

The total array of waste reduction techniques that help companies reduce lead time and inventory to produce exactly what the customer wants when it is wanted.

Team-based methods of just-in-time production (JIT) that remove non-value adding wastes (e.g., waiting, inspection, transport, motion, overproduction, defects, inventory) from the production process.

Level 1 Plan	Level 2 Pilot	Level 3 Deploy	Level 4 Integrate	Level 5 Excel
<ul style="list-style-type: none"> ▪ Job shop layout; large lots accumulate near machines and operators, each process moves at own pitch (rhythm) ▪ Unquestioned support for single-skill, single-process operations ▪ 1 or 2 changeovers per month, regardless of customer requirements, taking as much as half a day ▪ All processes require manual assistance ▪ Push production; inventory stored everywhere ▪ Production as it comes: monthly production schedule; processes have own rhythms 	<ul style="list-style-type: none"> ▪ Job shop layout; some small lot production and reliance on conveyance systems ▪ Single-skill, single process operations with some cooperation among operators at adjacent processes ▪ Opportunities identified for cellular manufacturing; product families identified; successful pilot JIT cell formed ▪ Die change and setup analysis and pilot changeover improvement projects begin ▪ Some automation exists, but operator always present while machines work ▪ Push production, with organized storage sites for WIP ▪ Fixed lots; biweekly production schedule; each process has its own rhythm 	<ul style="list-style-type: none"> ▪ Cellular and in-line layouts are geared for single process, small lot flow ▪ Flow-based, cooperative operations; workers capable of helping next worker "upstream" and "downstream" ▪ Application of group technology for major product families ▪ Changeover teams active in most major areas; changeover times decreasing, leading to 10 minute changeovers on bottleneck equipment ▪ Major equipment can run one unmonitored cycle during lunch, but defects still occur ▪ Pull production, with fixed locations and fixed volumes of parts and WIP; kanban implementation begins in pilot areas ▪ Weekly production schedule; overall line is roughly synchronized 	<ul style="list-style-type: none"> ▪ Cellular and in-line layouts are geared for one-piece flow within and between processes ▪ Flexible job assignments with wide variation between workers in quality and volume of output ▪ Ten-minute maximum on all changeover; 'one-touch exchange of die' implemented on bottleneck equipment ▪ Most machines run unmonitored during lunch; poka yoke devices applied actively to eliminate defects ▪ Pull production, with kanban; individual cells combine into lines ▪ Daily production runs; in-line production with specific cycle times; mixed model processing begins 	<ul style="list-style-type: none"> ▪ Full multiprocess operations with one-piece flow ▪ Flexible job assignments with little variation in quality and volume of output ▪ Changeovers done within cycle times; changeovers automated where necessary ▪ Human and machine work are separated; machines run unmonitored and make no defects ▪ Pull production with refined kanban ▪ Completely level production with plantwide synchronization; mixed model processing is routine