SIX BIG LOSSES

TOOL

LEVEL: FOUNDATION
DIFFICULTY: MODERATE

The Six Big Losses are a very effective way to categorize equipment-based losses: Unplanned Stops, Planned Stops, Small Stops, Slow Cycles, Production Defects, and Startup Defects. They are aligned with OEE and provide an excellent target for improvement actions.

OVERVIEW

What are the Six Big Losses?

The Six Big Losses originate from the world of Total Productive Maintenance (TPM). Seiichi Nakajima developed TPM and the Six Big Losses in 1971 while at the Japanese Institute of Plant Maintenance. He characterized maintenance as the responsibility of all employees; best carried out through small group activities with the goal of maximizing equipment effectiveness.

Six Big Losses categorize productivity loss from an equipment perspective. They align directly with **OEE**† and provide an additional and actionable level of detail about OEE losses.

Overall Equipment Effectiveness	Recommended Six Big Losses	Traditional Six Big Losses
Availability Loss	**Unplanned Stops**	Equipment Failure
	Planned Stops	Setup and Adjustments
Performance Loss	**Small Stops**	Idling and Minor Stops
	Slow Cycles	Reduced Speed
Quality Loss	**Production Defects**	Production Defects
	Startup Defects	Startup Defects
OEE	**Fully Productive Time**	Valuable Operating Time

Our recommended names and definitions for the Six Big Losses simplify and strengthen the alignment to OEE – and ensure that all losses are covered.

Why Use Six Big Losses?

The Six Big Losses are very well-aligned to discrete manufacturing and provide a more detailed perspective on equipment loss than OEE. Since the Six Big Losses are derived from TPM, each loss maps very well to a specific set of countermeasures. Not only do you get more information – you get a foundation for more effective actions.

The Six Big Losses

Unplanned Stops

Unplanned Stops are significant periods of time in which equipment is scheduled for production but is not running due to an unplanned event. Examples include equipment breakdowns, tool failures, unplanned maintenance, lack of operators or materials, being starved by upstream equipment or being blocked by downstream equipment.

Planned Stops

Planned Stops are periods of time in which the equipment is scheduled for production but is not running due to a planned event. Examples include changeovers, tooling adjustments, cleaning, planned maintenance, and quality inspections. Many companies also categorize breaks and meetings as Planned Stops.

Small Stops

Small Stops occur when equipment stops for a short period of time (typically a minute or two) with the stop resolved by the operator. Small Stops are often chronic (same problem/different day), which can make operators somewhat blind to their impact. Examples include misfeeds, material jams, incorrect settings, misaligned or blocked sensors, equipment design issues, and periodic quick cleaning.

Slow Cycles

Slow Cycles occur when equipment runs slower than the Ideal Cycle Time (the theoretical fastest possible time to manufacture one piece). Examples include dirty or worn out equipment, poor lubrication, substandard materials, poor environmental conditions, operator inexperience, startup, and shutdown.

Production Defects

Production Defects are defective parts produced during stable (steady-state) production. This includes parts that can be reworked, since OEE measures quality from a First Pass Yield perspective. Examples include incorrect equipment settings, operator or equipment handling errors, or lot expiration (e.g., pharmaceutical).

Startup Defects

Startup Defects are defective parts produced from startup until stable production is reached. They can occur after any equipment startup, however, are most commonly tracked after changeovers. Examples include suboptimal changeovers, equipment that needs "warm up" cycles, or equipment that inherently creates waste after startup (e.g., a web press).

BENEFITS

In the **short term**, Six Big Losses provides additional information that aligns with and extends OEE (improved information).

In the **long term**, Six Big Losses makes it easier to identify effective countermeasures for equipment-based losses (improved actions).

ROLES

Six Big Losses involves the following roles:

Role	Description
Manager	Define how data will be collected. Define standards for determining Ideal Cycle Times. Define and maintain reason codes. Set and track improvement targets. Identify strategic improvement initiatives. Audit for sustainability.
Supervisor	Validate Ideal Cycle Times. Review losses at the start of each shift to identify and assign improvement actions. Audit accuracy of data capture.
Operator	Capture reason codes for all Unplanned and Planned Stops. Suggest improvements and actions based on observations.

KEY INSIGHTS

Monitor the Constraint

Every manufacturing process has a constraint, which is the fulcrum (i.e., point of leverage) for the entire process. Measure Six Big Losses at the constraint and focus your improvement efforts to **IMPROVE THE CONSTRAINT**†. This will be the fastest path to improved throughput and profitability.

Don't Hide Loss

Time that *can be* used for value-added production (i.e., manufacturing to meet customer need as opposed to manufacturing for inventory) *should be* used for value-added production. If it is not – that time should be categorized as a loss. This strict standard drives innovation and improvement. Every loss can be targeted and improved.

