

Manufacturing Challenges

***Learning exercises in
Modern manufacturing***

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A note for Teachers

This document contains examples of prototype learning materials for high-school students and teachers, like you.

The enclosed *manufacturing challenges* form part of FL-ATE's outreach efforts to facilitate a connection between the your classroom and the manufacturing practices in the State of Florida. They are intended to be used in conjunction with our sponsored tours (on-site or virtual) to diverse manufacturing plants.

We hope that these activities and materials will add value to your teaching.

Please send any additional feedback or ideas to:

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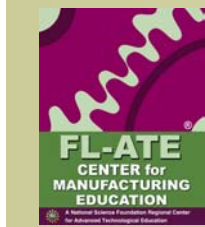


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Manufacturing Challenge # 1

Luxury Coaches

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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

Congratulations, you have been selected to join a team to design and manufacture the interiors of luxury coaches! Four custom designed coaches are needed by the end of each month. The first one will be build for the president of NASCAR racing. You will be provided with new coaches, which have been totally stripped on the inside. We are counting on you!

The Task

1. Analyze your client's basic design requirements. (See note from client)
2. Sketch a preliminary coach layout that responds to your client's needs. Are your ideas safe? Feasible?
3. What talents you need to bring on board to make these coaches a reality? (Specify job functions such as welders, mechanics, painters, engineers, etc.)
4. Considering that you need to produce four coaches in a month, how would you organize the production process?

The Process

Review the Design Briefs and formulate your solution to this challenge. When you are ready, click on **SOLUTION** and complete the information requested. You may then compare you 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 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 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 you 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.



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Manufacturing Challenge # 1

Custom Coaches

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EXERCISES IN MODERN MANUFACTURING

A note from your client

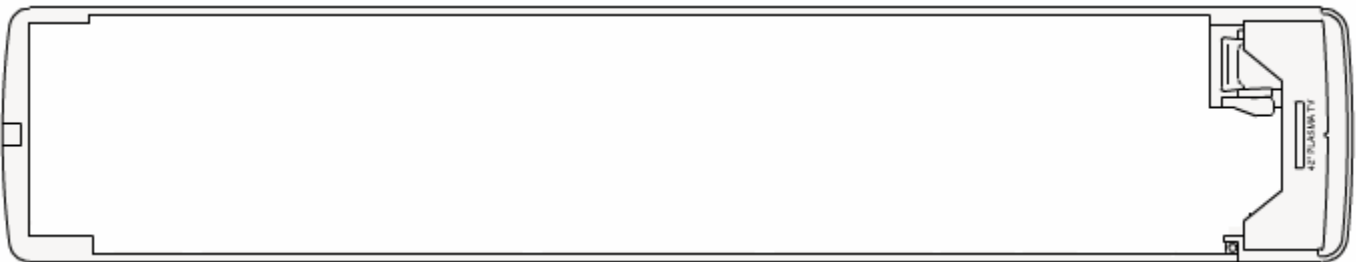
Hello,
Thank you for accepting this challenge. This coach is very important for me. I spend more than seven months of a year on the road. I am tired of hauling my things from hotel to hotel, so I need a coach that has everything I need. I entertain people, I do business and I rest. Here are some specific requests:

- Private bedroom with a Queen bed (I am a tall and heavy guy). Make sure I have plenty of room to move around!
- Meeting area that seats, at least, 5 people comfortably (get me a nice leather sofa and chairs)
- Plenty of closet space
- Laundry area (washer/dryer)
- Full bath with shower
- Full kitchenette (counter top, sink, microwave, refrigerator, stove)
- Office space with telephone, fax and printer connections
- Wi-Fi Internet connection
- Hi-line stereo and surround sound system
- Marble and carpet flooring
- Get me a big plasma TV for the bedroom

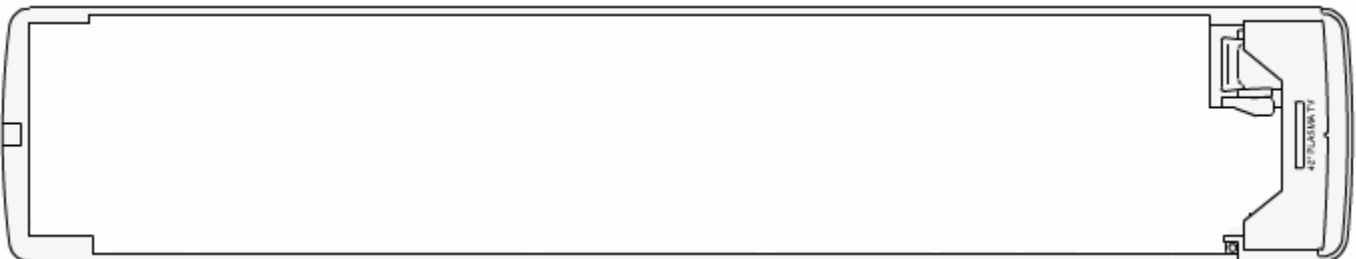
Design Sketches

Given the client needs, how would you distribute the space inside the coach? Make your sketches below.

