Setting the Standard for Automation™

The Science of Manufacturing

Making OEE work as a practical Business Performance Metric for your Plant

Arthur Stone – OEEsystems International

Standards
Certification
Education & Training
Publishing
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Arthur Stone

CEO - OEEsystems International

OEEsystems International develop

Manufacturing Performance Management

Software and Consultancy Service Solutions

for the world's most progressive

manufacturing companies

to improve competitiveness,

increase output, reduce costs and

deliver business performance excellence.

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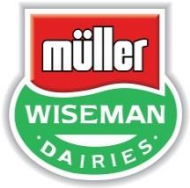
The Company we keep . . .



Overall Equipment Effectiveness

OEE is used as a business metric

by the world's leading manufacturing companies

to measure the effectiveness of their processes / equipment,

to identify improvement opportunities

and

deliver increased capacity increases and reduced costs.

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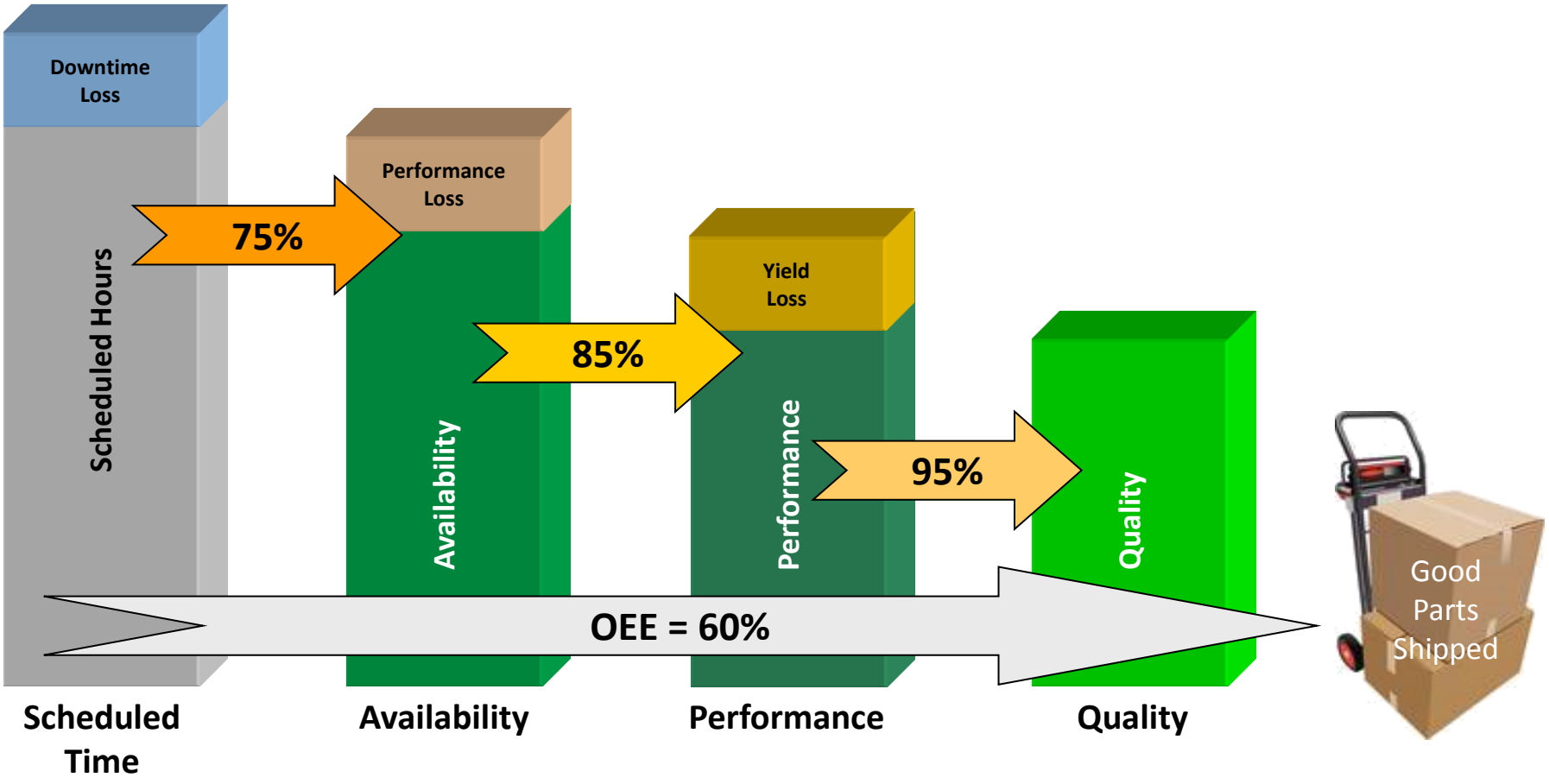
How OEE is calculated . . .

The Math . . . .



