

PROCESS VERSUS ASSEMBLY INDUSTRIES ¹



	Process	Assembly
Examples	Food & beverage Paper & cardboard sheet goods Plastic sheet goods Personal care: shampoo, toothpaste Metals & ceramics Wood	Cars Computers Power tools Industrial equipment: motors, transformers Home appliances
Predominant Line flow	Divergent Fewer parts & raw materials Many finished products V, T & I - factory types	Convergent Many parts & raw materials Fewer finished products A - factory type
Line design	Unbalanced flow lines	Paced assembly lines
Primary rate limiting factor	Equipment	Labour
Labour vs capital & material	Labour ~ 30% factory costs Capital & material ~ 70% factory costs	Labour ~ 70% factory costs Capital & material ~ 30% factory costs
Improvement prioritisation	System modelling with business focus	Toyota Production System with local focus
Primary waste focus	Inventory reduction Throughput Yield losses	Inventory reduction Overproduction Defects
Points of waste accumulation	Capacity buffers <ul style="list-style-type: none"> - standby labour - standby capital 	Time & stock buffers <ul style="list-style-type: none"> - WIP between steps - extra transport between steps
Primary economic drivers	Asset productivity Inventory reduction Increased throughput Reduced yield losses	Labour productivity Inventory reduction
Role of operators	Observers Setup management	Craftsmen Complex part & material manipulation Setup management
WIP purpose	Protect bottleneck Protect schedule control points Protect customers promised ship date Manage a push/pull interface	Protect paced assembly line Protect customers promised ship date
WIP control	Size restricted by asset design (e.g. conveyors, silo's, etc.) Control system is usually CONWIP using electronic signals	Size restricted by manual control system and transport batch Control system is usually Kanban using bins or manual indicators
Application of Lean	Restricted (see here)	Extensive
Application of Six Sigma	Extensive (see here)	Extensive (see here)
Application of Theory of Constraints (TOC)	Extensive - can be complex (see here)	Extensive - can be complex (see here)
Application of Total Productive Maintenance (TPM)	Restricted (see here)	Extensive
Production levelling techniques	Product wheels Sequence optimisation Campaign length optimisation	Heijunka Control market demand
Batch size influences	Bottleneck behaviour (machine & product interactions) Economic order quantity (EOQ)	Machine setup time Transportation lot size
Setup issues	Time to clean out process vessels Material losses flushing lines out Time to reset & stabilise temperatures Tool cleaning & replacement time Time for regulatory testing Time for pressures to equilibrate Time to get properties back to target Material losses getting properties back to target	Time to replace & reset tooling

¹ Foundational references - *Lean for Process Industries*, Peter King 2009, Productivity Press and *Liquid Lean*, Raymond C. Floyd, 2010, Productivity Press.