SSG Case Study Template

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Sector: Manufacturing – Kitchen & Bedroom Furniture

Introduction & Context

The asset system (production line) was more than 25 years old and located in a factory in a remote area of a very large manufacturing site.

The maintenance strategy was largely reactive with planned preventative maintenance and autonomous maintenance being done on an ad hoc basis.

The author was conducting a business interruption (BI) study of the site. This was to get a more detailed understanding of the;

- Raw material, component, and finished goods supply to the entire manufacturing site, including those that were single sourced.
- Alternative raw material supply and how quick they could be “turned on” in the event of an incident at the supplier’s site.
- Component and product flow across the entire manufacturing site to understand the constraints and to get a shared understanding of known risk and to identify emerging risks

It should be noted in most manufacturing industries that BI insurance premiums are usually the second highest insurance cost (depending on the length of the indemnity period). The first is generally employer liability insurance.

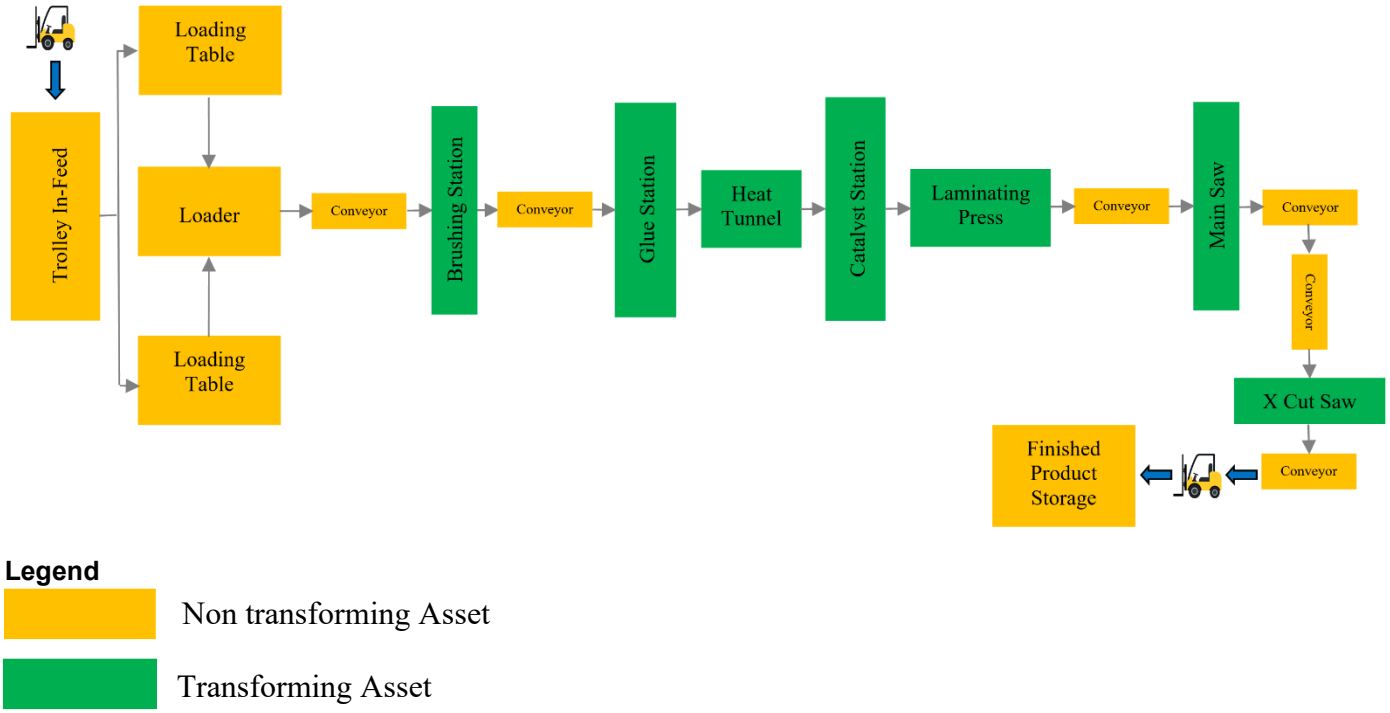
It was this work that identified the need for the asset intervention detailed in this case study.