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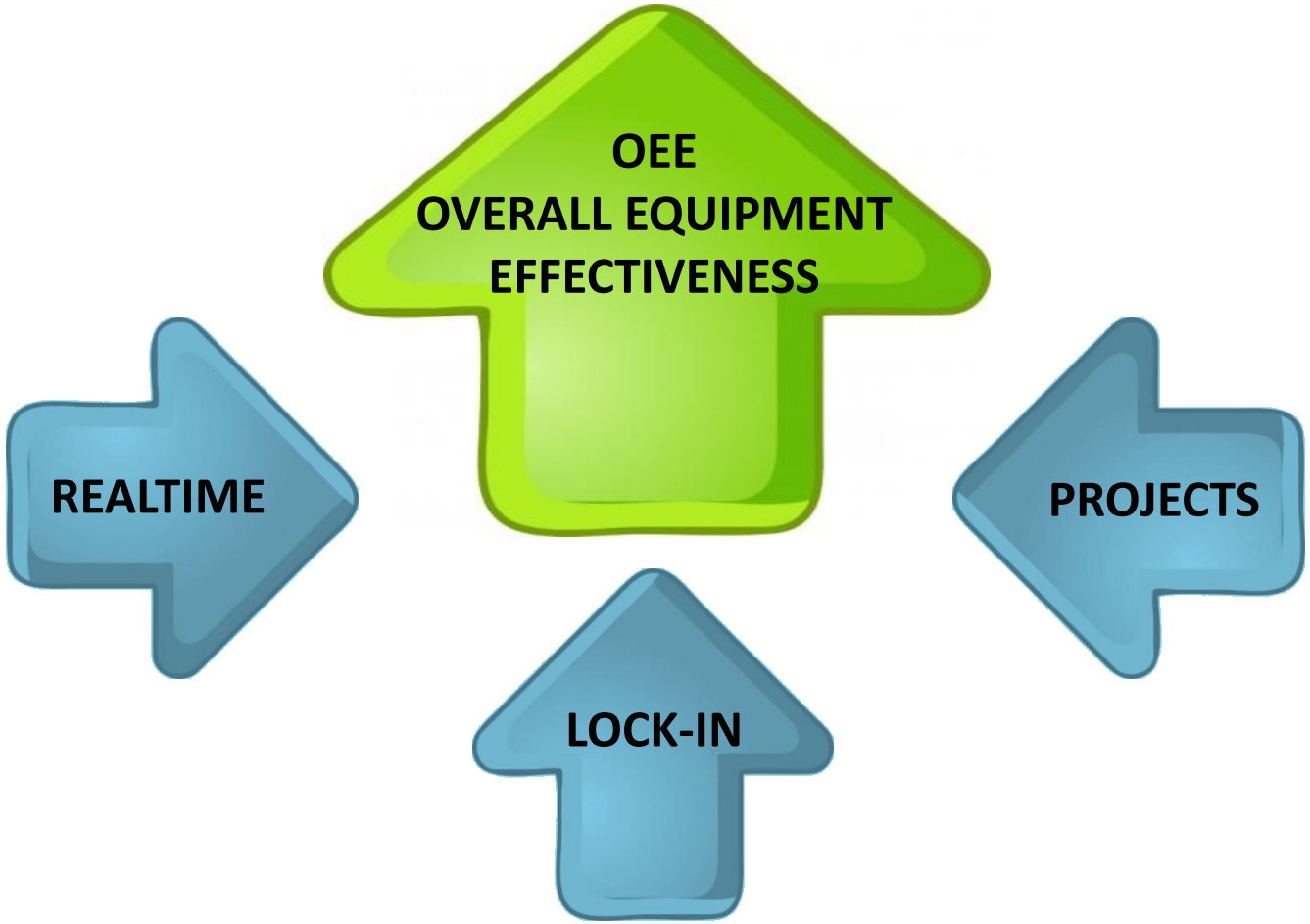
The Fundamentals of Improving OEE

The Three Fundamentals to delivering better OEE performance :



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1. Managing and Improving OEE in Realtime

OEE Performance Management

- ✓ During the Shift
- ✓ During Changeovers
- ✓ At Shift Change and Handover

1. Realtime - What should we measure ?

- During the course of a Shift, only certain metrics are relevant.
- Production Operators do not have control over all the factors which influence OEE Losses and OEE Performance.
- Consequently, using OEE as a KPI Target over the course of a Shift may be asking the Shift Team to attempt to achieve a Performance Target that is impossible !

For example, if a four-hour Changeover is scheduled during the course of an eight-hour shift - it is not possible to achieve an OEE Performance of 60% !!