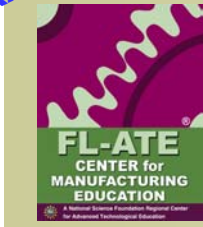
Sketch 1



Sketch 2



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Manufacturing Challenges *Notes for Instructors*

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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

We are pleased that you are reviewing this educational resource. The activities presented are intended to increase your student's awareness and interests in the field of manufacturing and all the careers it represents. As Florida's Advanced Technological Center, a National Science Foundation sponsored project, we are charged to focus on manufacturing education in our state. We welcome you to take advantage of your services and resources. To find more about us, visit our website at WWW.FL-ATE.ORG.

Learning Options

This activity can be completed in several ways: (a) as a class exercise prior to a physical tour to manufacturing plants in your area, (b) as a class exercise prior to sending your learners to explore our virtual tours or (c) as independent study. If

interested in a physical tour to a manufacturing plant, please contact us and we would be glad to facilitate the activity. During 2004-2005, almost 600 students have already participated in our physical tours!

Our Challenges are based on a discovery learning model that encourages students to assume roles, research information, propose ideas and compare their proposals to real case studies of manufacturing industries in the State of Florida. For its ease of use and wide-spread adoption, we have followed the structure of a Web-Quest, an inquiry-oriented methodology proposed by Dr. Bernie Dodge at San Diego State University (for additional information visit <http://webquest.sdsu.edu>)



Alignments with Science and Technology Standards

Exercises in Modern Manufacturing are aligned with the Florida's Sunshine State Standards for Science and the Curriculum Framework for Technology Education. The Standards being addressed are listed in the following page.



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Manufacturing Challenges Notes for Instructors

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EXERCISES IN MODERN MANUFACTURING

SCIENCE STANDARDS ADDRESSED

Standard 3:

The student understands that science, technology and society are interwoven and interdependent. (SC.H.3.4)

2. knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.

6. knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.

TECHNOLOGICAL LITERACY STANDARDS ADDRESSED

01.0 Demonstrate an understanding of the characteristics and scope of technology.

02.0 Demonstrate an understanding of the core concepts of technology.

03.0 Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.

04.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.

09.0 Demonstrate an understanding of engineering design.

11.0 Demonstrate the abilities to apply the design process.

14.0 Demonstrate an understanding of and be able to select and use medical technologies.

17.0 Demonstrate an understanding of and be able to select and use information and communications technologies.

19.0 Demonstrate an understanding of and be able to select and

23.0 Discuss individual interests, aptitudes, and opportunities as they relate to a career.



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Manufacturing Challenge # 1

Custom Coaches

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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

Company Information Sheet

Featherlite Inc.

4441 Orange Blvd.
Sanford, Florida 32771
Voice 888.826.8273
Fax 407.323.1945
www.featherlitecoaches.com



Manufacturing – Featherlite designs, manufacture and markets high quality aluminum specialty trailers, specialized transporters and custom mobile marketing trailers, and luxury motor coaches. Manufacturing processes include the following:

- Fabrication and welding of custom body shell compartments
- Design and installation of customized interiors with specified materials.
- Design and installation of specialized entertainment systems (interior and exterior) that are integrated with the motor coach.
- Design and installation of interior and exterior cooking and serving facilities.
- Design and installation of self-contained water systems, bath, and shower, etc.
- Motor coach is designed to be self-contained with sufficient support for 30 days or more.
- Installation of communications and global positioning systems that are designed and enabled by programmable logic controls.

Number of Employees:

Featherlite Luxury Coaches at Sanford, Florida employs approximately 250 people in manufacturing and service operations. At all locations, Featherlite employs over 1,300 people.

Career Opportunities:

Featherlite, Inc., is a national leader in designing, manufacturing and marketing high quality aluminum specialty trailers, transporters and luxury motorcoaches. Featherlite maintains that superior products start with superior employees. Positions are open regularly. Familiarities with manufacturing equipment, the desire to problem solve, and the desire to work in a team environment is quite critical.

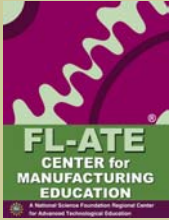
Education Level Required:

Featherlite is an engineering and manufacturing company, education requirements vary from High School to Engineering Degrees, depending upon the position requirements and the skill level.

Recommended Courses of Study:

For the manufacturing positions, a 2 year technical degree or the equivalent is suggested. Courses relating to: Math at all levels, Science, Physics, Computers, Electronics, Electrical Circuits, Engineering and Engineering Technologies are recommended. Featherlite suggests the following skills: "A strong knowledge of math and computer skills and general business knowledge are desired. Successful candidates will demonstrate consensus-building and self management skills with the ability to work within a group for common goals."

