

An OME systems engineering process improvement

Opportunity

An OME company wishes to upgrade a production line for assembling an OME system. A number of requirements have been given to improve the process.

Requirements

- Ensure components are assembled in the correct orientation.
- Eliminate the possibility of OME items leaving the process without all components present.
- Eliminate the possibility of Repetitive Strain Injury.
- Ensure all parts are correctly torqued into the assembly.
- Eliminate the possibility of causing damage to the product.

Literature Review

SOFT VS HARD SYSTEMS ENGINEERING

- Soft – a flexible and adaptable approach well suited to investigating and defining the problem.
- Hard – a structured, data driven approach that focuses on the technical aspects of a pre-defined problem.

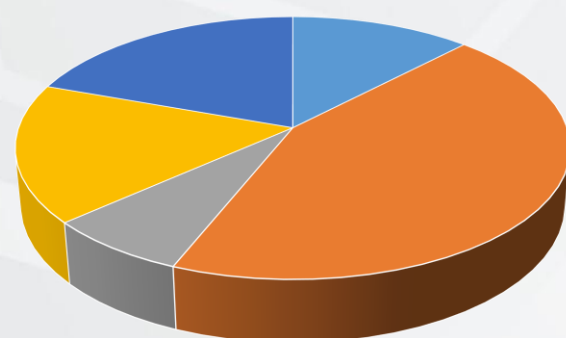
SAFETY

- Critical component performance is key in reducing the possibility of a system failure.

HUMAN FACTORS

- Operations staff need to be included throughout the project to help fully understand the process, and ensure the system works in harmony with human involvement.

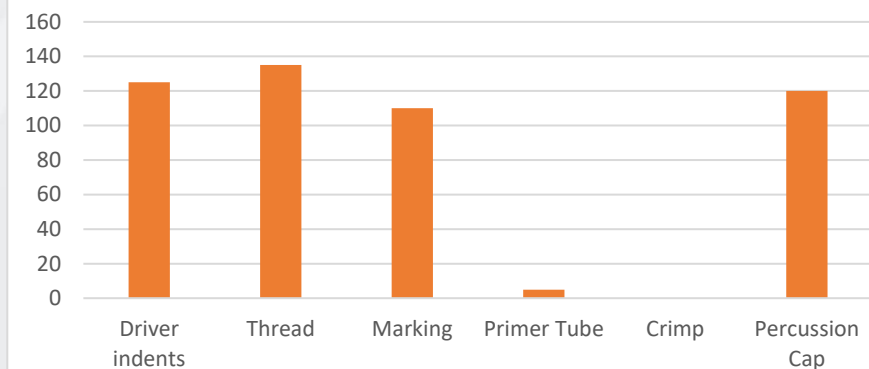
Requirements Analysis



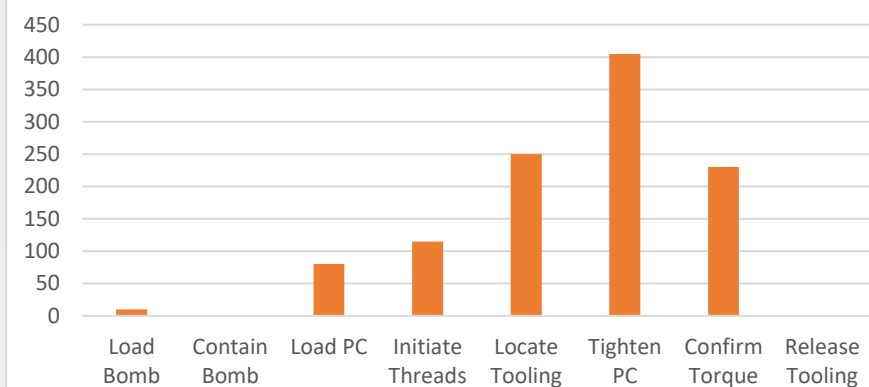
- Expressed
- Non Functional System
- Non-Functional Implementation
- Non-Functional Performance
- Functional

Criticality

Critical Design Features



Critical Manufacturing Steps



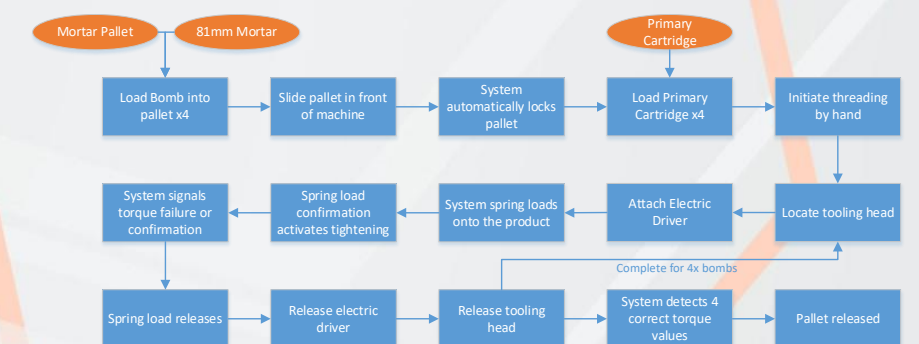
Function Means Analysis

Activity Summary	Possible Ways of Performing Function					
Load Bomb	Human Operator	Robotic Arm	Pneumatic assisted lifting clamp	Electrically assisted lifting clamp	Automatic conveyor delivery	
Contain Bomb	On-machine jig	Existing Pallet	Robotic clamp	Mechanical clamp	Visual sensor clamp	
Load PC	Human Operator	Robotic arm	Hopper delivery	Conveyor delivery		
Initiate Threads	Human operator	Electric driver	Pneumatic driver	Hydraulic driver	Trigger controlled	Pressure controlled
Locate Tooling	Human Operator	Mechanically Assisted	Robotic arm	Lowering lever	Vision system	
Tighten PC	Torque Wrench	Hand Tighten	Electric driver	Pneumatic driver	Hydraulic driver	Auto control
Confirm Torque	Audio indicator	Visual indicator	Kinetic indicator	Automatic stop		
Release tooling	Manual release	Automatic release				

Final Design



Process Operation



Conclusion

- Robust design produced using a hard systems engineering approach.
- Component orientation not applicable to this process.
- Critical features are protected by the suggested design.

Further Work

- Process testing & installation.
- Wider lean manufacturing investigation.
- Industry 4.0 incorporation.