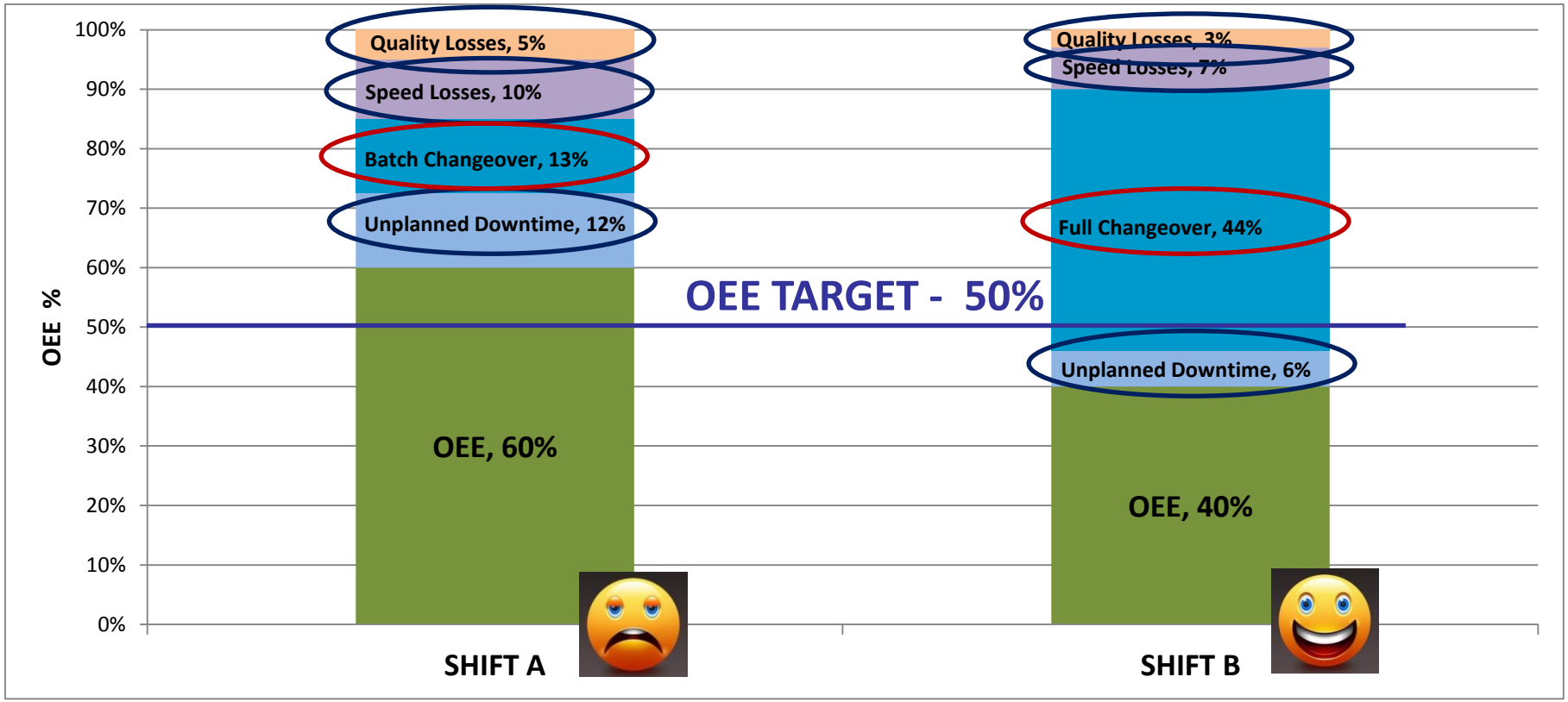
So, we need to select metrics for which the Shift Team can be accountable.

For the Shift Team, select Performance Metrics which :

1. **Contribute to OEE Performance.**
2. **Are a meaningful measure over the course of a Shift.**
3. **Can be delivered by an accountable Team.**

1. Realtime - What should we measure ?

Consider these two Shifts :



Even though Shift A has delivered a higher OEE figure (60%),
we would consider Shift B to have delivered a superior performance at 40% OEE.

Try to explain that to the Production Shift Teams !!

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1. Realtime - What is relevant for a Line Operator ?

There are three or four parameters that are usually under the control of the Production Operator :

1. **Unplanned Downtime**
   - Stoppages due to operational delays, shortages, resources, breakdowns.
   - Focus on downtimes which are within the control of the Team.

2. **Changeover Time**
   - Rather than focus on Changeover Targets as a percentage OEE Loss, focus on carrying out the Changeovers on time.

3. **Line Speed**
   - Forget the 'Performance' component.
   - Keep the Line running at the specified Speed . . .

4. **Wastage - Yield and Scrap**
   - Minimise Rework, Scrap, Defects and Waste.
   - Be accountable for machine and process defects.