This is the reason that many companies choose to categorize breaks and meetings as Planned Stops, and are also very careful to ensure that their Ideal Cycle Times are based on the fastest possible time to manufacture one piece (not "standard" or "budget" times).

Standardize Changeover Time Measurement

Measure changeover time accurately and consistently by standardizing the measurement. It is usually measured as the time between the last good part of the prior run to the first good part of the next run. You can define your own standard – the important thing is to be consistent.

Create a Six Big Loss Rulebook

Consistency is important when using the Six Big Losses as a benchmark (comparing across shifts, equipment or plants) or as a baseline (comparing over time). Create written standards to ensure consistency.

	Rule	Six Big Loss
✔	Any cycle that is **200%** of Ideal Cycle Time is an Unplanned Stop.	Unplanned Stops
✔	Reasons **are**/are not captured for each Unplanned Stop.	Unplanned Stops
✔	Changeover time is measured from **last good piece to first good piece**.	Planned Stops
✔	Breaks are **Planned Stop**/Not Scheduled time.	Planned Stops
✔	Reasons are/**are not** captured for each Small Stop.	Small Stops
✔	Any cycle that is **150%** of Ideal Cycle Time is a Small Stop.	Small Stops
✔	Any cycle that is **120%** of Ideal Cycle Time is a Slow Cycle.	Slow Cycles
✔	Rework pieces are **included**/excluded as defects.	Production Defects
✔	The first **5 minutes** after a Planned Stop is Startup Time.	Startup Defects

Create a simple Six Big Loss Rulebook and uniformly apply it across your company to ensure that every team measures loss consistently.

Automate Data Capture

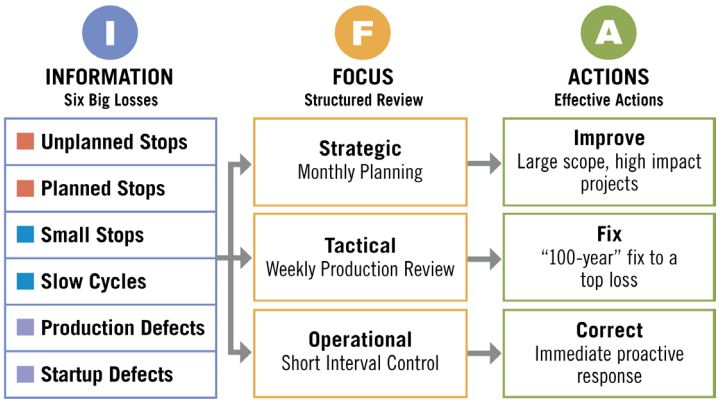
Automated data capture significantly improves measurement accuracy for Unplanned and Planned Stops, and is the only way to accurately measure and differentiate losses from Slow Cycles and Small Stops.

A quick rule of thumb for setting the threshold between an Unplanned Stop (OEE Availability Loss) and a Small Stop (OEE Performance Loss is to define Unplanned Stops as long enough to require a reason to be logged – and then deciding what that duration should be.

Actions Speak Louder Than Words

The Six Big Losses provide valuable information and insights, but most of their value comes from using that information to drive actions. An excellent framework for driving actions is the combination of **IFA**† and **STRUCTURED REVIEW**†.

- **IFA**† transforms information into actions through focused decision-making at all levels of the company (strategic, tactical, and operational).
- **STRUCTURED REVIEW**† ensures those actions are aligned through all levels of the company.



IFA and Structured Review provide a framework for driving effective actions across all levels of the company.

LEVEL AND DIFFICULTY

The Level is Foundation. Six Big Losses are a natural extension to measuring OEE and provide valuable insights for driving improvement.

The Difficulty is Moderate. The core concepts are straightforward. However, capturing accurate and complete information requires automation (which can be easily achieved with an off-the-shelf system).

RATE YOURSELF

How good are you at Six Big Losses? Answer ten simple questions to see how close you are to a model implementation.

Question	✔
1. Are all six (6) of the Six Big Losses being measured?	
2. Do all operators and supervisors understand the Six Big Losses?	
3. Are all losses measured from the perspective of the constraint?	
4. Are reasons captured for all Unplanned Stops?	
5. Are changeovers, breaks, and meetings categorized as Planned Stops?	
6. Are validated Ideal Cycle Times available and in use for each part?	
7. Are rework parts counted as defects (First Pass Yield perspective)?	
8. Do all teams use the same Six Big Loss Rulebook?	
9. Is data capture automated to improve accuracy?	
10. Is a formal framework in place to transform information to actions?	

†This topic is also available as part of the XL Improvement Framework.

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