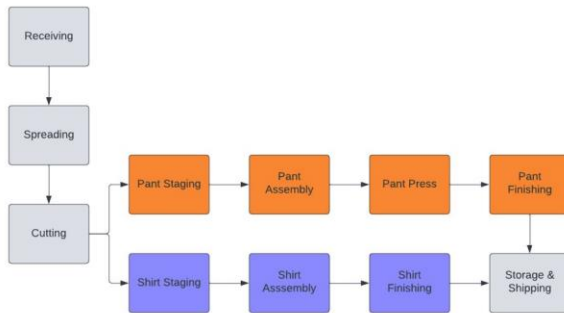


Increasing Production Capacity using Assembly Line Balancing

Ashley Stanek, Team Leader; Ben Mitchell, Cody Bonds, Hudson Mcdiarmid, Rhett Caldwell
Industry Partners: Joey Roland, Plant Manager; Jennifer Gibson, Production Manager

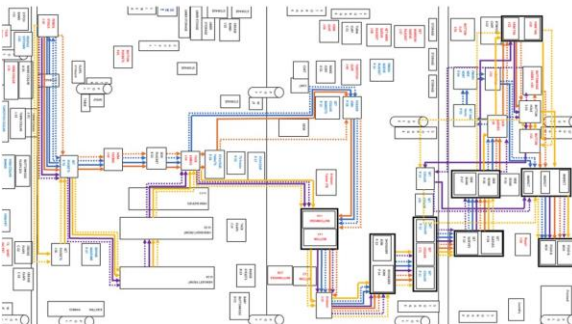
NSA-Arkansas

National Safety Apparel (NSA) is a fourth-generation family-owned business headquartered in Cleveland, OH, that manufactures clothes for tough industries. The plant in Fort Smith, Arkansas is the plant our project specifically addresses, and the goal we are helping NSA-Arkansas with is doubling their production on their floor.



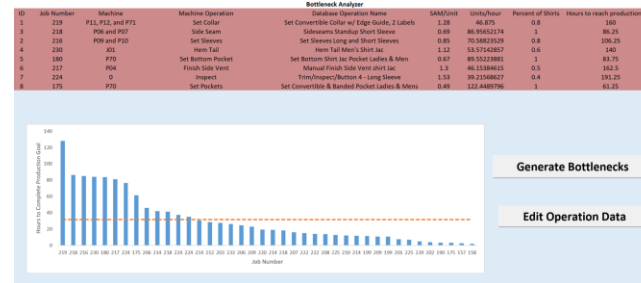
Facility Layout

The first picture here is a high-level material flow diagram of the Fort Smith facility. There is a pants side and a shirt side of the facility, for our project we focused on the shirt production. We as a team worked together to create the flow diagram on the right which shows the ten different styles of shirts going through the assembly process in the floorplan.



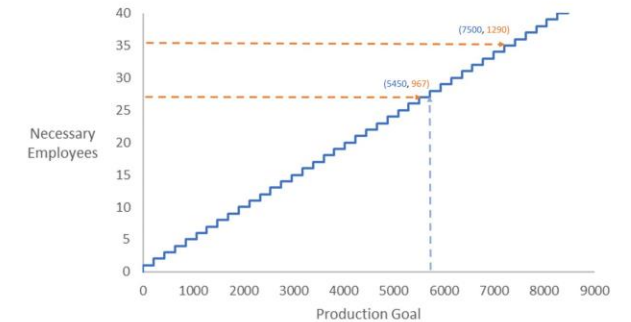
Bottlenecks

We worked to determine bottlenecks that lie within the shirt assembly process at NSA Arkansas's facility. We created a tool that NSA can use to identify their bottlenecks. The user can update operation data using the "Edit Operation Data" button. They can then click the "Generate Bottlenecks" button which will automatically sort the data in the data bank and output the top 8 bottlenecks in the system. This will help NSA-Arkansas determine opportunities for improvement within their system



System Improvements

If the production goal input by NSA is infeasible, they will know they need to make improvements to the system to reach their goal. These improvements include increasing the number of employees, adding machines, or upgrading machines by replacing them with ones that are more automated.



Resource Allocation

There is another feature within the bottleneck analyzer that provides NSA-Arkansas with the ability to optimally allocate their labor force. With this tool, the user can input a weekly production goal and the current number of employees, and the tool will output the percent of time to assign an employee to each operation as well as the feasibility of the goal with the current number of employees.

| INPUTS | |
|---|-------|
| Weekly Production Goal (number of shirts): | 7500 |
| Total Number of Styles: | 10 |
| Number of Employees (for the week): | 27 |
| Weekly Hours per Employee: | 35.83 |
| OUTPUTS | |
| Is goal feasible? | No |
| Minimum Number of Weekly Employees Necessary: | 36 |

Optimization Model

We provided a suggestion for how NSA could reach their goal of doubling production by creating and utilizing an optimization model. We performed multiple iterations with the optimization by adding either a new machine or worker to the system in each iteration until the production goal was reached. It was concluded that NSA could reach their goal by adding ten new machines and hiring nine workers.

