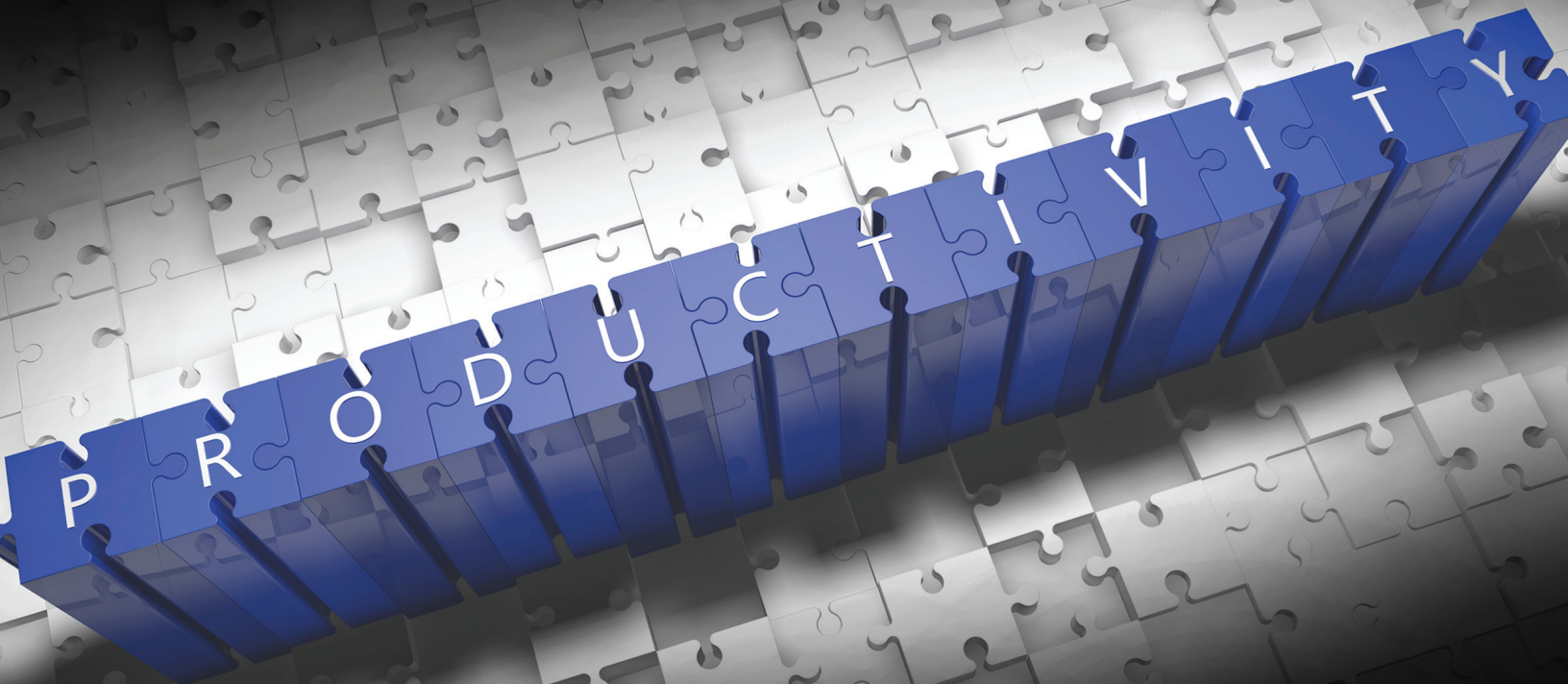


USER GUIDE

OEE STARTER TOOL

Key Concepts & Instructions



brought to you by:

PMMI | 11911 Freedom Drive, Suite 600 | Reston, VA 20190 | opxleadershipnetwork.org



OEE STARTER TOOL Key Concepts & Instructions

TABLE OF CONTENTS

Sponsors & Contributors	2	Labor Cost Elements	7
Overview	3	Labor Cost Savings Opportunities	8
Purpose of the OEE Benefit Calculator	3	Scope of the OEE Starter Tool	9
Overall Equipment Effectiveness	3	Guide to Completing the OEE Starter Tool	9
OEE: a pervasive impact on business results	3	Inputs	10
Why Focus on OEE?	4	Outputs & Calculations	11
OEE Starter Tool Basis for Savings Calculations.	4	Up-Front Pointers	12
Yield Loss Defined (Tomato Paste Example).	5	Step-by-Step	13
Driving Yield Loss Improvement	6	Report Out	16

SPONSORS



Facilitated by PMMI, the OpX Leadership Network is a dynamic community of manufacturing, engineering and operations professionals dedicated to operational excellence. Through open dialogue between CPG manufacturers and OEMs, the OpX Leadership Network provides an exceptional forum where the best minds come together to identify and solve common operational challenges, and apply best practices and innovative solutions to the real-world context of manufacturing.



PMMI is a trade association of more than 600 member companies that manufacture packaging, processing and related converting machinery in the United States or Canada; machinery components and packaging containers and materials. PMMI's vision is to be the leading global resource for the packaging and processing supply chain, and its mission is to improve and promote members' abilities to meet the needs of their customers. Learn more about PMMI and the PACK EXPO trade shows at PMMI.org and Packexpo.com.