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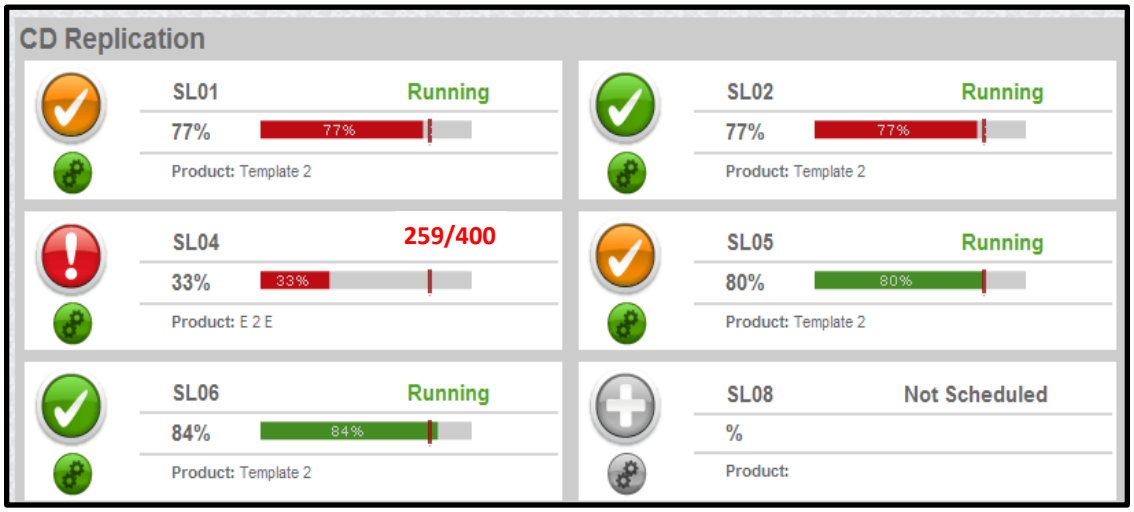
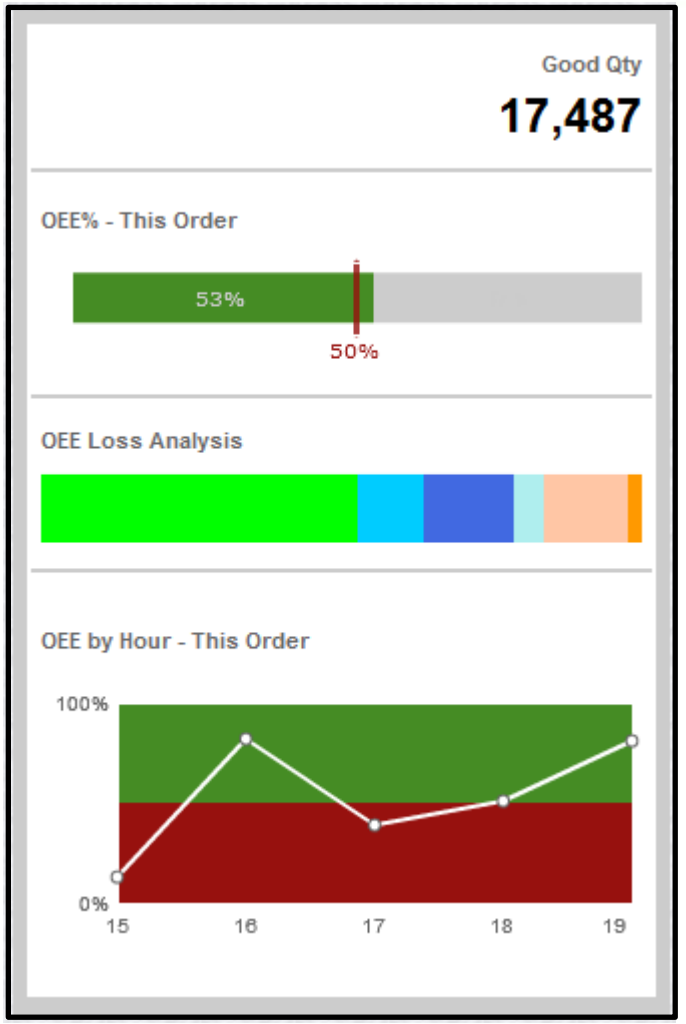
1. Realtime OEE Management





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2. Identifying and Delivering Improvement Projects

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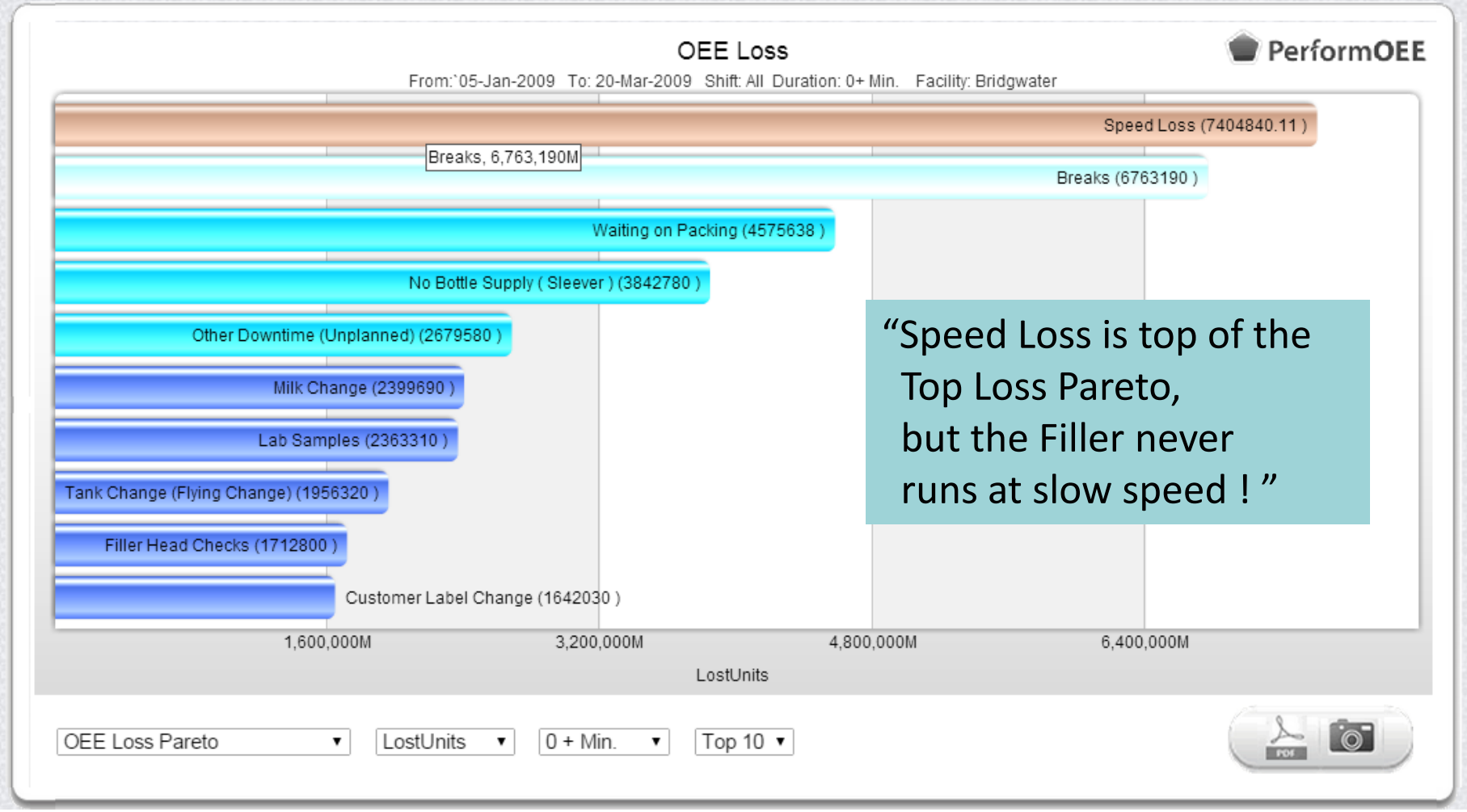

