1. Problem Definition
The 21.2% reduction of warehouse square footage has led to a constricted workflow and amplified problems concerning the inventory system, leading to an increase in workload for the storage employees.

2. Project Scope
- Identify and remove deadstock in the warehouse
- Improve overall flow in the warehouse by implementing an inventory allocation plan
- 5S layout improvement for the Receiving and Marshalling areas

3. Initial Conditions

4. Methods & Analysis

4.1 Product Families
- Created based on delivery locations to shop floor
- Warehouse locations derived from item throughput
- Items placed on Slot 2 for ergonomic benefit

4.2 5S Methodology
- Conducted interviews identified following issues:
  - Deadstock
  - Lack of space for employees
  - Created Spaghetti and AutoCAD diagrams to quantify flow
  - Placed visual indicators for equipment

5. Results & Implementation

5.1 Product Families
- Overall reduction of work effort: 63.6%

5.2 5S Methodology
- Implemented improvement of shelving slot to product height

6. Pallet Location Optimization
- Linear program using Python’s CBC Solver considers:
  - Distance to Shop Floor, Item Throughput, & Accessibility of Slot to Operator
  - Optimal Flow-Distance
  - Optimal Shelving Slot to Product Height Ratio
  - Pallet and Slot Height

\[ O_{F1} = \sum_{i=1}^{m} \sum_{j=1}^{n} \sum_{k=1}^{r} (\alpha_{i} x_{ijkm}) + \frac{O_{F2}}{O_{F2}} (1 - \alpha_{i} (h_{j} + h_{m})) \]

- Implemented reduction of flow-distance: 8%
- User-friendly Excel Interface calls Python to create Inventory Allocation Plan in under 4 minutes
- Implemented improvement of shelving slot to product height ratio: 0.4%