Description of assets in study

The asset system under study was a draw bottom and back panel production line. This production line used to produce approximately 18,000 panels a week.

The panels were produced for use in the UK domestic kitchen market by a UK vertically integrated kitchen and bedroom furniture business. This supplied both retail and trade customers.

The production line lay out is shown below.



The estimate cost for a new production line was £3.5M. This excludes enabling works.

When was the activity carried out?

The asset intervention, in this case refurbishment, was carried out in 2003.

The need was identified in the last two quarters of 2002, when it was identified by the BI study, and a newly introduced production downtime data collection and analysis to identify “bad actors”.

This was further reinforced by production management and production line operators’ “frustration” with the line unpredictability and requiring, in some instances, significant operator attention to reduce levels of waste.

The bad actor analysis activity and the execution of the refurbishment work took place over an 8-month period. This included the creation of the business case to release CAPEX from the business unit.

Why was the activity carried out?

There were two main operational drivers:

- The asset system performance across operational, technical and financial performance factors. Downtime was showing as upward trend and was consisting of both chronic and catastrophic failures

- Impact on operations and maintenance teams’ morale.

There was one main business driver:

- The emerging risk in the ability to supply the draw bottoms and back panels into the supply chain at the required time, volume, cost and quality.

The author at that time had been with the business for just over one year and had come from managing an Engineering and Maintenance department of as Tier 1 COMAH facility. It was during this time that the author was becoming more aware of asset management with PAS 55 being developed by the IAM, BSi and utilities, transport, oil & gas, and manufacturing leaders.

The business had already in place plans managing and addressing the requirements of EAWR 89, LOLER, PSSR and PuWER at an asset portfolio level. The business had many manufacturing facilities as well a significant logistics/warehousing facilities. The Central Engineering Project team managing these improvement activities were engaged to ensure an aligned and integrated approach, and to ensure the refurbishment work was not delayed but also that funding sources i.e. both CAPEX and OPEX were agreed and clearly owned.

The work prioritisation was viewed at site level with the Engineering Manager working with the Site Director and the Production Managers on what the priorities were. It should be noted the consequences were group wide as a kitchen unit cannot be shipped unless back panels and draw bottoms where available. Packing lines soon back up if components (of which back panels and draw bottoms form part of) are not available.

Terminology

Term	Description/Meaning
Bad Actors	Poorly performing asset or asset systems that are impacting site/business performance.
BI	Business Interruption is the insured loss of revenue and additional operating costs that arise when a business cannot operate normally due to a covered incident—typically fire, natural catastrophe, machinery breakdown, or other insured property damage. The coverage compensates the business for lost income and necessary expenses during the period it takes to restore operations.
Non transforming asset	In this case study it is an asset that does not make physical changes to the raw material, semi-finished products or components.
Plant	A facility/factory that can contain a single unit or number of units that carryout transformation activities to raw materials or semi-finished products.
Unit	An asset, or asset systems, that performs a major transformation to raw materials, or semi-finished products.
Supply Chain	Consists of all parties involved, directly or indirectly involved, in fulfilling an end customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers and even customers themselves.
SKU	Stock Keeping Unit i.e. kitchen cabinet pack.
WACC	Weighted Average Cost of Capital is the average rate a company must pay to all its capital providers—both equity investors and debt holders—weighted by their proportion in the firm's capital structure. It represents the minimum return a company must earn to create value for its investors

Objectives

The site had Plant Level Objectives (PLOs) and Unit Level Objectives (ULOs).

Objectives in the context of this case study is that the PLOs gave details what manufacturing units supply the customers in the supply chain.

