

ABC Shipyard: Facility Layout & Process Improvement Case

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What is Facility Layout?

Definition

Facility layout refers to the arrangement of physical facilities and resources such as machines, shops, equipment, and storage areas within a manufacturing system.

Goal: Ensure efficient material flow, minimal handling cost, high throughput, and production flexibility.



Layout Types & Selection Factors

Types of Layout

- **Process-oriented:** Functional layout (grouping similar machines).
- **Product-oriented:** Line or continuous flow.
- **Fixed-position:** Product stays, resources come to it.
- **Cellular / Hybrid:** Combination for flexibility.

Determining Factors

- Volume and variety of production.
- Flow and movement of materials.
- Space and handling constraints.
- Cost and investments required.
- Technology and labor intensity.

Layout Types Identified in ABC Shipyard

Shop / Area	Type of Layout
Steel Shop, Pipe Shop, Paint Shop	Process-focused Layout (Functional grouping)
Block Erection Area, Docks, Quay	Fixed-position Layout (Large scale assembly)
Proposed Flat & Curved Plate Cells	Product-oriented / Cellular (Streamlined flow)

Impact of Product-Oriented Layout & TOC

Impact on WIP

- Better synchronization reduces WIP accumulation.
- Prevents blocking and waiting due to missing plate types.
- Resolves semi-finished blocks congestion on the floor.

Impact on Throughput

- Maximizes utilization of the constrained resource (Block Erection Area).
- Ensures faster block completion and linear material flow.
- Reduces overall cycle time & increases ship delivery rate.

TOC Principle: *Maximize use of the bottleneck and subordinate upstream processes to it.*

What is an REL Chart?

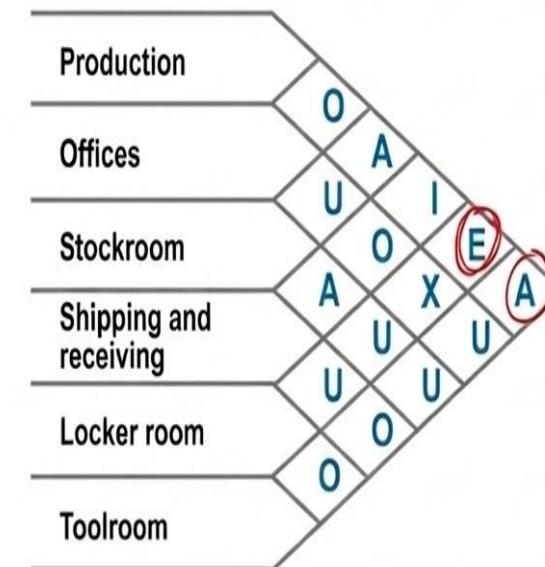
Definition

A Relationship (REL) chart is a systematic layout planning tool used to evaluate and document the necessary closeness relationships between departments based on process flow and dependency.

Key Factors Considered

- Frequency of material movement
- Handling cost reduction
- Workflow sequence requirements
- Safety, supervision & communication
- Utility and crane access constraints

Activity Relationship Chart



A - absolutely necessary for departments to be next to each other
E - especially important
I - important
O - ordinary
U - unimportant
X - Undesirable to locate departments near each other

- What is the relationship between Production and Offices?
- What is the relationship between Production and Toolroom?
- What is the relationship between Offices and Locker room?

Analysis & Process Improvements



Steel ↔ Paint

These shops should be closer. There is a major material flow from cutting (Steel) to priming (Paint) that is currently inefficient.



Warehouse Location

Currently near the office (unnecessary). It should be moved closer to General Purpose & Outfitting shops to reduce transport.



Improvement Outcome

Reduce handling delays and transportation time.

Result: Improved cycle time and overall throughput.

Limitations in Restructuring

⚠ Practical Limitations

- Disruption to current production if heavy machinery is relocated.
- Limited shutdown windows due to active ship
- ~~Lack of~~ physical space during the rearrangement phase.
- Availability of skilled labor and training requirements.

฿ Monetary Limitations

- High cost of relocating heavy equipment, cranes, and buildings.
- Significant upfront investment in redesign and infrastructure.
- Opportunity cost of lost production time during the transition.

Conclusion

- ✓ **Challenge:** ABC Shipyard suffers from excess WIP and bottlenecks at block erection.
- ✓ **Solution:** Implementing TOC and a product-oriented layout can effectively resolve bottlenecks.
- ✓ **Tool:** REL-based layout redesign will significantly improve material flow and throughput.

Verdict: *Accepting the new order is feasible with layout and process restructuring.*

