

- Packing tablets by hand involved repetitive handling and awkward postures because of poor workstation layout
- Risk of musculoskeletal disorders, particularly to upper limbs
- The flow of work was examined to identify imbalances and causes of awkward postures
- With work better organised, productivity targets can be met and ergonomic risks reduced significantly
- Direct intervention costs around £12,000; payback period around 3 months

Statement of the Issue

In a pharmaceutical plant, tablets were packed into vials by hand. It was cost effective to pack smaller orders by hand than run the Company's large capacity automatic packers. Figure 1 below shows the original layout of the packing area.

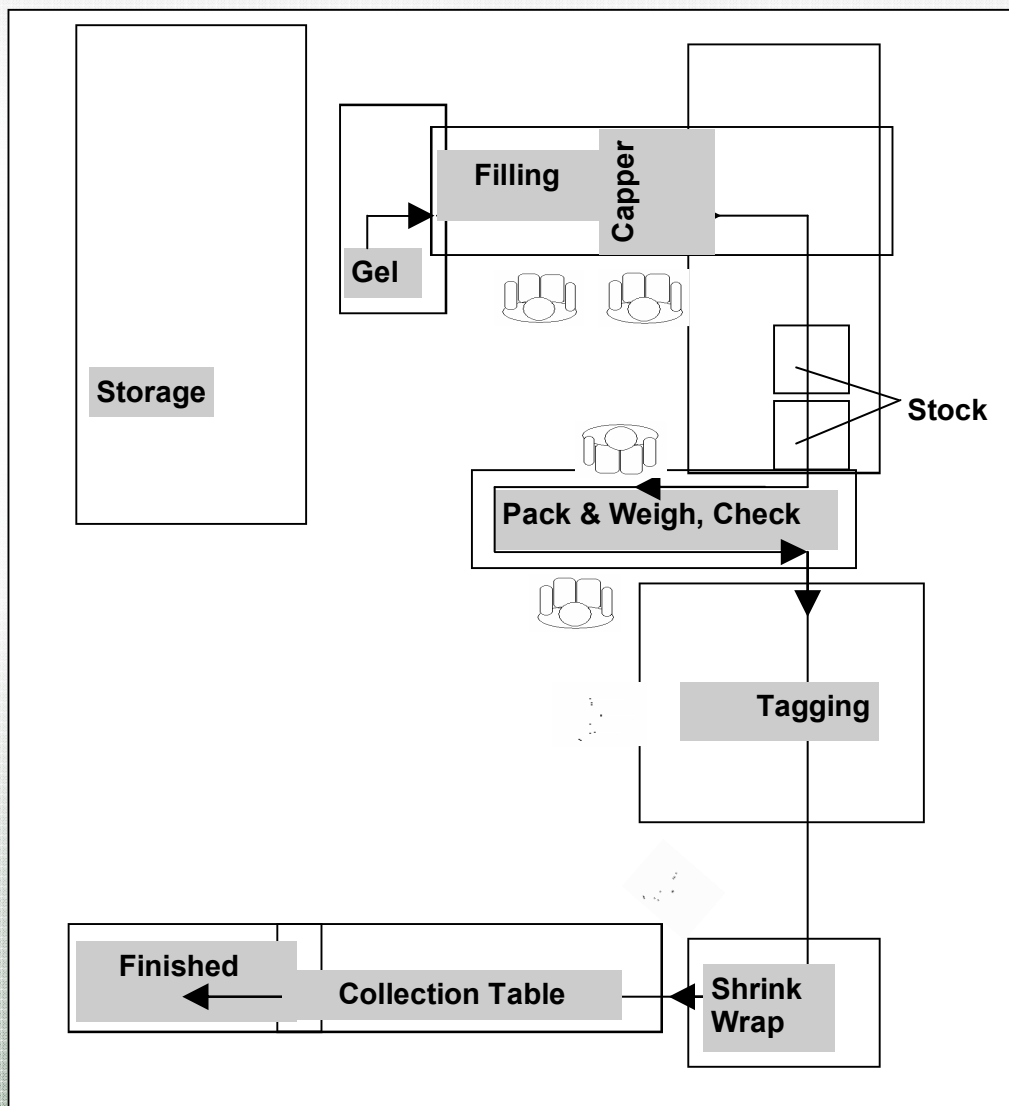


Figure 1. Original Packing Area

Most of the stages were done manually except for the counting of tablets which was done with a machine. Once each operator had finished their part of the process the tablet vials were moved on to the next stage.