GE is the world's Digital Industrial Company, transforming industry with Software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry. www.ge.com.

CONTRIBUTORS:

CHAIR: MARK HANLEY, LAND O'LAKES

PROJECT LEADER: PETE HOCK, CON AGRA

Big Heart Pet Brands, Dean Haverkamp
B G Foods, Bill Herbes
Boston Beer, Zeb Robbins
Bush Bros., Chris Payne
Campbell Soup, Galen Breuninger
Del Monte, Scott Butler
GE, Marcela Marquez
GE, Katie Moore
GSK, Diana Franciosa
Hersheys, Bill Vipperman
Hormel, Matt Stasi
Land O'Frost, Jeremy Fair
Marzetti, Tom Deschler
Morgan Foods, Tim Hargrove
NBTY, Scott Spencer
Nestle, Bryan Griffen
OpX Leadership Network, Stephen Perry Ph.D.
OpX Leadership Network, Steve Schlegel
Pepperidge Farm, Dean Hoag
PMMI, Tom Egan
Snyder's Lance, Erik Jensen
SPX, Bill Snow
Sunopta, Jeremy Kacuba

OEE STARTER TOOL Key Concepts & Instructions

Overview

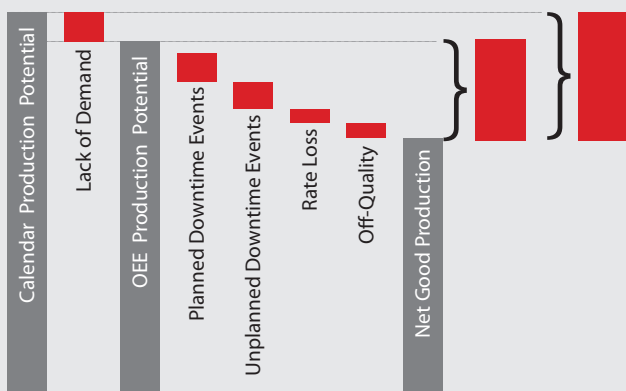
- Statement of Purpose
- OEE Defined
- OEE Impact on Performance
- Basis of OEE Starter Tool
- Scope of OEE Starter Tool
- Guide to Completing the OEE Starter Tool

Purpose of the OEE Starter Tool

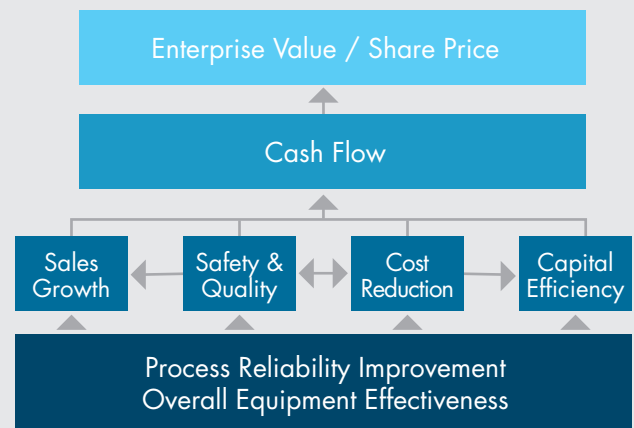
Gain an estimate of the “size of the prize” of potential savings to be gained through OEE improvement

Provide analysis to help determine the return on investment for an OEE tracking & improvement program

OVERALL EQUIPMENT EFFECTIVENESS



OEE: A PERVERSIVE IMPACT ON BUSINESS RESULTS



OEE STARTER TOOL Key Concepts & Instructions

Why Focus on OEE?

OEE performance has a pervasive impact on key success factors for automated manufacturers

Customer service & delivery

Quality variation and defect loss

Raw material scrap & waste

Labor efficiency

Equipment repair & maintenance expense

Overhead spending and absorption

OEE Starter Tool Basis for Savings Calculations

Production Labor and Raw Material Yield losses have a very strong direct correlation with production line efficiency loss

The following slides identify the relationship between line efficiency and production labor and raw material usage efficiency

Other performance dimensions such as case fill rate, quality defects, etc., also correlate with line efficiency, but the relationship is impacted by additional factors and the calculations are more complex

Due to the complexity of those relationships, the OEE Starter Tool focuses only on Production Labor and raw Material Yield losses