"Speed Loss is top of the Top Loss Pareto, but the Filler never runs at slow speed ! "

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2. Identifying and Delivering Improvement Projects

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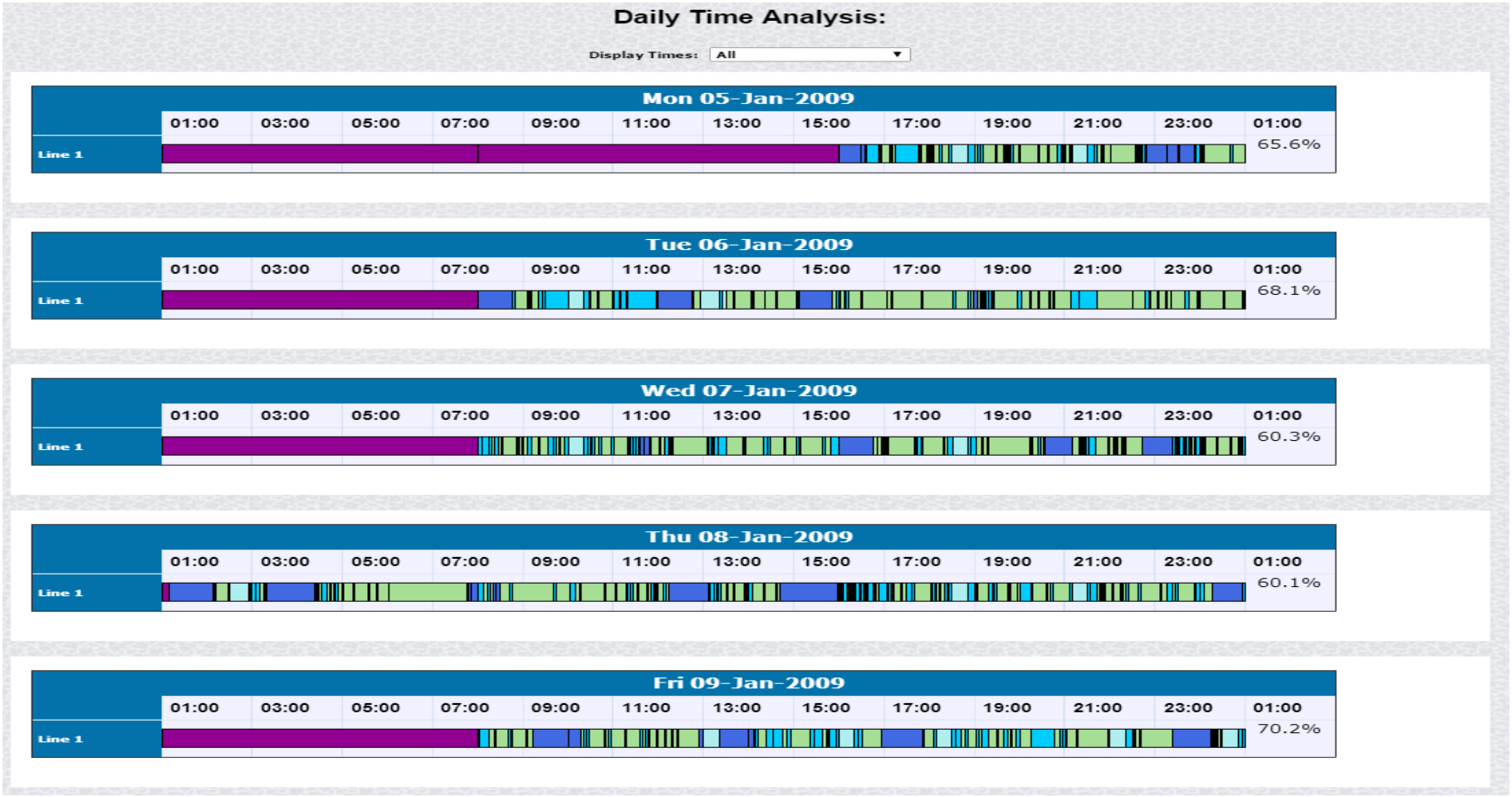