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Manufacturing Challenge # 1

A Solution

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EXERCISES IN MODERN MANUFACTURING

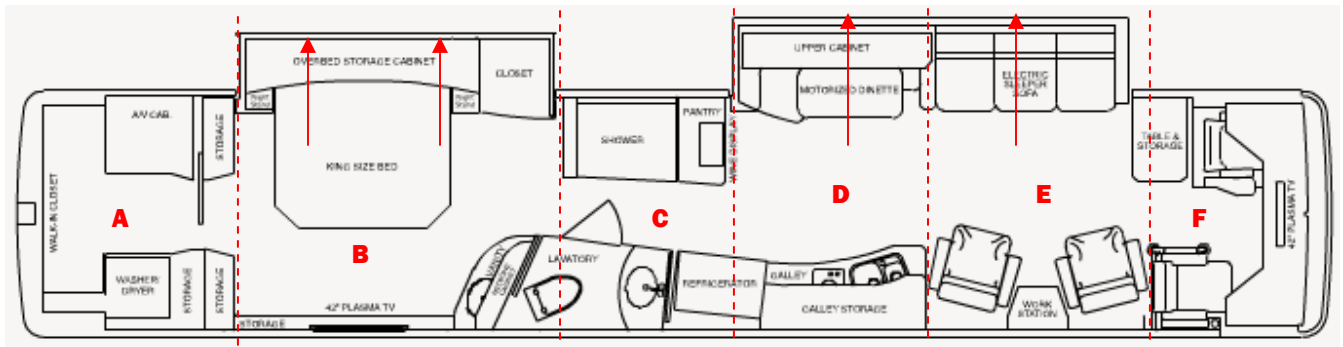
Solution from an actual manufacturer

We visited a manufacturer in Sanford, Florida, [Featherlite Inc.](#), to learn how they design and manufacture luxury coaches.

1. How do they distribute the space?

First, they divide the coach in sections. From left to right, these are (A) the walking closet and laundry area, (B) the bedroom, (C) the bathroom, (D) the kitchenette, (E) the work/reception area and (F) the driver's space. Notice that in order to provide more space, the engineers created two pull-out sections in areas B and D-E.

How does this distribution compares to your preliminary sketch?



2. What talents you need to bring on board to make these coaches a reality?

Featherlite employs 250 people at the Sanford plant. Specify job functions includes welders, mechanics, painters, engineers, interior designers, seamstresses, CAD operators, electricians, carpenters, sales & marketing, graphic designers...(pending company feedback to complete list).

3. Q: How do they get to manufacture several coaches a month?

A: By adopting a **cell manufacturing process**. (See definition) Team members are assigned to different cells. When the coach arrives at Cell #1, welders and structural engineers work together to create the pull-out sections. Once completed and waterproofed, the coach

moves to Cell #2, for all the electrical work. The coach moves from Cell to Cell

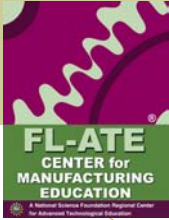


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EXERCISES IN MODERN MANUFACTURING



Tell me about...

Cell Manufacturing Process

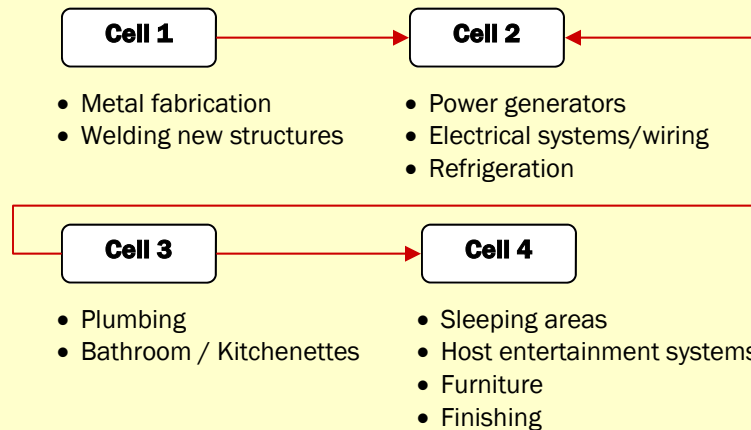
Definition

A cell is a group of workstations, machines or equipment arranged such that a product can be processed progressively from one workstation to another without having to wait for a batch to be completed or requiring additional handling between operations. Cells may be dedicated to a process, a sub-component, or an entire product. Cells are conducive to single-piece and one-touch manufacturing methods and are often found as part of lean manufacturing applications. Cells may be designed for the office as well as the factory.

Source: <http://rockfordconsulting.com/cell.htm>

Example

Luxury coaches can be manufactured by **cells** or teams who are responsible for different components. As each cell concludes it's job, the coach moves to the next cell.



See [Manufacturing Challenge # 1 \(Luxury Coaches\)](#).



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