Study

INTRODUCTION

The shaping of metal by deformation is as old as recorded history. The Bible, in the fourth chapter of Genesis, introduces Tubal-cain and cites his ability as a worker of metal. While we have no description of his equipment, it is well established that metal forging was practiced long before written records. Processes such as rolling and wire drawing were common in the Middle Ages and probably date back much further. In North America, by 1680 the Saugus Iron Works near Boston had an operating drop forge, rolling mill, and slitting mill.

Although the basic concepts of many forming processes have remained largely unchanged throughout history, the details and equipment have evolved considerably. Manual processes were converted to machine processes during the Industrial Revolution. The machinery then became bigger, faster, and more powerful. Water wheel power was replaced by steam and then by electricity. More recently, computer-controlled, automated operations have become the norm.

KLASIFIKASI PROSES DEFORMASI

Poin-Poin

Primary

Reduce a cast material into intermediate shapes, such as slabs, plates or billets

Contoh : Casting

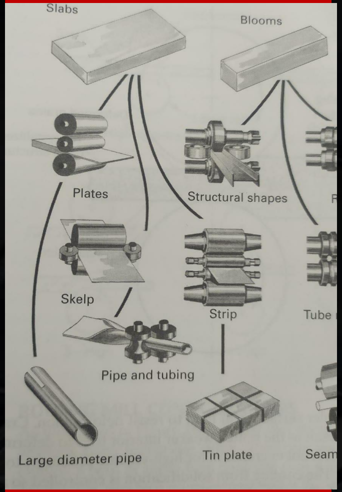
Secondary

Further convert shape from primary process into finished or semifinished products

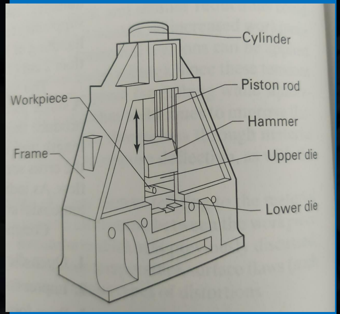
Contoh: Bulk Manufactuing (Rolling, Forging, Drawing)

BULK DEFORMATION PROCESS

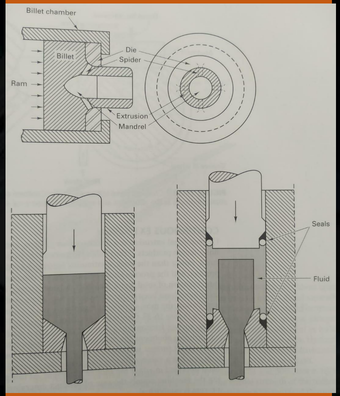
Rolling



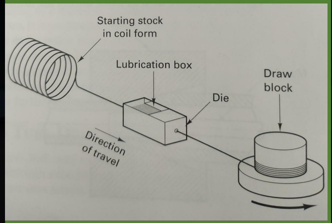
Forging



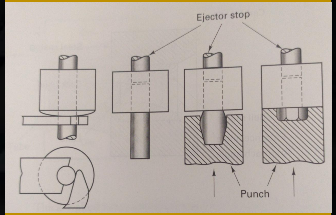
Extrusion



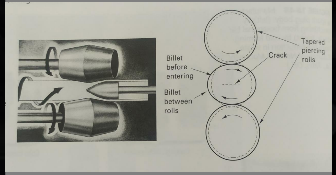
Wire, rod and tube drawing



Cold forming, cold forging, Impact extrusion



Piercing

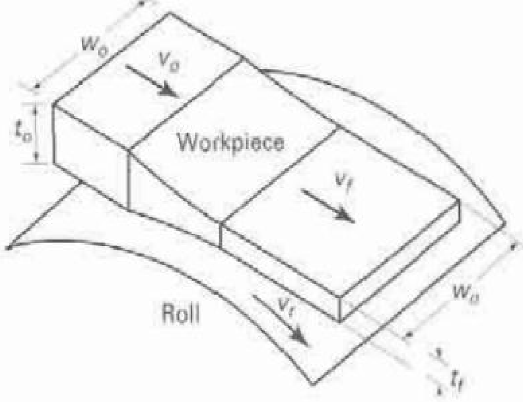


In all bulk forming process, the primary deformation stress is compression. This may be applied directly by tools or dies that squeeze the workpiece or indirectly as in wire drawing, where the workpiece is pulled in tension but resisting die generates compression in the region undergoing deformation.

CASE STUDY

es.

FIGURE 16-B Strip rolling where the width of the strip remains unchanged. The lines across the workpiece block the area of contact with the rolls. The top roll has been removed for ease of visualization.



Handle and Body of a Large Ratchet Wrench

Figure 15-A has already presented the handle and body segment of a relatively large ratchet wrench, such as those used with conventional socket sets. The design specifications require a material with a minimum yield strength of 50,000 psi and an elongation of at least 2% in all directions. Additional consideration should be given to weight minimization (because of the relatively large size of the wrench), corrosion resistance (due to storage and use environments), machinability (if finish machining is required), and appearance.

1. Based on the size and shape of the product, describe several methods that could be used to produce the component. For each method, briefly discuss the relative pros and cons.
2. What types of engineering materials might be able to meet the requirements? What would be the pros and cons of each general family?
3. For each of the shape generation methods in question 1, select an appropriate material from the alternatives discussed in question 2, making sure that the process and material are compatible.
4. Which of the combinations do you feel would be the "best" solution to the problem? Why?
5. For this system, outline the specific steps that would be required to produce the part from reasonable starting material.
6. For your proposed solution, would any additional heat treatment or surface treatment be required? If so, what would you recommend?
7. If a variation of this tool were to be marketed as a "safety tool" that could be used in areas of gas leaks where a spark might be fatal, how would you modify your previous recommendations? Discuss briefly.

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