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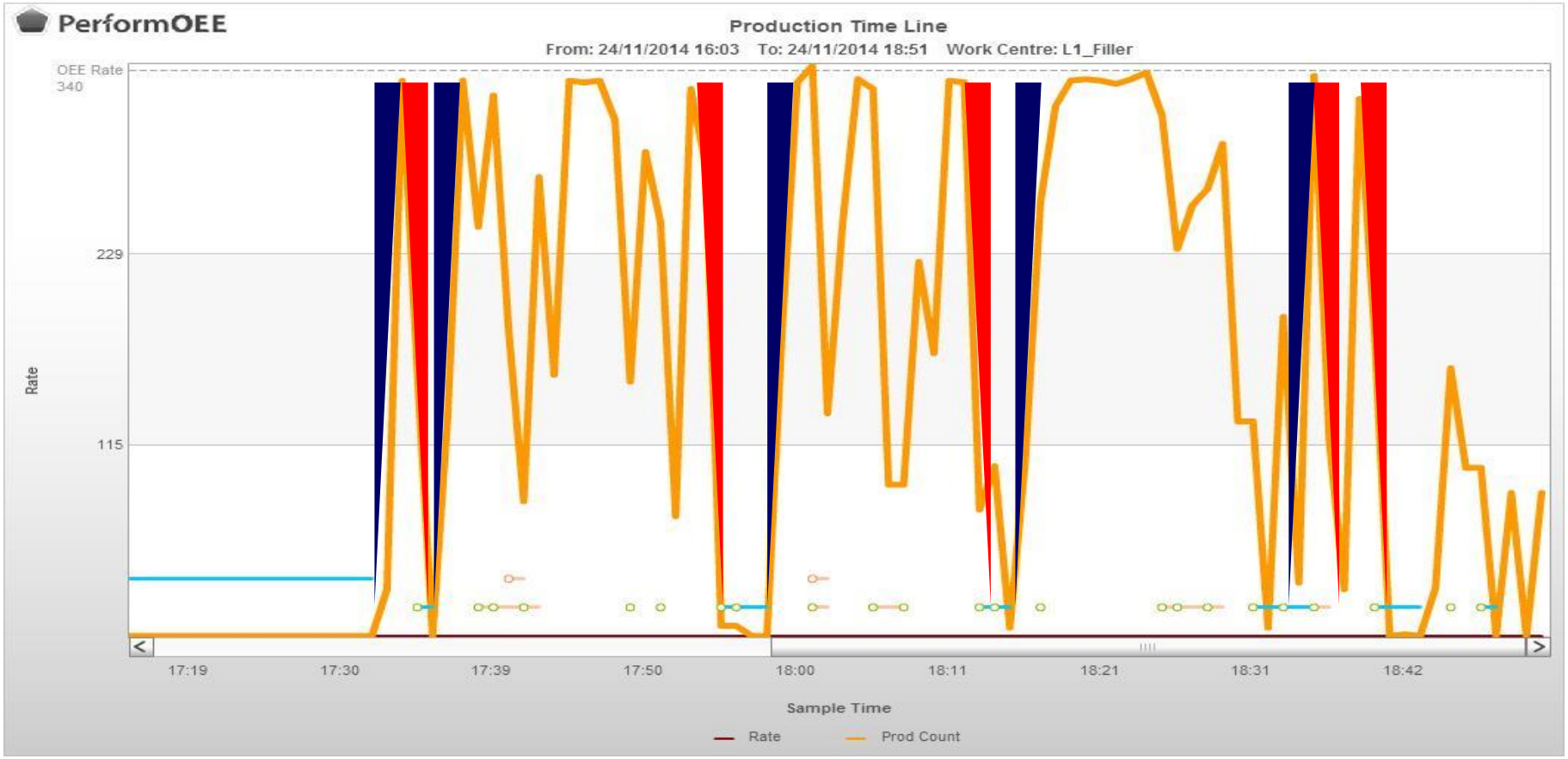

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2. Identifying and Delivering Improvement Projects

- The Filler constantly stops to wait for a downstream bottleneck.
- But the Filler takes almost 30 seconds to slow to zero speed,
  and another 30 seconds from a standing-start to full speed.
- So in addition to the downtime of each stop,
  there is a one-minute speed-loss penalty per stop !
- Reducing the number of stoppages directly impacts the Speed Loss.
- **Consider running the Filler at a lower maximum speed until the downstream bottleneck is dealt with . . .**