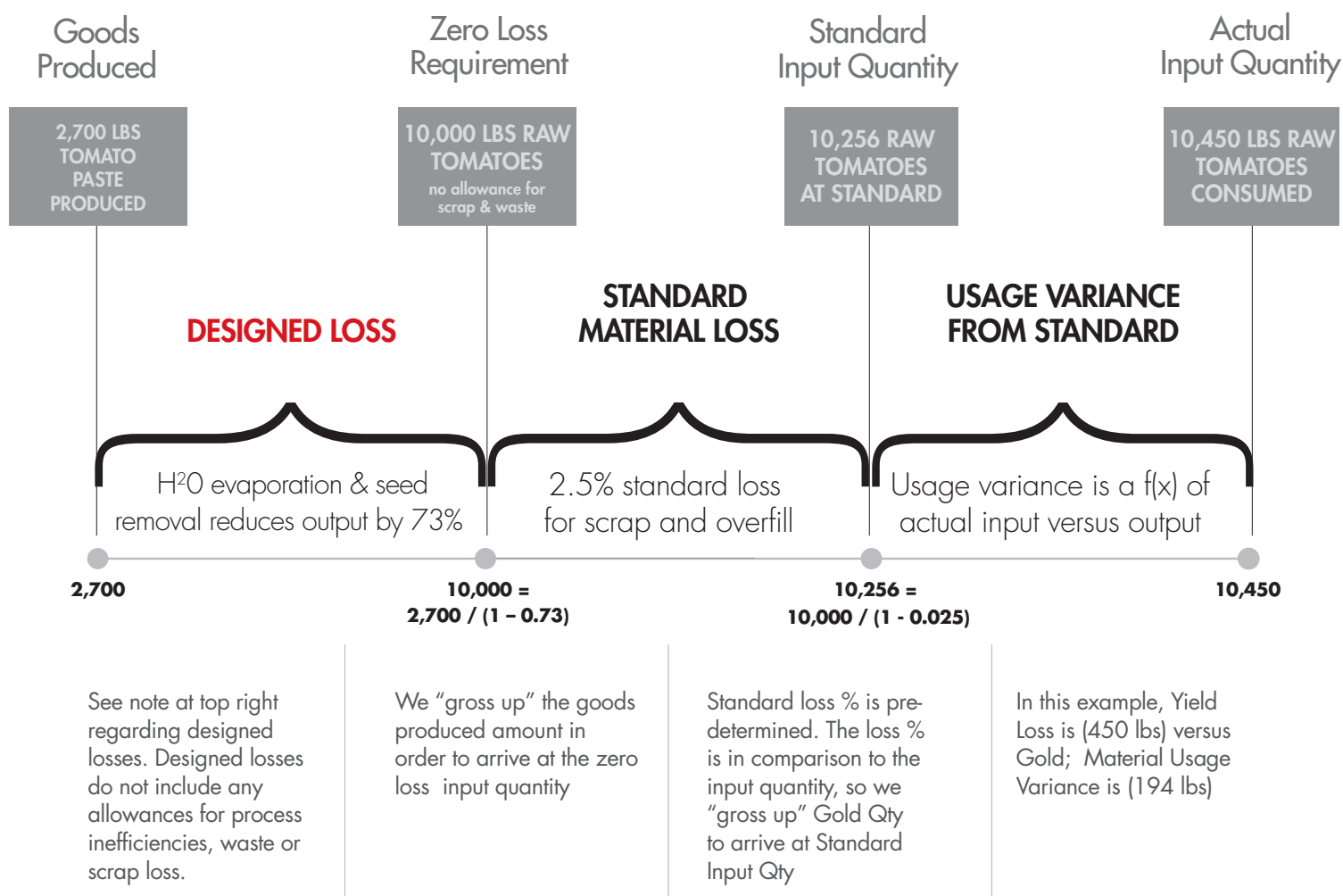
OEE STARTER TOOL Key Concepts & Instructions

Yield Loss Defined | Tomato Paste Example

Designed Loss Included in Zero Loss Requirement:

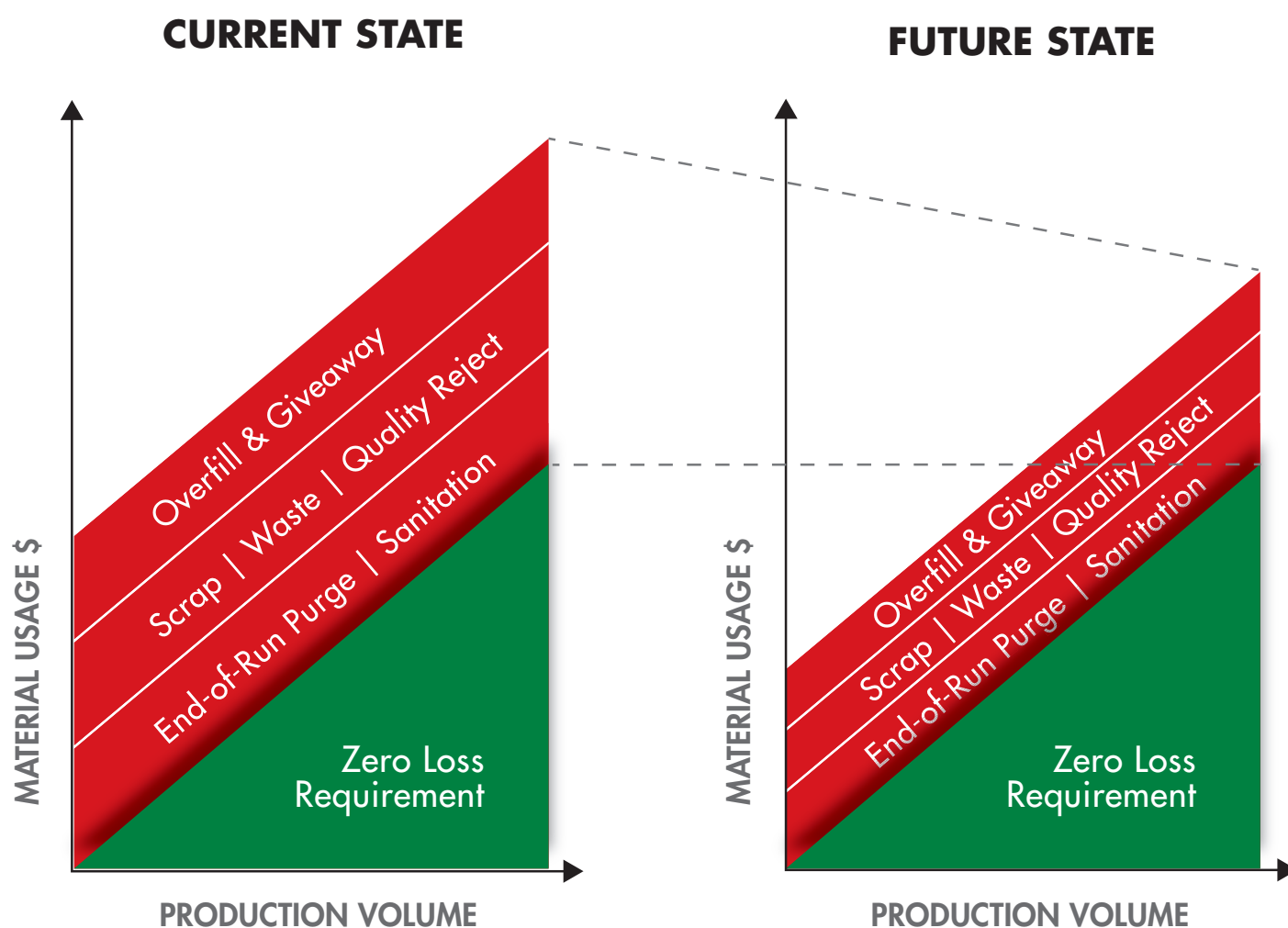
Elements that are a natural part of the raw material input, but are removed in order to meet consumer requirements.

Examples include: excess moisture, impurities, bones, husks, seeds, etc.



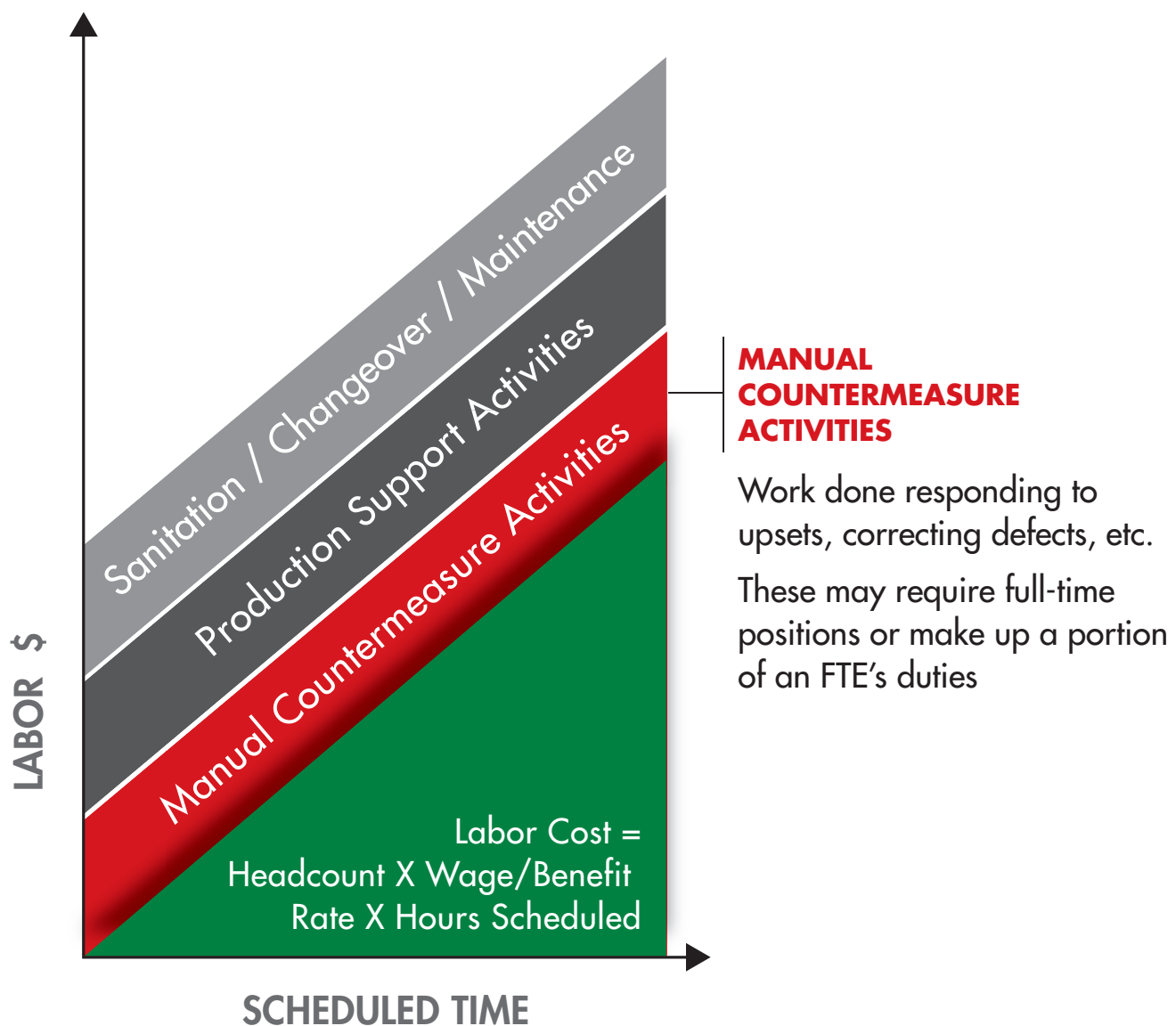
OEE STARTER TOOL Key Concepts & Instructions

