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# Facility Layout and Production Flow Plan

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# Facility Layout and Production Flow Plan

## **Problem Statement**

Puck Enterprises is considering a facility expansion project to better utilize product flow. Incorporate new machinery in a projected building layout to better utilize space. The company is expanding from a small town Iowa Company to a large scale Agricultural facility in the Midwest. Currently provide custom designed manure spreaders to a wide variety of local farmers. They are not a publicly traded company. Their stakeholders are within the company. They service farmers throughout the state of Iowa. The presence they hold in Iowa is with spreaders and pump systems. Their product flow is poorly laid out within the facility, which causes conflicts within the production line. They do not have enough space to hold all of the products and desired equipment for the continued growth of the company. They are trying to create a more setline of machines and are diverting from custom builds. During the transition, there is no set cost constraints. They are losing time and money not being able to produce products at their maximum efficiency rate. There are no companies to our knowledge that are in the same circumstances as Puck Enterprises. The development of the facility layout is facilitating their own product and process needs.

## **Disciplines**

Bioresource and Agricultural Engineering | Industrial Technology

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TSM 416 Technology Capstone Project

# Facility Layout and Production Flow Plan

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## 1 PROBLEM STATEMENT

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*Puck Enterprises is considering a facility expansion project to better utilize product flow. Incorporate new machinery in a projected building layout to better utilize space.*

### Problem Statement

*A. The company is expanding from a small town Iowa Company to a large scale Agricultural facility in the Midwest. Currently provide custom designed manure spreaders to a wide variety of local farmers. They are not a publicly traded company. Their stakeholders are within the company. They service farmers throughout the state of Iowa. The presence they hold in Iowa is with spreaders and pump systems.*

*B. Their product flow is poorly laid out within the facility, which causes conflicts within the production line. They do not have enough space to hold all of the products and desired*

*equipment for the continued growth of the company.*

*C. They are trying to create a more setline of machines and are diverting from custom builds. During the transition, there is no set cost constraints. They are losing time and money not being able to produce products at their maximum efficiency rate.*

*D. There are no companies to our knowledge that are in the same circumstances as Puck Enterprises. The development of the facility layout is facilitating their own product and process needs.*

## **Business Case Statement**

- A. The basic need for our project would be to better utilize their existing space and also future additions.
- B. Involves the whole facility, staff, and products.
- C. The problems occur when they are moving finished products from assembly to painting.
- D. With the addition of new machines and product lines, space is not being utilized efficiently.
- E. For the company to continue its successful upward trend, the need for expansion is crucial. Also, by expanding the facility, the customers will receive products quicker and potentially less expensive.

## **2 GOAL STATEMENT**

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*The fundamental issue at hand involves the machine layout and potential expansion of the facility. The improvement of success will be measured through the use of material flow efficiency. In return, this will lead to improved storage solutions, less material movement, and increased turnaround time/reduced production time. Some tangible results include reducing operating time which will alleviate staffing constraints thus saving time/money.*

### **Main Objective(s) and Specific Objectives:**

*The main objective is to incorporate required machinery while improving the current layout of the facility to create the most efficient process flow possible.*

- 1) Create a working CAD model of facility layout for both pre-existing and potential expansion.*
- 2) Plan and implement machine placement to minimize material movement throughout the facility.*

### **Rationale:**

*Reducing cross flow issues between machine centers and departments.*

### 3 PROJECT PLAN/OUTLINE

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#### A. Methods/Approach

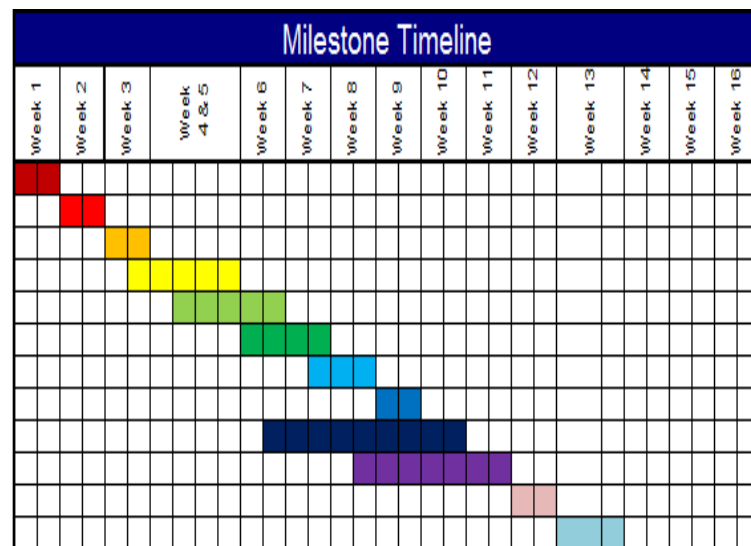
- Reference Material(s)
  - Our reference materials will include CAD files of current building and proposed expansions, machine schematics, machine dimensions, ISU faculty, materials used in facility, OSHA space requirements, and building code requirements.
- **Data collection:**
  - To determine our root cause, we will collect data and information through the use of industry professionals, measurement of current space, and the orientation that machines need to be placed for an efficient process flow.
- **Skills:**
  - To understand the problem proposed by our client, we must learn the allowed space for the current and potential facility, while implementing machine size and orientation to the manufacturing requirements. As a team, to achieve this task, we will need to utilize facility planning, CAD, and lean practices to accomplish this task. Previous experiences from courses, such as TSM 116, 210, 216, 440, and 444, will assist our group in applying these practices. Particularly, AutoCAD will be the most used component in our planning and process development.
- **Solutions:**
  - Our method of development will be to provide the client with an efficient product flow and machine placement through the use of AutoCAD. Before we can develop our placement of machines in AutoCAD, we will use facility planning tools, such as to from charts, to assess the efficiency ratings of our proposed solutions. In turn, we will evaluate the potential solutions with the client and evaluate how effective they meet our standard goals.
- **Organization:**
  - During the fall semester, we were able to communicate with our client through the use of email and one site visit. For the spring semester, continued the use of email and completed one extra site assessment. To address organizational tasks for team members, we delegated specific tasks during our weekly meeting time, which consisted of a two hour time slot. Some of the major tasks included meeting with the client, collecting additional space requirements, developing both preliminary and final CAD drawings, and completing the final presentation. In the event of unexpected circumstances, communication between the group and client occurred to resolve the outstanding issues.