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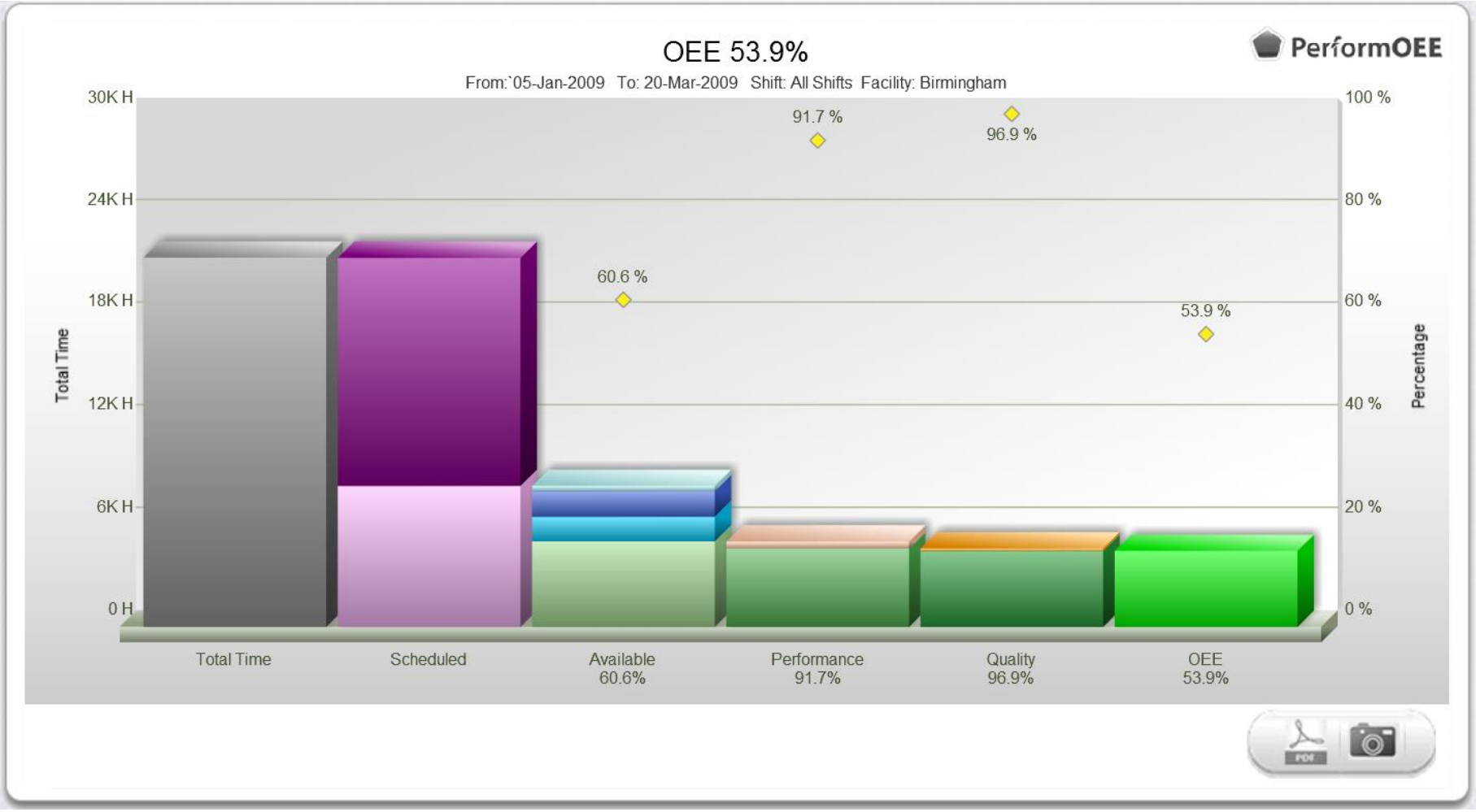
2. Identifying and Delivering Improvement Projects



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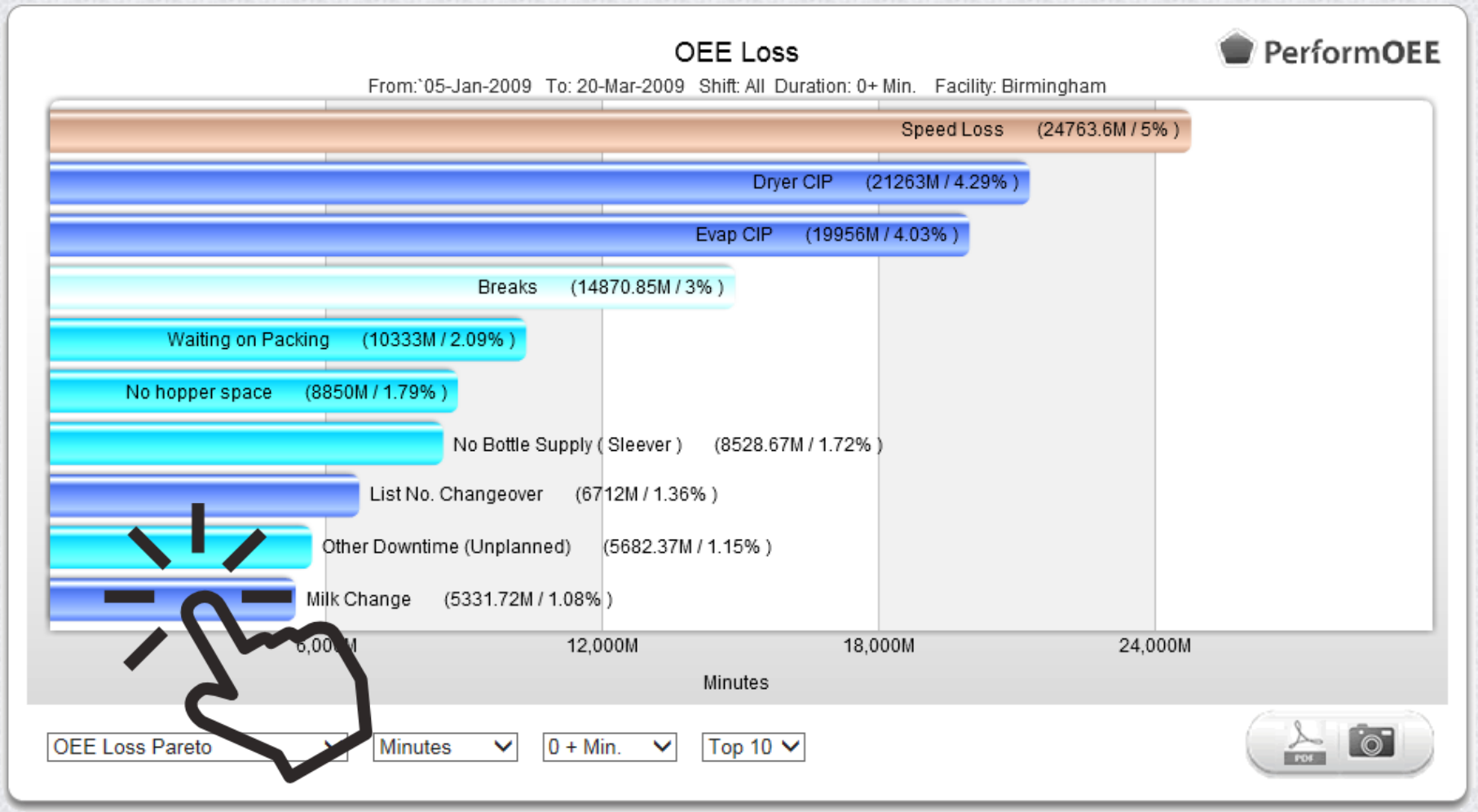