Driving Yield Loss Improvement



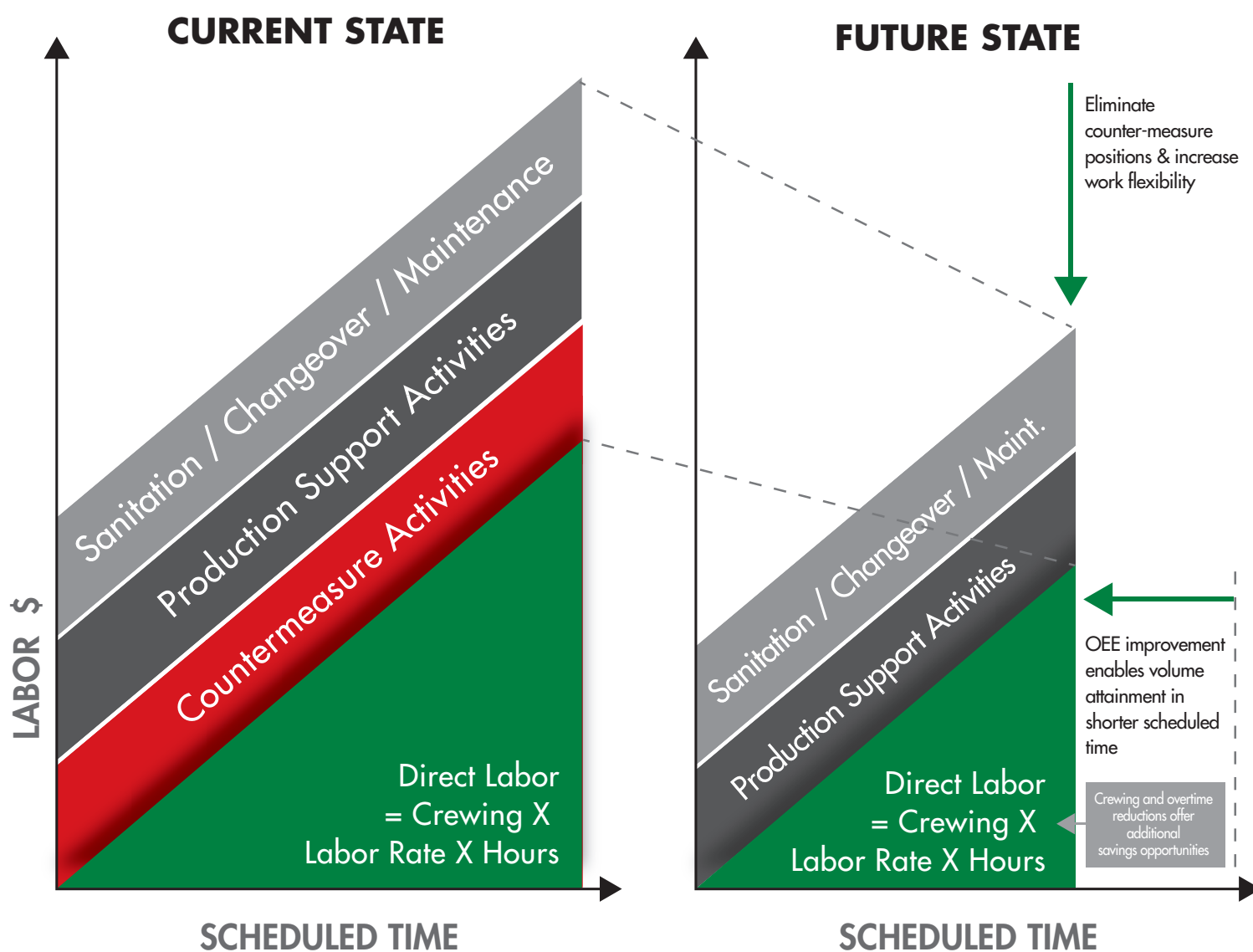
OEE STARTER TOOL Key Concepts & Instructions