Objectives in the context of this case study is that the ULOs gave details what production units (or asset systems) produce the required product or components to enable the manufacture of the completed product i.e. SKU

The objectives for the shutdown work were:

- Defer capital investment and extended asset/equipment life
- Reduce equipment downtime hence improve availability
- Reduce waste
- Improve Product Quality
- Reduce “Set Up” times
- Reduce “Changeover” times
- Replace Main drives and controls giving consistent line speed

Description of the activity

Identifying the following:

- Asset related risk that would prevent the supply of products to internal and external customers.
- Asset systems, or assets within those asset systems, that could reduce the resilience of the businesses supply chain.

To inform the key stakeholders of these risks and the asset intervention scenarios.

Methodology

The methodology followed is illustrated in Figure 1.

It consists of:

- Data and information collection (BI Study and Downtime Analysis)
- Analysis of data and information
- Review by key stakeholders

- Objectives and goals agreed with key stakeholder
- Work selection, detailed planning and funding

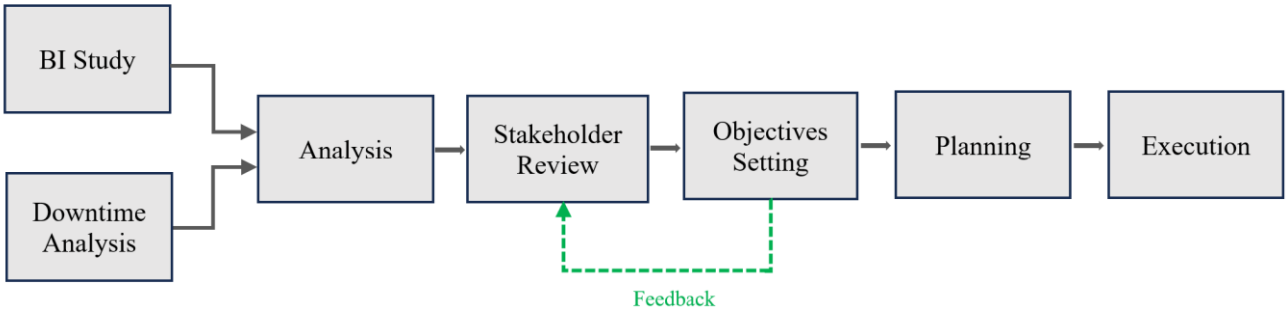


Figure 1 Methodology Deployed

The BI study had identified that the draw bottom and back panel production line was significant risk to business operations and group retail & trade operations.

The Bad Actor analysis identified, with supporting tacit knowledge from the production operators, maintenance technicians, the increasing trend in down time and waste generation.

The analysis of the production line down time helped identify the main areas of concerns and hence areas for improvement. These are shown in Figure 1- Production Line Downtime Analysis 2002.

Table 1 Downtime Over 2002

Issue	%
Line Control and Board Gapping	56%
Glue & Catalyst Stations	13%
General Electrical	19%
Other Stoppages	12%

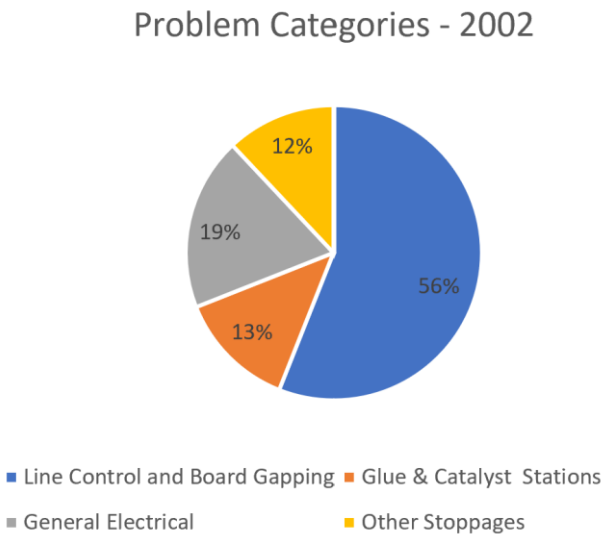


Figure 2 Production Line Downtime Analysis 2002

The downtime analysis gave a list of assets that required some sort of asset intervention covering:

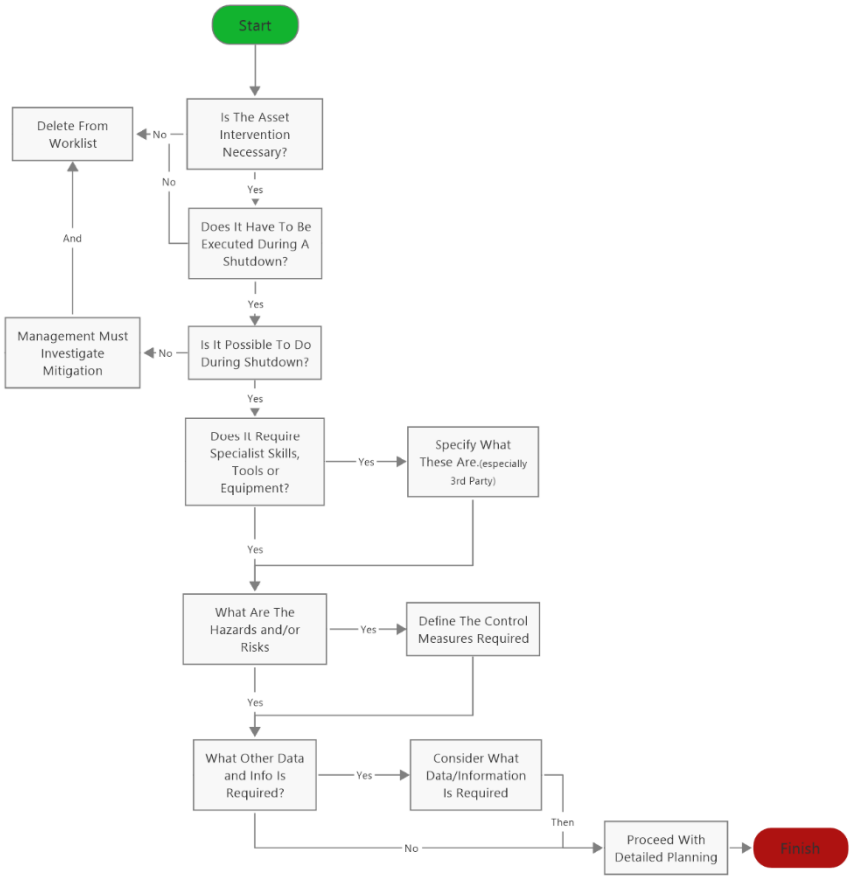
- Repair
- Refurbishment and
- Replacement

The nature of the interventions meant funding would require coming from OPEX and CAPEX. The OPEX was under the control of the author so was straight forward. CAPEX was managed centrally at Group level and required a business case. The business case was supported by the findings of the BI study that already had key stakeholder support.

Production management was asked to provide a list of jobs that in their opinion required doing. Some of these were improvement to general building fabric and the working environment within the factory such as lighting.

These work lists were consolidated by means of using a flow chart that removed work that did not require an outage i.e. shutdown as these would just be a distraction and consume money. The process used is shown below in Figure 2 Job Selection Flow Chart.

The jobs selected where then risk assessed to ensure they were where within the risk appetite of the key stakeholders. For this activity these were plotted on a simple risk matrix as shown in Figure 3 – Risk Matrix. This risk matrix was designed and agreed with the key stakeholders as a common business risk matrix did not exist in the business for this type of analysis for shutdown work.



Note: Adapted from T. Lenahan "Turnaround Management" p 45, 1999

Figure 3 Job Selection Flow Chart

The risks that were being addressed are supply chain related and were:

- Supply risk

  Supply risk relates to potential or actual disturbances to the flow of product from the business. It is risk associated with the business's suppliers not being able to deliver the raw materials or semi-finished products that is needed to meet production volumes.

- Process risk

  Processes are the sequences of value-adding and managerial activities undertaken by the business. The execution of these processes is likely to be immediately dependent on internally owned or managed assets and on a functioning supporting infrastructure. Process risk relates to disruptions to these processes.