The organisation of the work area resulted in the following problems:

- Long cycle time – it took over three hours for a pack to go from start to finish of the line.
- As a result work-in-progress was often 1500 packs part-finished.
- It was difficult to estimate how long jobs would take – additional operators were often brought in to help clear backlogs and overtime was costing approximately £55,000 a year.
- Storage of components was inadequate which resulted in operators frequently having to collect supplies.
- Working conditions were cramped because of the need to store items that were waiting to be progressed.
- Communication between operators was difficult because of the layout.
- Although staff were working continuously, production targets were often not achieved.

A risk assessment showed that there were ergonomic problems that increased the risk of musculoskeletal disorders:

- Operators had to twist to communicate with one another as most were not facing each other.
- A number of stages required the operators to twist to collect or move the vials.
- Tables were at different heights and some were unstable which made the transfer of materials more awkward. The tables tended to bow in the middle.
- Some of the chairs were broken; most were not adjustable.
- The work process appeared to be disorganised and was unclear. Team morale was low.

Significant outcomes

An ergonomic assessment was carried out to improve working postures. The Kanban method of studying and improving workflow was used to smooth the workflow and avoid stockpiling of vials waiting to be processed. After considering a straight line and a U shaped arrangement, the operators decided that an L shaped option would be best. The new layout is shown in Figure 2 below.

The other areas shown in Figure 1 - shrink wrapping, collation and storage tables were located nearby. The L shaped layout allowed all components to be passed by hand in a comfortable manner; there was no over-reaching or twisting. Communication was found to be easiest with this layout.

In addition to the layout, better tables and chairs were bought. The tables had no sharp edges, were resistant to vibration (which had affected the weighing scales) and did not bow in the middle. Adjustable chairs were selected, which all members of the team could use comfortably. Mobile storage units were selected which would fit under the tables. These allowed operators to keep their work area tidy and reduced the number of trips made to retrieve components.

Operators rotated jobs every hour to provide variety of postures and movements, and reduce the risk of fatigue associated with repetitive actions.