Labor Cost Elements



OEE STARTER TOOL Key Concepts & Instructions

Labor Cost Savings Opportunities



OEE STARTER TOOL Key Concepts & Instructions

Scope of the OEE Starter Tool

OEE Tracking

OEE data is captured and tracked at the production line level

OEE data can be rolled up to plant and multi-plant levels

OEE Improvement

OEE improvement is most effective when it is prioritized to a specific line with a clear plan of action to deliver measurable results

Successful improvements and learnings may be reapplied across additional production lines

The OEE Starter Tool focuses on evaluating the opportunity on a single production line

Pick a line where gaps in service, quality or costs are hurting your business

Justify and deploy an OEE tracking and improvement program on that line

Use the successes on that line to prove the value of expanding the OEE tracking & improvement program to additional lines and plants

Guide to Completing the OEE Starter Tool

The following slides present:

Inputs data points, definitions & guidance

Outputs & calculations

Pointers & step-by-step instructions

OEE STARTER TOOL Key Concepts & Instructions

Inputs

INPUT CATEGORY	GUIDANCE
Plant Name, Date Prepared and Prepared by	Identify who, where, when
Production Line	Identify the line. The AIOE recommends that this analysis be performed at the production line level, since that is where direct costs and production efficiencies are most easily measured
Annual Budget Units Produced	Use the units that are called for in your budget cost standards, for example, cases or hundredweight
Annual Budget Line Production Hours	Annual Budget Line Production Hours
Annual Budget Raw Material \$000	Total annual budget expense for ingredients, raw materials and packaging Enter as thousands of dollars
Annual Budget Production Labor Wages & Benefits \$000	Total annual budget expense for direct production labor wages and fringe benefits Enter as thousands of dollars
Raw material efficiency loss %	Most standard costing systems identify an estimated % of material in excess of the zero-loss quantity, that is needed to cover expected levels of scrap, waste, quality defects or overfill/giveaway
Target Production Speed	This is the target line speed setting called for in standard operating procedures. It is greater than budgeted production units per hour in cell C18, because the budget takes into account efficiency losses, slow running, rework, etc. This may require calculation of a weighted average target speed if the budget is calculated based on SKU-specific production rates Be sure to convert the target line speed into budget units per hour, for example, cases per hour, not bottles per minute
Target % Reduction in Line Productivity Loss	Enter a target % reduction in line efficiency loss . As an example, for a line at 80% efficiency, the loss is 20%. A 10% reduction in efficiency loss is worth (10% improvement X 20% loss = 2% improvement. So the line would improve from 80% to 82% efficiency.

OEE STARTER TOOL Key Concepts & Instructions

Outputs & Calculations

OUTPUT DATA CATEGORY	DESCRIPTION & CALCULATION
Raw Material Zero Loss Opportunity \$000	This is the amount of budget raw material expense that is in excess of a theoretical zero-loss expense. The zero-loss expense is that which would be achieved if 100% of all material consumed was converted into saleable product, with no scrap, waste, quality defects and no overfill/giveaway Calculation: Annual Budget Raw Material \$000 X Raw Material Efficiency Loss %
Direct Labor Zero Loss Opportunity \$000	This is the theoretical zero-loss total direct labor savings that could be achieved if there were no scrap, rework or production inefficiencies. This calculation is based on the assumption that, with improved efficiency, the budget annual production volume could be achieved in fewer labor crew production hours Calculation: Annual Budget Labor \$000 X (1-production line efficiency %)
Estimated "Size of the Prize" at various improvement target levels	
Raw Material Yield Savings \$000	Calculation: % Improvement in Line Efficiency X Raw Material Zero Loss Opportunity \$000
Production Labor Savings \$000	Calculation: % Improvement in Line Efficiency X Production Labor Zero Loss Opportunity \$000
Total Savings \$000	Sum of Raw Material Yield Savings and Production Labor Savings

OEE STARTER TOOL Key Concepts & Instructions

UP-FRONT POINTERS

OEE Starter Tool®

Developed by the 25+ CPG companies and their suppliers who are members of the AIOE Operational Reliability Solutions Group
Available for free download



PURPOSE OF THIS WORKSHEET: Gain a rough estimate of the "size of the prize" of potential savings, to determine the potential payout to be gained through OEE measurement and improvement activities

Plant Name		Date Prepared	
Production Line		Prepared by	

Data Required to Estimate the "Size of the Prize"

Basic Financial Data	Total	\$/Unit	Data Source
Annual Budget Units Produced			Annual Budget
Annual Budget Line Production Hours			Annual Budget
Annual Budget Production Units/Hour	0		

Annual Budget Raw Material \$000		#VALUE!	Annual Budget
Annual Budget Production Labor Wages & Benefits \$000		#VALUE!	Annual Budget
Total Raw Material & Direct Labor \$000	\$0	#VALUE!	

