Improving Back-End operations productivity for a major semiconductor manufacturer

One of our major semiconductor clients is a global leader in embedded processing solutions, advancing the automotive, consumer, industrial and networking markets. The client has its Back-End (Assembly and Test) facilities in various parts of Asia. This case study focuses on the productivity improvement assessment performed at their Kuala Lampur site.

The key component of Tefen's diagnostic study included the MOS (Multi-Observation Study) methodology during shop observations. In addition, qualitative methods were applied as well such as interviews and analysis for internal information systems and reports.

As a result of the diagnostic, 4 primary improvement levers were identified

- Reduction of non-value added activities including Inspections
- Rationalization of overall shop floor layout
- Streamlining of Planning and Scheduling Process
- Defining the Staffing Strategy

In addition several tactical and cultural improvement opportunities were identified.

Implementation of these improvement levers helps our client achieve:

- Potential reduction of full time equivalent's (FTE's) by 48 – 66 operators, leading to annual savings of approximately $288,000 to $396,000
- Increase in O.E.E. improvements in several areas of up to ~10 % points

Challenge

The client wanted to improve the overall productivity in their Back-End Operations. The client decided to select the RF lines in the Kuala Lumpura facility as a prototype area for a productivity improvement program. The areas of productivity improvements included: Labor Productivity, Increasing Throughput, Cycle Time Reduction, OEE Improvement, Yield Improvement, Layout Improvement, Cost Reduction, Lean Methodologies, Work Processes / Standard Operations Improvements, Safety and overall continuous improvement culture.

How Tefen Helped

The key component in Tefen's diagnostic study was floor observation. The observation included continuous sampling of the production floor using MOS (Multi-Observation Study) methodology. MOS consists of four major steps, Study Preparation, Floor Observation, Data Analysis, and Identifying and Quantifying Improvement Opportunities:

1) Study Preparation

- Interview operators, technicians, engineers, and managers. Identify perceived problems and constraints
- Perform preliminary observations of the production floor
- Collection of historical data from the floor information system
- Define activity list for observation of each entity (equipment, operators, WIP locations, etc.) to be sampled
- Define the sub-areas to be sampled and plan the study accordingly
- Describe (in detail) activity identification
- Perform pilot study of the area to identify potential problems

2) Floor Observation

Observations were collected from the production floor for six days, around the clock by a team of Tefen consultants and client team members according to the sampling plan. During the study Tefen completed the following:

- Sampled and logged defined activities
- Observed and recorded qualitative issues such as:
    a. Operational work methods
    b. WIP management / WIP scheduling
    c. Manufacturing procedures (Pass-downs, breaks, etc.)
    d. Maintenance and tool qualification procedures
    e. Layout and workstation design

In addition, during the study Tefen gathered and correlated qualitative information from internal information systems and other resources, such as interviews, forms, reports, and direct observations.

3) Data Analysis

Tefen performed a detailed analysis of the MOS data gathered during observations. After the information was processed, the following was completed:

- Analyzed quantitative and qualitative data gathered in the study
- Conducted internal brainstorming
- Evaluated general subjects relevant to the study area, including:
    a. Operational work methods
    b. WIP Management / WIP scheduling
    c. Staffing level considerations
    d. Manufacturing procedures
    e. Maintenance procedures
    f. Communication, and interface between the different operational functions (manufacturing, maintenance, production control, engineering)
    g. Layout and workstation design

4) Quantified Improvement Opportunities

- Developed a preliminary list of improvement opportunities
- Quantified the opportunities
- Conducted cost benefit analysis
- Prioritized the Opportunities

Results/Acheivement

During the diagnostic project, the following five levers for improvement were identified by Tefen:

1) Reduction of Manual and Repeated Inspections

The current quality regimen consists primarily of various 100% manual visual inspections which have led to a large proportion of operators' time being utilized for inspection. To eliminate 100% manual visual inspection, Tefen proposed moving toward Statistical Process Control (SPC) sampling in strategic areas of the RF production processes and eliminating repeated inspections. This would result in a potential reduction of 27 FTEs.

2) Rationalization of RF Test layout

During observation, Tefen identified ways in which the cell layout in the RF test area can be further optimized to reduce operators' movements and decrease the required manning ratio. This includes improvements to the individual cell structure and overall area layout. This would result in a potential reduction of 24 FTEs.

3) Streamlining of Planning and Scheduling Process

An opportunity to decrease downtime and increase production capacity was recognized by improving the planning process. This would be achieved by dedicating production lines for high volume products. This corresponding decrease in downtime would correlate to a potential increase in OEE percentage from approximately 1-4% in the various processes of RF production.

4) Defining the Staffing Strategy

During observation, Tefen identified high levels of trainee and contract employees working in skilled roles in production, mainly in Manual Die Bond and Wire bond processes. Besides creating efficiency losses, this staffing practice unnecessarily increased head-count and training requirements. An opportunity was identified to define an optimal strategy to retain skilled employees and assign them efficiently across operations, thus maximizing return on investment of operator skills.

5) Additional Improvements

In addition, the following improvements opportunities were identified

- Elimination of resources conducting non value-add activites in Die Bond, leading to a potential reduction of 3 FTEs.
- Training and introduction of technically capable operators in Manual Die Bond and Wire bond to assist with setups and minor repairs, thus allowing technicians to focus on broken down machines. This would ultimately increase uptime of machines and thusly increase OEE percentage approximately 4-5% in the relevant processes.
- Also, the short term opportunity to increase uptime of Manual Die Bond machines exists due to the simple lack of technical capability on the line to manage machine breakdowns and set-ups. This can be remedied by reducing operators by a potential of 12 FTEs to only staff functional machines or to increase the amount of technicians by 6 FTEs to more efficiently manage the technical and maintenance needs of Manual Die Bond machines.

About Tefen

Tefen is an international management consulting firm, committed to improving overall operational effectiveness for Fortune 500 companies around the world. The firm's main areas of focus include operations excellence, manufacturing, quality, customer service, research and development and supply chain management. With its "hands-on" approach philosophy, the company has achieved tremendous success in delivering quantifiable and value-driven results for its clients in a variety of industries, including healthcare, life sciences, general manufacturing, high-tech and financial services. All of Tefen's support programs are ISO 9001 certified. Tefen currently employs over 300 professionals worldwide.

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