

A lean production maintenance approach that ensures proper operation and maintenance, as well as readiness and availability of equipment and processes.

Team-based methods that ensure equipment and processes always function when they are needed, at the rate that is needed, and with exceptional quality.

Level 1 Plan	Level 2 Apply	Level 3 Deploy	Level 4 Integrate	Level 5 Excel
<ul style="list-style-type: none"> ▪ No ongoing improvement activities; occasional projects initiated by engineering when critical equipment fails ▪ Operators "operate" equipment; when it goes down they expect maintenance to "fix" it ▪ Most equipment is in a deteriorated condition and is repaired by maintenance as it breaks down ▪ Individual equipment histories, where they exist, give inadequate information for failure analysis ▪ Installation and startup phases for new equipment and processes are lengthy and often involve extensive debugging and retrofitting ▪ Finance department makes equipment investment decisions based on price and machine capacity 	<ul style="list-style-type: none"> ▪ Operator teams form to work with maintenance in establishing and maintaining basic equipment wellness conditions ▪ Maintenance and Engineering work with teams to restore equipment to "like new" condition ▪ Equipment loss is baselined and monitored on constraint equipment; cross-functional improvement teams formed to track OEE and eliminate the 7 big equipment losses ▪ CMMS used to track and manage preventive and proactive maintenance activities ▪ Cross functional Early Equipment Management teams focus their efforts on right sizing equipment and resolving startup problems ▪ Life cycle cost is considered as an investment criteria ▪ OEE for constraint equipment 40%--> 65% 	<ul style="list-style-type: none"> ▪ Initial application area has restored all equipment in response to autonomous maintenance activities and rollout to other areas begun ▪ Operators learn and understand equipment functions and structure and are trained to conduct general equipment inspections ▪ Teams strive to achieve zero unplanned downtime losses through pareto analysis of the 7 big losses and problem solving; implemented quick changeover ▪ Sporadic failures are controlled through implementation of predictive maintenance tools ▪ Equipment problems and their solutions are routinely documented in a Failure Report and Corrective Action System (FRACAS) for use in subsequent equipment design/development activities ▪ Design to life cycle cost and for quality assurance are major equipment investment criteria ▪ OEE for constraint equipment 65%-->75% 	<ul style="list-style-type: none"> ▪ All critical equipment and all lines are managed through the LEM process ▪ Cross-functional teams establish and maintain conditions for zero unplanned downtime losses on constraint equipment ▪ Processes highly capable, but variability still high ▪ Operators learn the relation between equipment conditions and quality ▪ Condition monitoring and predictive maintenance are expanded; failure analysis of equipment parts is routine ▪ Equipment design and procurement teams establish and are using an effective Early Equipment Management process ▪ Design for life cycle profit is included in equipment investment criteria ▪ Preliminary constraint equipment has been elevated and OEE on remaining constraint equipment is 75%-->85% 	<ul style="list-style-type: none"> ▪ Many lines regularly reporting zero unplanned downtime losses ▪ Variability very low ▪ Operator teams incorporate maintenance standards into their daily routines and participate in equipment improvement activities ▪ Predictive maintenance technologies are used extensively to support maintenance activities and maintenance costs are reduced substantially ▪ New equipment and product installations achieve "vertical startup" ▪ OEE on constraint equipment 85% or better as all lines achieve takt time ▪ Reliability growth is tracked on each process and trends upward