

Phil Bedford

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“Change Management”

£1.0M INVESTMENT IN METAL MANUFACTURING

This project started life as a feasibility study into whether manufacturing activities could be consolidated into a single location, and evolved into a £1.0M investment in manufacturing equipment and facilities. The overall objectives of the investment were to:

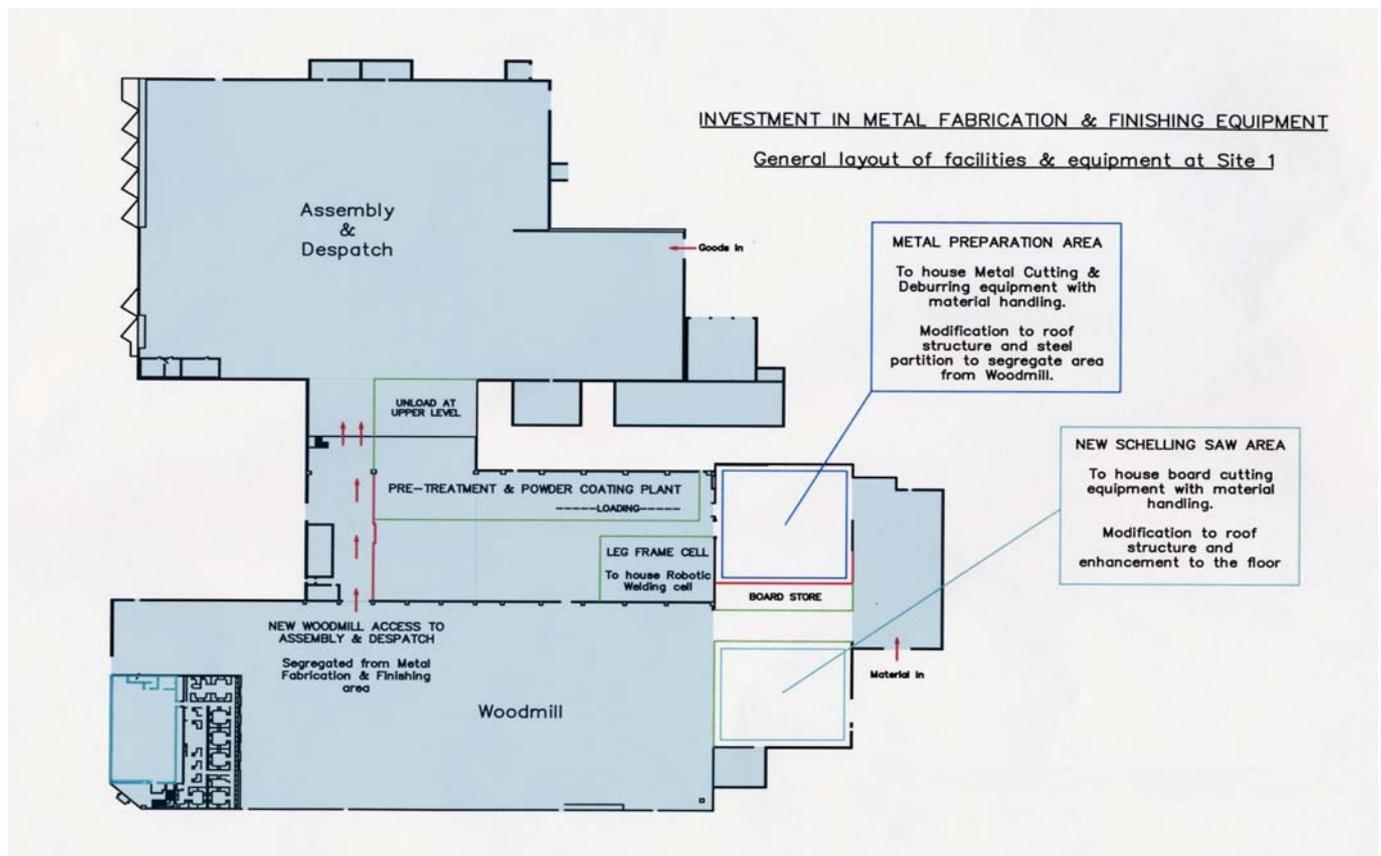
- Reduce manufacturing costs.
- Significantly increase production capacity.
- Improve operating flexibility.
- Replace old and obsolete technology.

The company in question had a 14000 sq. metre site housing Design & Development, Administration & Support and Sales & Marketing functions together with manufacturing facilities for wood based components, final product assembly and despatch activities. Metal components were manufactured exclusively at a separate facility located one mile away and transported by road to the main site as required.

This paper covers re-layout and upgrade of the manufacturing facilities. For details of the related investment in manufacturing equipment please click on [Pre-treatment & Powder Coating Plant](#) or [Metal Cutting & De-burring Cell](#) or [Robotic Welding Cell](#) as required.

The first job was a meeting with the insurance risk assessors to discuss the project in outline and agree the key requirements. The world of insurance has changed significantly over recent years due to the spiralling cost of claims. This has resulted in a climate of increased premiums and, in some cases, a refusal to taken on “unacceptable risks”. So, the involvement of the risk assessors was considered essential to ensure that they would support any proposal.

Armed with the above information a feasibility study was completed in terms of overall space requirements and a proposed layout prepared.



1 – Proposed site layout with details of key facility work required

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To add interest to the project, the main site was actually built on two levels with Assembly and Despatch located on the upper level, some three metres above the rest of the factory!

