



Manufacturing Challenge # 2

Bone replacements

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E X E R C I S E S I N M O D E R N M A N U F A C T U R I N G

Introduction

The story goes,

*Humpty dumpty sat on a wall
Humpty dumpty had a great fall
All the King's horses
And all the King's men
Couldn't put Humpty together again*

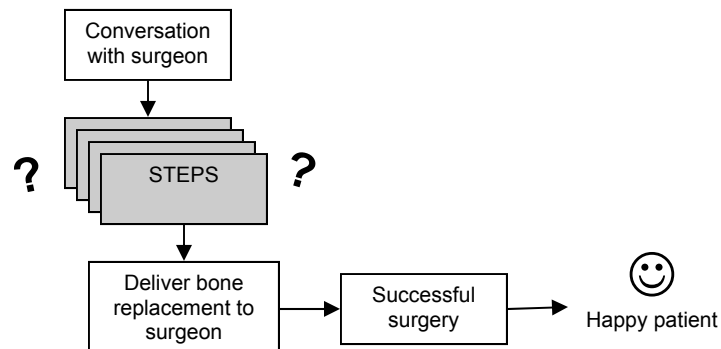
But, then again, this story happened before we had modern medical manufacturing. People who work in medical manufacturing create products to help others with medical problems (like broken bones) and also create the tools and materials that doctors use. One example is the manufacturing of bone replacements and the parts to hold them in place.

What if Humpty dumpty could have receive a shell replacement from a medical manufacturer?

Now, let's consider a more possible scenario. Imagine you work at a medical manufacturing plant. Your support the work of real brain surgeons that help patients repair bone loss from head injuries (like when someone crashes on a motorcycle without a helmet).

The Task

1. Brainstorm about what are the characteristics of our bones and what types of materials are more similar to bones. (*Tip: Look for objects around your house or classroom.*)
2. Outline or draw a flowchart of the most critical steps you would follow to make and deliver a bone replacement to the surgeon. (*Tip: Consider, at least, 5 steps.*)



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Resources

What is a CAT scan? Visit this website for an explanation: <http://www.colorado.edu/physics/2000/tomography/>

CT Scan a definition— http://my.webmd.com/hw/health_guide_atoz/hw233596.asp

The Process

Complete the suggested tasks and formulate your solution to this challenge. When you are ready, click on **SOLUTION** and complete the information requested. You may then compare your proposed solution to how a real manufacturing company in Florida responded to this challenge. You will be able to see a virtual tour of the plant and participate in a follow-up discussion board.

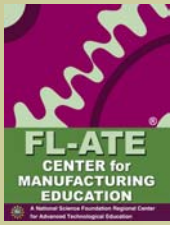
Physical Visits: In case you are participating in a physical tour to this plant, we encourage you to complete this exercise ahead of time, in order to get the most out of your visit. If no tours have been scheduled to this plant, share this information with your instructor and ask him/her to contact us to arrange for a local tour.

Evaluation

1. Compare your own ideas against a case study of how a real manufacturing company responded to the same challenge.
2. If you complete this exercise in class, compare your responses with your peers and ask for your teacher's input.

Conclusion

You have completed a simulated exercise in modern manufacturing decision-making. Did you enjoy this? Is manufacturing an area you may be interested in pursuing a career? Check out additional challenges and resources in our website.



Manufacturing Challenge # 2

A Solution

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EXERCISES IN MODERN MANUFACTURING

Solution from an actual manufacturer

We visited a medical manufacturer in Jacksonville, Florida, [Lorenz Surgical](#), to learn how they design and manufacture bone replacements and titanium hardware to fit it in place. This is the [custom manufacturing](#) (see definition) process they follow.

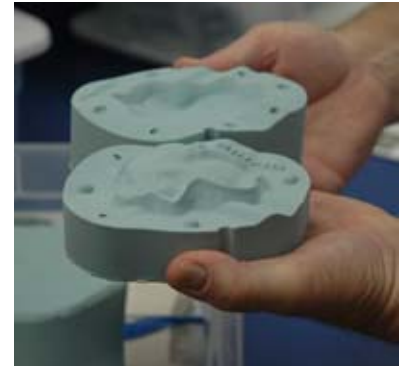


Patients get a CAT scan from their head. A "Computed Axial Tomography" is the process of using computers to generate a three-

dimensional image from flat (two-dimensional) x-ray pictures.



The data from the CAT scan is used to create a real-size model of the patient's skull.



Technicians create a mold for the bone replacement.



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The new implant is fitted to the model.



The final product, including titanium plates and screws, is ready to be sent to the surgeon.

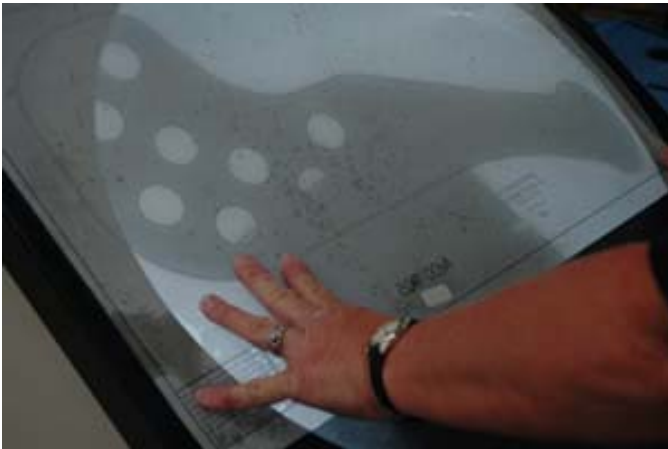


Manufacturing Challenges *Notes for Instructors* WWW.FL-ATE.ORG



EXERCISES IN MODERN MANUFACTURING

IMAGES FOR OTHER LEARNING TASKS RELATING TO DESIGN & PRODUCTION PROCESSES



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Manufacturing Challenges *Tutorials*

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Tell me about...

Custom Manufacturing

Definition

There are three ways to manufacture a product: custom manufacturing, intermittent manufacturing and continuous manufacturing.

Custom manufacturing is used when products need to be made for a specific customer with unique specifications (like a bone replacement) or when only a few products are required (like space vehicles). Because they are special ordered, it may be more timely and expensive to produce. The people who make these products are highly specialized.

Example

If you are producing...



A unique coin that will be given as a gift from the President of the United States to the President of another country, you will very likely use a **custom manufacturing process**.



A one-time commemorative coin, you will very likely use an **intermittent manufacturing process**. Once you are done with the order, you will continue producing your regular coins.



All the coins that are used by everyone on a daily basis, you will very likely use an **continuous manufacturing process**.

See [Manufacturing Challenge # 2 \(Bone replacement\)](#).



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EXERCISES IN MODERN MANUFACTURING

Company Information Sheet

Walter Lorenz Surgical, Inc.

1520 Tradeport Drive
Jacksonville, Florida 32218
Voice 800-874-7711
www.lorenzsurgical.com



Manufacturing – Walter Lorenz Surgical, Inc. manufactures a complete range of products to repair problems with bones in the skull, face, and jaws. They also create titanium plates and screws to attach their products, as well as a complete line of instruments for surgical procedures.