## B. Results/Deliverables

- For the following spring course period, our deliverables included the implementation of machine placement and development of the facility CAD drawings. In the effort to create consistency between our deliverables and project objectives, weekly goals and tasks based on the core principles of our project were recorded through excel. By continuously referring to our objective statement during meetings and discussions, we accomplished the goals we originally set out to complete. Through the use of a schedule and Gantt chart, we were able to finish our main research by mid to late march. For the finalized CAD drawings, we were able to complete the files by mid-April.

## C. Timeline

Milestone Performance				
Major Project Milestones	Time Required (Days)	Completion Date	Actual % Complete	On / Off Schedule
◆ First scheduled meeting of semester	7	1/10/2017	100%	on
◆ Revise semester schedule	7	1/26/2017	100%	on
◆ Schedule visit with client	14	2/10/2017	100%	on
◆ Develop machine layout for facility	8	2/17/2017	100%	on
◆ Finish rough draft of CAD design	10	2/26/2017	100%	on
◆ Start presentation	7	3/2/2017	100%	on
◆ Schedule final meeting with client	5	3/8/2017	100%	on
◆ Spring break: no meetings scheduled	7	3/19/2017	100%	on
◆ Finalize CAD drawing	6	3/30/2017	100%	on
◆ Finalize presentation	7	4/6/2017	100%	on
◆ Wrap up outstanding components of project	7	4/13/2017	100%	on
◆ Completion of project	8	4/21/2017	100%	on



## 4 BROADER OPPORTUNITY STATEMENT

- We believe our project has an appeal and can be understood by an average person because our project involves many common concepts found throughout a variety of companies.
- In a small way, our project provides solutions to the big challenges of improving crops and feeding thousands of people. Since Puck Enterprises deals with the fabrication of manure spreaders, which go hand in hand with crops, one could translate that back to helping feed many people.  
Many smaller companies who are starting to grow and mature could be facing the same type of problems that Puck Enterprises is facing. It can be challenging to design and create a viable work flow throughout a fairly large facility.
- Some trends affecting broader opportunity could involve future planning and

- projections on how soon a company should expand their building and products.
- Other companies are currently addressing similar problems by either looking into separate building locations or adding onto existing building locations to improve their output and workflow.

## 5 PROJECT SCOPE

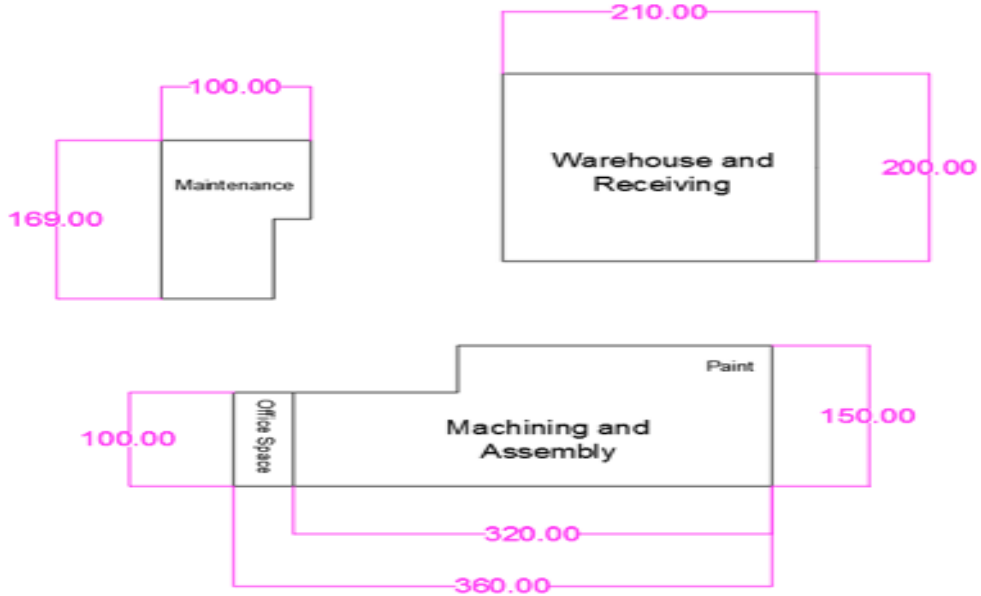
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- We have no boundaries while solving the problem besides working within the existing building. We have freedom to place any machines wherever we seem they will fit according to data collected.
- Every part of the business will be affected at one point or another during this project. The transition will start with the machining, paint, and assembly separating them into their own separate zones. The separation of all of these will give Puck more room to improve and safely conduct the processes included in each separate zone. There will also be new offices placed above part of the new expansion and a shipping dock will be connected to the warehouse. This expansion means they will need more employees to cover the added load. They also plan to add a prototyping.
- Maintenance will not be affected during the expansion transition. It is in a building not included in this expansion and will not be moved or changed.
- The amount of money this project will cost is not included because we were told by our client not to worry about the cost of this project.

## 6 GRAPHICAL ABSTRACT

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### Original Facility



## 7 APPENDIX

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By request of our client, we were asked to omit any materials including the final results of the project.