Raw material efficiency loss %		Budget Standard Cost Detail
Raw Material Zero-Loss Opportunity \$000	\$0	

Target Production Speed in Budget Units per Hour		Standard Operating Procedures
Production Line Efficiency %	0.0%	
Production Labor Zero-Loss Opportunity \$000	\$0	

Estimated "Size of the Prize" at Different Levels of Line Efficiency Improvement

10% Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		10.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

25% Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		25.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

Target % Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		0.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

- 1 The workbook contains no macros
- 2 Input cells are highlighted in light-blue
- 3 All other cells are protected. Calculations & outputs are automatic
- 4 Hover your mouse pointer over cells with red corners to view comments and definitions
- 5 Print ranges are pre-set

OEE STARTER TOOL Key Concepts & Instructions

STEP-BY-STEP 1

OEE Starter Tool®

Developed by the 25+ CPG companies and their suppliers who are members of the AIOE Operational Reliability Solutions Group
Available for free download



PURPOSE OF THIS WORKSHEET: Gain a rough estimate of the "size of the prize" of potential savings, to determine the potential payout to be gained through OEE measurement and improvement activities

Plant Name		Date Prepared	
Production Line		Prepared by	

Data Required to Estimate the "Size of the Prize"

Basic Financial Data	Total	\$/Unit	Data Source
Annual Budget Units Produced			Annual Budget
Annual Budget Line Production Hours			Annual Budget
Annual Budget Production Units/Hour	0		

Annual Budget Raw Material \$000		#VALUE!	Annual Budget
Annual Budget Production Labor Wages & Benefits \$000		#VALUE!	Annual Budget
Total Raw Material & Direct Labor \$000	\$0	#VALUE!	

Raw material efficiency loss %		Budget Standard Cost Detail
Raw Material Zero-Loss Opportunity \$000	\$0	

Target Production Speed in Budget Units per Hour		Standard Operating Procedures
Production Line Efficiency %	0.0%	
Production Labor Zero-Loss Opportunity \$000	\$0	

Estimated "Size of the Prize" at Different Levels of Line Efficiency Improvement

10% Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		10.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

25% Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		25.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

Target % Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		0.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

- 1 Input name of plant, production line, preparer and date prepared
- 2 Input annual budget units produced and annual production line budget production hours
- 3 Input annual budget raw material and production labor wages & benefit dollars in thousands (\$000)

OEE STARTER TOOL Key Concepts & Instructions

STEP-BY-STEP 2

OEE Starter Tool®

Developed by the 25+ CPG companies and their suppliers who are members of the AIOE Operational Reliability Solutions Group
Available for free download



PURPOSE OF THIS WORKSHEET: Gain a rough estimate of the "size of the prize" of potential savings, to determine the potential payout to be gained through OEE measurement and improvement activities

Plant Name		Date Prepared	
Production Line		Prepared by	

Data Required to Estimate the "Size of the Prize"

Basic Financial Data	Total	\$/Unit	Data Source
Annual Budget Units Produced			Annual Budget
Annual Budget Line Production Hours			Annual Budget
Annual Budget Production Units/Hour	0		

Annual Budget Raw Material \$000		#VALUE!	Annual Budget
Annual Budget Production Labor Wages & Benefits \$000		#VALUE!	Annual Budget
Total Raw Material & Direct Labor \$000	\$0	#VALUE!	

Raw material efficiency loss %		4	Budget Standard C
Raw Material Zero-Loss Opportunity \$000	\$0		

Target Production Speed in Budget Units per Hour		5	Standard Operating
Production Line Efficiency %	0.0%		
Production Labor Zero-Loss Opportunity \$000	\$0		

Estimated "Size of the Prize" at Different Levels of Line Efficiency Improvement

10% Reduction in Line Efficiency Loss

Raw material efficiency improves to		#VALUE!	
Production line efficiency improves to		10.0%	
Raw Material Yield Savings \$000		#VALUE!	#VALUE!
Production Labor Savings \$000		#VALUE!	#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

25% Reduction in Line Efficiency Loss

Raw material efficiency improves to		#VALUE!	
Production line efficiency improves to		25.0%	
Raw Material Yield Savings \$000		#VALUE!	#VALUE!
Production Labor Savings \$000		#VALUE!	#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

Target % Reduction in Line Efficiency Loss

Raw material efficiency improves to		#VALUE!	
Production line efficiency improves to		0.0%	
Raw Material Yield Savings \$000		#VALUE!	#VALUE!
Production Labor Savings \$000		#VALUE!	#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

4 Enter Raw Material Efficiency Loss % –

Most standard costing systems identify an estimated % of material in excess of the zero-loss quantity, that is needed to cover expected levels of scrap, waste, quality defects or overfill/give-away

5 Enter Target Production Speed in Budget Units per Hour –

This is the target line speed setting called for in standard operating procedures.

It is greater than budgeted production units per hour in cell C18, because the budget takes into account efficiency losses, slow running, rework, etc.

