Product Wheel Optimization for Devils Backbone

COLLEGE OF ENGINEERING
GRADO DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING
VIRGINIA TECH

Faculty Advisor: Dr. Weijun Xie

Chris Brassel • Joshua Glaab • Rachel Hollatz • Cher Wang

Company Contact: David Ryan

Background

Devils Backbone

Devils Backbone (DBB) is a brewing company located in Lexington, VA. After gaining regional popularity for its craft brews, the company was acquired by Anheuser-Busch in 2009.

Problem Statement

The DBB packaging facility is struggling to keep up with increasing product demands due to inefficient changeovers.

Project

The ISE senior design team sought to reduce the packaging bottleneck by:

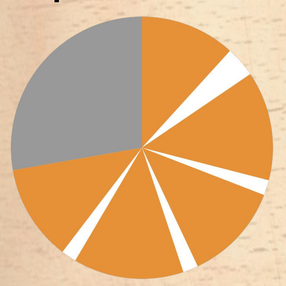
PHASE 1

Creating an optimized product wheel for production planning

PHASE 2

Developing a software tool to automate the creation of a product wheel with new data.

A product wheel is a regularly repeating sequence of various products. Its key components are:

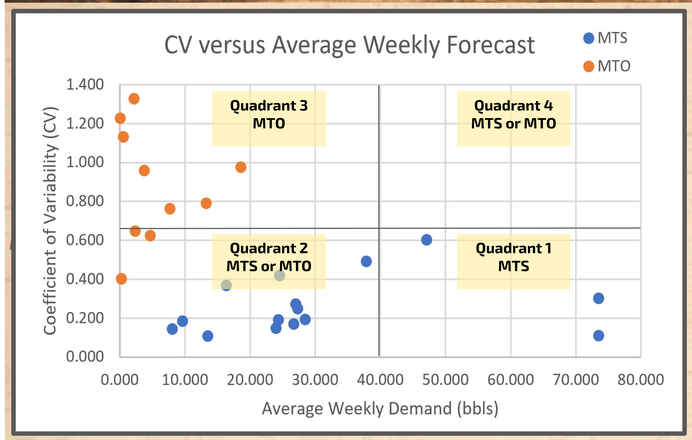


Make to Stock (MTS) products

Changeover times between products

Process Improvement Time (PIT)
Can include: Make to Order (MTO) production, cleaning, staff training

Phase 1 | Product Wheel Results

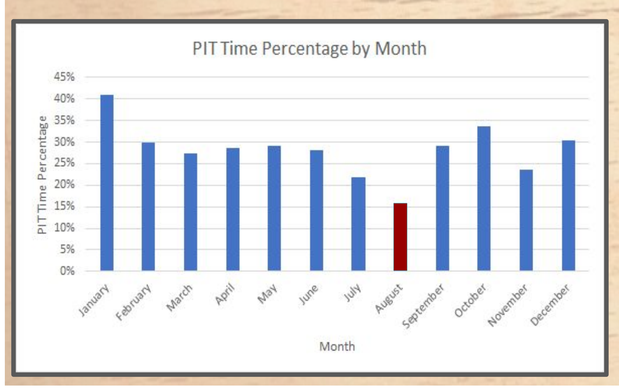


Product Wheel built on Forecasted Sales (Right)

- 4 week total product: 2048.76 barrels
- PIT percentage: 29%
- Utilization: 70.7% w/ MTO

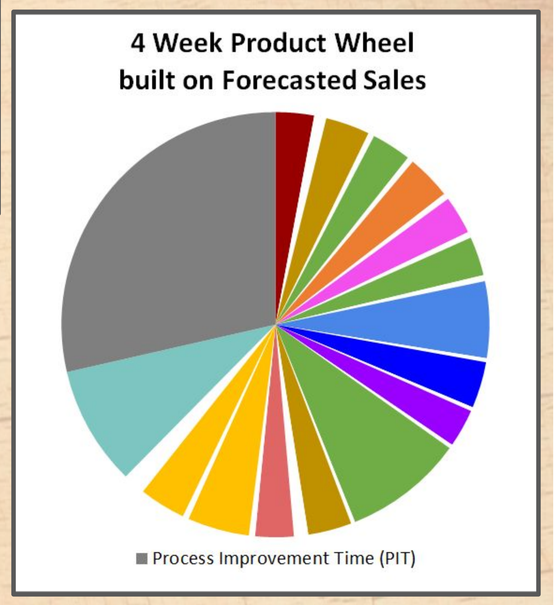
2019 Product Wheel built on True Sales

- 4 week total Product: 2149.87 barrels
- PIT percentage: 26%
- Utilization: 81.9% w/ MTO



Make-To-Stock Assignments (Left)

- High demand, low variability
- 15 MTS products on wheel
- 90% of total production volume



PIT Time Percentage by Month (Left)

- Insight: PIT is significantly reduced in summer months. DBB may need to expand their 80 hour operation week in August.

MRPs for Stock-Outs on MTS Products

- Forecasted Sales Product Wheel has a 93.49% CSL for True Sales data (Goal: 95%)

Phase 2 | Production Scheduling Tool

INPUT
- Weekly demand
- Product type
- Packaging type
- Unit cost
- Lead time

FUNCTIONS
- Calculate weekly demand
- Run Hill Climbing heuristic
- Calculate weekly production

OUTPUT
- Optimal sequence
- Balanced product wheel
- Safety stock levels

Methodology

The Product Wheel Handbook

1. Create Value Stream Map (VSM)
2. Decide where to apply the wheel
3. Develop Make-To-Order strategy
4. Optimize sequence of production
5. Analyze factors influencing wheel time
6. Calculate wheel time and frequencies
7. Balance the wheel
8. Plot the wheel cycles
9. Set inventory requirements

Impact

Reduced Operating Time
Initial: 112 hrs/wk
New: 80 hrs/wk
Savings: $208,000

Reduced Inventory
Initial: 2763 barrels
New: 587 barrels
Savings: $74,000

Increased Utilization
Initial: 64%
New: 71% - 82%

Annual savings of:
$282,000