- Control risk

  Controls are the assumptions, rules, systems and procedures that govern how the business exerts control over the processes. In terms of the supply chain, they may be batch sizes, safety stock policies etc. This includes the policies and procedures that govern asset management and logistics management. Control risk is therefore the risk arising from the application or misapplication of these rules.

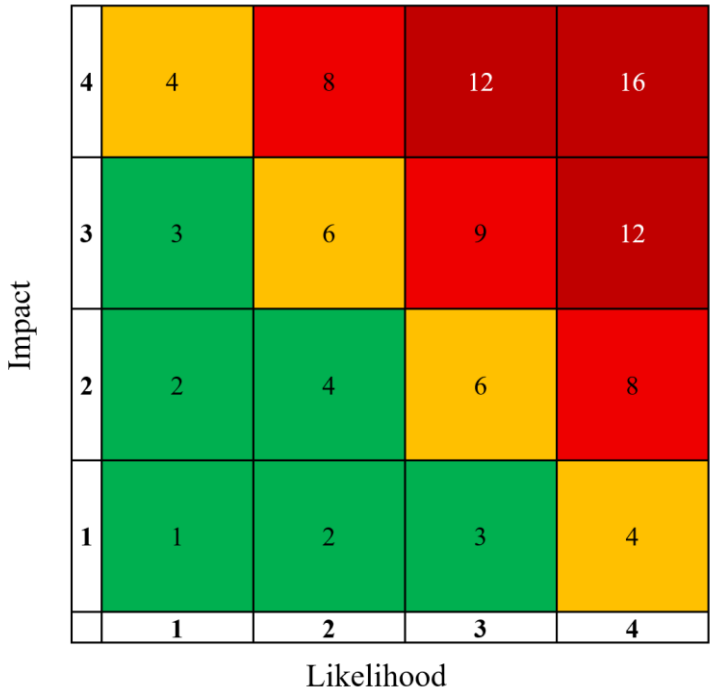


Figure 4 Risk Matrix for Shutdowns

Work was selected by:

- Including all jobs that sat within the "green" cells
- Considering those that sat within the "amber" cells and deciding which ones to progress to work plan. Further mitigations were considered at this stage.

- Review of those that sat in the “light red” and “dark red” cells. Key stakeholders agreed the omission of these jobs.

An example of the effectiveness in this approach was around a specific job that required the replacement of all the bearings on the calendar rolls of the laminating press. The job was driven by the age of the laminating press (approx. 25 years) and that they were the original bearing and housings. The mitigation taken was to take vibration and Acoustic Emissions (AE) readings to ascertain the bearing condition. AE was carried out as the machine was a “slow” running machine and at this time AE was better at picking up bearing defects in slow running machinery than vibration analysis alone. The site had a dedicated lubrication craftsman whose tacit knowledge of the machine and its lubrication schedule also provided valuable input into the management decision making process. Future plans were put in place to fit fixed-point vibration studs to enable vibration readings to be taken as part of a site vibration route.

Consideration was also given to obsolescence and spares availability to support the production line to maintain the required level of availability. An example of this was the replacement of the d.c. drive system to an a.c. drive system including all the associated controls.

Benefits Delivered

The benefits delivered are summarised in Table 2 - Benefits

Table 2 Benefits

Benefit Area	**Annual Value (£k’s)**
Capital Deferral (depreciation avoided)	26.8
Downtime Reduction	22
Waste Reduction	65
Quality Improvements	13
Total Annual Benefit	**126.8**

It should be noted the WACC for the business during this period was high, and CAPEX deferment was highly attractive as it enabled it to be used at the customer facing end of the business.

Executive Summary

- The refurbishment avoided a £3.5M capital spend and delivered £126.8k/year in recurring operational savings.
- The one-off £150k refurbishment paid back in 1.2 years.
- Over 10 years, the net financial benefit is £1.118M, representing a 745% ROI.
- Waste reduction is the largest contributor (£65k/year), followed by downtime reduction (£22k/year).
- The capital deferral provided strategic flexibility and reduced depreciation burden.

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