All the requirements identified during the discussions with the risk assessors were basic common sense. However, in addition to gaining their support at the start of the project, it was also felt that their input would be useful to justify some of the costs when preparing the business proposal. The main requirements identified were:

- Physical segregation of wood and metal manufacturing activities.
- Hazardous metal manufacturing activities to be contained within the existing factory firewalls (minimum 2hr fire rating to be maintained).

In addition to the above considerations the key operating requirements used to develop the layout were:

- All raw materials (chipboard and metal stock) to enter the building via a single point to enable consolidation of material handling requirements.
- Goods Inwards for all other purchased items to be relocated to the upper level of the factory adjacent to Assembly and Despatch.
- A 15% reduction in the space required for metal manufacture, to be achieved by a reduction in in-process inventory.
- Production flows to be streamlined, with delivery of finished wood and metal components adjacent to the point of use.

The results of the feasibility study showed that consolidation would be possible, but part of the site would need to be upgraded to create more usable space. The area in question was the oldest part of the factory (highlighted on the proposed layout) and had been neglected for many years. Although there had been virtually no investment in the fabric of the building or basic factory services in this area, the original corrugated asbestos roof had recently been replaced with steel composite panels. However, as the facility work required became apparent, this would actually hinder the work which was subsequently required to upgrade the area, and make it more useable.



2 – In need of some refurbishment.....

One half of the area requiring upgrade to create more usable space. The key problems are: the steel support columns at 6 metre centres, restricted headroom resulting from the roof construction/low level services and the uneven floor which was up to 250mm below the floor level in the rest of the factory.



3 – Existing roof structure with typical services

Close up view of the roof structure at the centre line of the building. This shows an example of the current and redundant services requiring modification. Also shown is part of a previous attempt to create more usable space by installing a steel strap between support columns to support the roof structure where the bottom of a support column had been removed

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The key problems which needed to be addressed were:

- Steel columns supporting the roof structure were a maximum of 6 metres apart.
- The effective headroom in one half of the building was less than 3.5 metres due to the construction of the roof.
- Restricted headroom elsewhere due to low level services, including ducting which formed part of the extraction system for the Woodmill.
- More than 60% of the floor area required replacing.

A firm of Structural Engineers was engaged to design the modifications required to the steelwork. This work included producing all the information required to obtain approval for the work under the Building Regulations, and providing a short list of companies who were capable of carrying out the work. They also liaised with both the contractors and the Building Inspector while the project was in progress. The modifications to be carried out comprised:

- Removing every other support column and replacing it with a support beam at roof level.
- Strengthening the concrete foundations under each of the remaining columns.
- Replacing every roof truss with a cellular beam which followed the line of the roof.
- Raising a section of the roof to accommodate an overhead crane which would be required to move metal stock.

This work was carried out in two phases with minimal loss of production.

Phase 1 concentrated on the area where the floor required replacing. Following relocation of woodworking machinery to other parts of the Woodmill, all the services were stripped out and the modifications to the steelwork completed. Normally these modifications would have been carried out by removing the roof and using a crane to lift the steelwork into position. However, as the roof had been recently replaced, it was decided to carry out this work from below by lifting the steel beams using a mobile crane with a custom made cradle mounted on top of the jib.

Following completion of modifications to the steel work the site was prepared for installation of the new concrete floor. The plan was to install an existing CNC wood saw in this area which was used to cut wood composite panel blanks ready for further processing in the Woodmill. This machine required a pit in the floor to accommodate material handling equipment and preparation of the site actually included provision of two pits, one for the existing machine, and one to accommodate another saw to be installed at a later date. The position of these pits coincided with an existing 250mm clay surface water drain which had to be diverted and re-laid using plastic pipe.

The replacement floor consisted of a 200mm thick reinforced concrete slab which was dowelled into the surrounding floor to prevent differential movement. The floor was poured in one day using the laser flood technique and finished using a power float. Once the concrete had cured, the floor was shot blast to provide a suitable surface for operating forklift trucks, and then painted with high quality floor paint.



4 – Phase 2 steelwork modifications complete

The completed steelwork modifications with Phase 2 (foreground) ready for decoration and installation of services. Also in view is the crane (front right) used to hoist the new steelwork into position. In the background the area completed during Phase 1 is already in use following installation of the CNC saw used to cut wood composite panels ready for further processing in the Woodmill.

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The changes to the steelwork meant that the existing sprinkler system had to be modified to raise the pipe work which fed the existing ranges installed against the underside of the roof. This work was completed using an approved contractor, after advising the insurance company and the local fire service that fire protection in that area of the factory would be reduced for several weeks. During this period additional fire extinguishers were provided and the area checked regularly for any signs of fire, particularly at the end of each late shift.

Following completion of the construction work the whole area was decorated to improve the working environment. Replacement of services included new power distribution, lighting and compressed air installations. Completion of this work enabled the existing CNC wood saw to be relocated. At the same time the extraction system was reconfigured to remove the low level ducting from the area.

Relocation of the existing CNC wood saw enabled the other half of the building to be cleared prior to the commencement of Phase 2. This was effectively a repeat of Phase 1 except that the floor did not require replacement. However, the modifications to the steelwork were complicated by the fact that additional work was needed to raise a section of roof and remove part of the steel frame of an adjacent building in order to accommodate the overhead crane.

The plan to modify the existing building, rather than demolish and rebuild it, could be considered to be somewhat unorthodox and made the project more complex to manage. However, by adopting this approach, the overall objectives were achieved much quicker, at a lower cost and perhaps most importantly with minimal loss of production.

The result of all this work can be seen in the following photograph which shows the two CNC wood saws installed in one half of the new area.



5 – In production after completion of all the facility work

“From concept through to implementation”