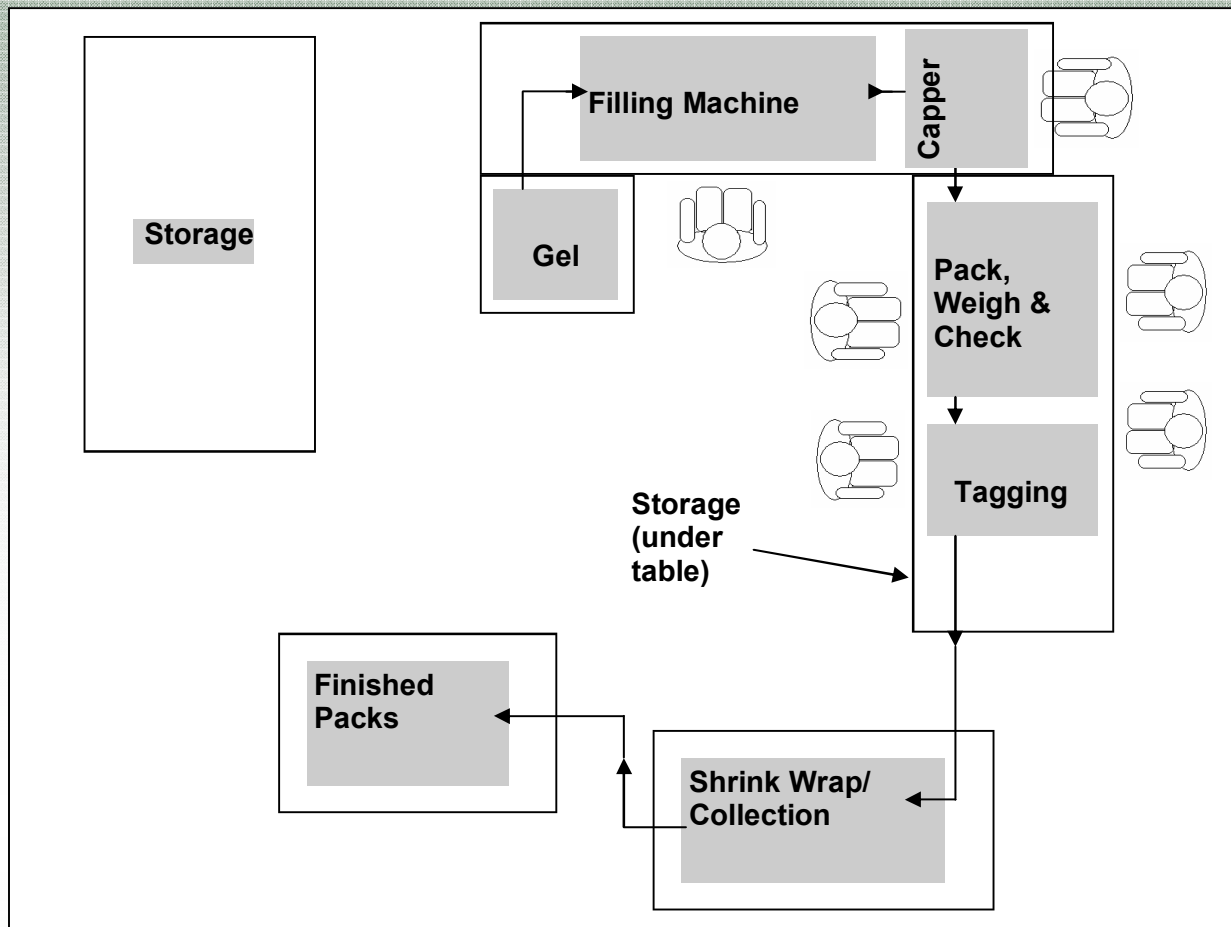


Figure 2 L shaped Layout

Costs & Benefits

Workflow and productivity benefits were as follows:

- Cycle time was reduced from three hours to five minutes as stockpiling was avoided
- Work in progress reduced to 50 packs part-finished
- Productivity targets could be consistently met
- 25% increase in productive hours for the line.

The principal ergonomic benefits were:

- Adjustable seating and better work surfaces
- Improved morale – better working conditions and the team contributed to the solution
- Better workflow, layout and organisation – reduced risk of musculoskeletal disorders through reduced twisting and stretching, balanced work flow and job rotation.

Economic Analysis

<u>Costs and benefits</u>	
Direct intervention costs:	Cost
Staff time for Kanban training, and implementation of proposals	£9,000
Purchase of equipment, tables and chairs	£2,900
	£11,900
Annual pre-intervention costs	
Overtime payments	£54,815
Work in progress costs - labour included in overtime payments	
Work in progress costs - materials	£4,688
	£59,503
Annual post-intervention costs	
Overtime payments	£5,000
Work in progress costs - materials	£156
	£5,156
	£54,347
Annual post-intervention cost savings	
	£54,347
Conclusion	
The process lifecycle is assumed to be 3 years from the date of intervention.	
Total cost of intervention	£11,900
Net present value of post intervention cost savings over the process lifecycle at an 8% discount rate £59347 per annum for 3 years	£151,262
Net intervention benefit	£139,362
Payback period	2.83 months
Base price year is 2000	

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