This may require calculation of a weighted average target speed if the budget is calculated based on SKU-specific production rates. Be sure to convert the target line speed into budget units per hour, for example, cases per hour, not bottles per minute

OEE STARTER TOOL Key Concepts & Instructions

STEP-BY-STEP 3

OEE Starter Tool[®]

Developed by the 25+ CPG companies and their suppliers who are members of the AIOE Operational Reliability Solutions Group
Available for free download



PURPOSE OF THIS WORKSHEET: Gain a rough estimate of the "size of the prize" of potential savings, to determine the potential payout to be gained through OEE measurement and improvement activities

Plant Name		Date Prepared	
Production Line		Prepared by	

Data Required to Estimate the "Size of the Prize"

Basic Financial Data	Total	\$/Unit	Data Source
Annual Budget Units Produced			Annual Budget
Annual Budget Line Production Hours			Annual Budget
Annual Budget Production Units/Hour	0		

Annual Budget Raw Material \$000		#VALUE!	Annual Budget
Annual Budget Production Labor Wages & Benefits \$000		#VALUE!	Annual Budget
Total Raw Material & Direct Labor \$000	\$0	#VALUE!	

Raw material efficiency loss %		Budget Standard Cost Detail
Raw Material Zero-Loss Opportunity \$000	\$0	

Target Production Speed in Budget Units per Hour		Standard Operating Procedures
Production Line Efficiency %	0.0%	
Production Labor Zero-Loss Opportunity \$000	\$0	

Estimated "Size of the Prize" at Different Levels of Line Efficiency Improvement

10% Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		10.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

25% Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		25.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

Target % Reduction in Line Efficiency Loss

Raw material efficiency improves to	#VALUE!		
Production line efficiency improves to		0.0%	
Raw Material Yield Savings \$000	#VALUE!		#VALUE!
Production Labor Savings \$000	#VALUE!		#VALUE!
Total Savings \$000	#VALUE!		#VALUE!

6 Input Alternative Target % Improvement in Line Efficiency Loss –

the spreadsheet calculates potential savings at 10% and 25%. This feature allows you to estimate savings at a different efficiency improvement level.

Enter a target % reduction in line efficiency loss. As an example, for a line at 80% efficiency, the loss is 20%. A 10% reduction in efficiency loss is worth (10% improvement X 20% loss) = 2% improvement. So the line would improve from 80% to 82% efficiency.

6

OEE STARTER TOOL Key Concepts & Instructions

REPORT-OUT

OEE Starter Tool®



PURPOSE OF THIS WORKSHEET: Gain a rough estimate of the "size of the prize" of potential savings, to determine the potential payout to be gained through OEE measurement and improvement activities

Plant Name	Bottle Packaging	Date Prepared	2/21/15
Production Line	All Lines	Prepared by	Sam E.

Data Required to Estimate the "Size of the Prize"

Basic Financial Data	Total	\$/Unit	Data Source
Annual Units Produced by Line	270,000,000		Budget (Actuals)
Annual Line Production Hours	112,320		Budget (Actuals)
Annual Production Units/Hour	2,404		

Annual Raw Material \$000	\$151,440	\$0.561	Budget (Actuals)
Annual Production Labor Wages & Benefits \$000	\$37,860	\$0.140	Budget (Actuals)
Total Raw Material & Direct Labor \$000	\$189,300	\$0.701	

Raw material efficiency loss %	2.0%	Budget Standard Cost Detail
Raw Material Zero-Loss Opportunity \$000	\$3,029	

Target Production Speed in Budget Units per Hour	4,550	Standard Operating
Production Line Efficiency %	52.8%	
Production Labor Zero-Loss Opportunity \$000	\$17,858	

Estimated "Size of the Prize" at Different Levels of Line Efficiency Improvement

10% Reduction in Line Efficiency Loss	Total	\$/Unit
Raw material efficiency improves to	1.8%	
Production line efficiency improves to	57.5%	
Raw Material Yield Savings \$000	\$303	\$0.001
Production Labor Savings \$000	\$1,786	\$0.003
Total Savings \$000	\$2,089	\$0.004

25% Reduction in Line Efficiency Loss

Raw material efficiency improves to	1.5%	
Production line efficiency improves to	64.6%	
Raw Material Yield Savings \$000	\$757	\$0.001
Production Labor Savings \$000	\$4,464	\$0.003
Total Savings \$000	\$5,222	\$0.004

Target % Reduction in Line Efficiency Loss

5.0%

Raw material efficiency improves to	1.9%	
Production line efficiency improves to	55.2%	
Raw Material Yield Savings \$000	\$151	\$0.001
Production Labor Savings \$000	\$893	\$0.003
Total Savings \$000	\$1,044	\$0.004

- 1 Print ranges are pre-set
- 2 The lower half of the worksheet provides data points you may use to discuss and evaluate return on investment for OEE tracking and improvement programs
- 3 This spreadsheet looks only at potential savings in production labor and raw material yield. Be sure to investigate and analyze possible savings in other areas – such as quality defect loss, customer complaints, missed deliveries, etc.

OEE STARTER TOOL Key Concepts & Instructions



The Association for Packaging
and Processing Technologies



Leadership Network
Moving Operational Excellence Forward

opxleadershipnetwork.org