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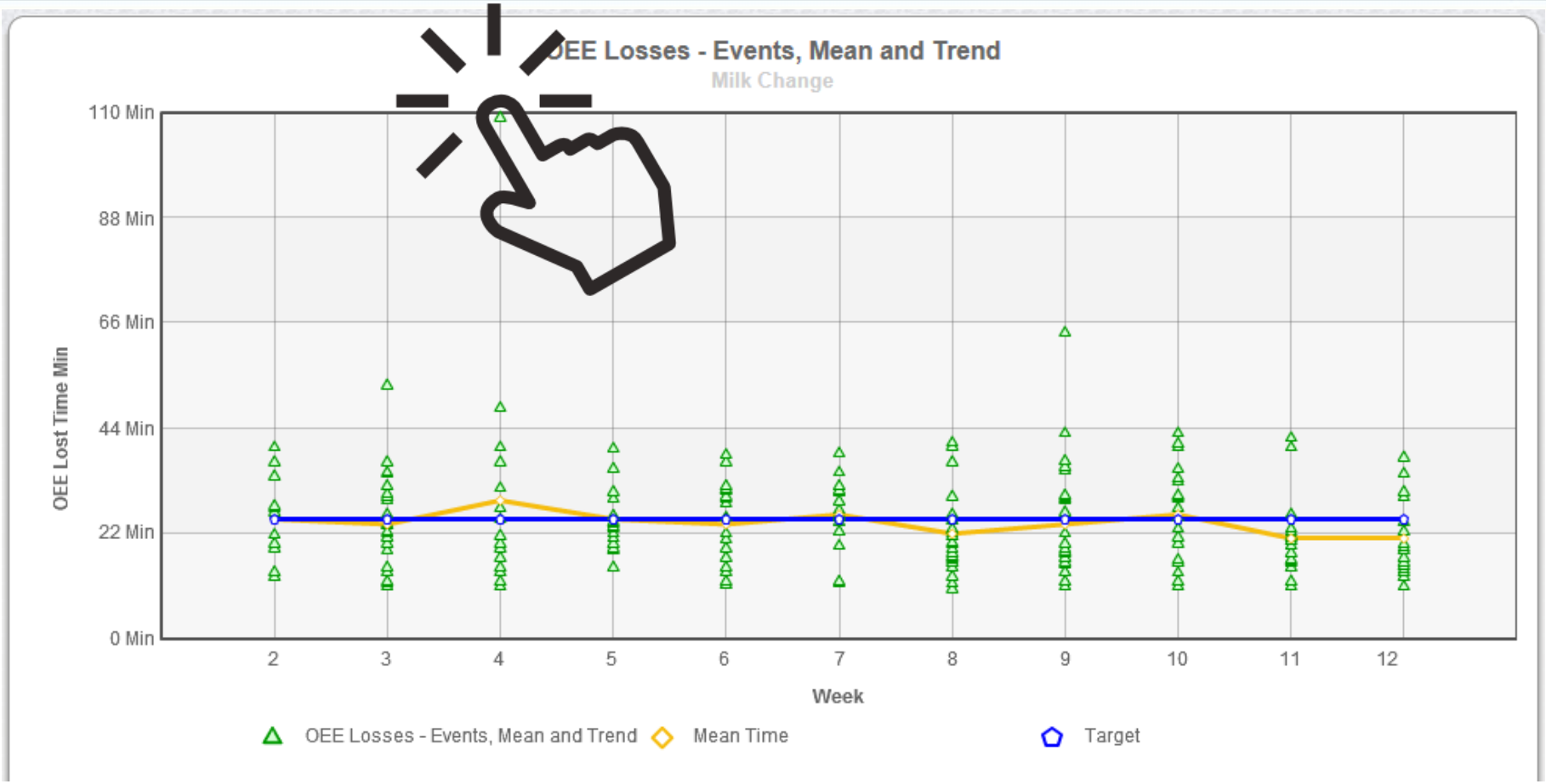

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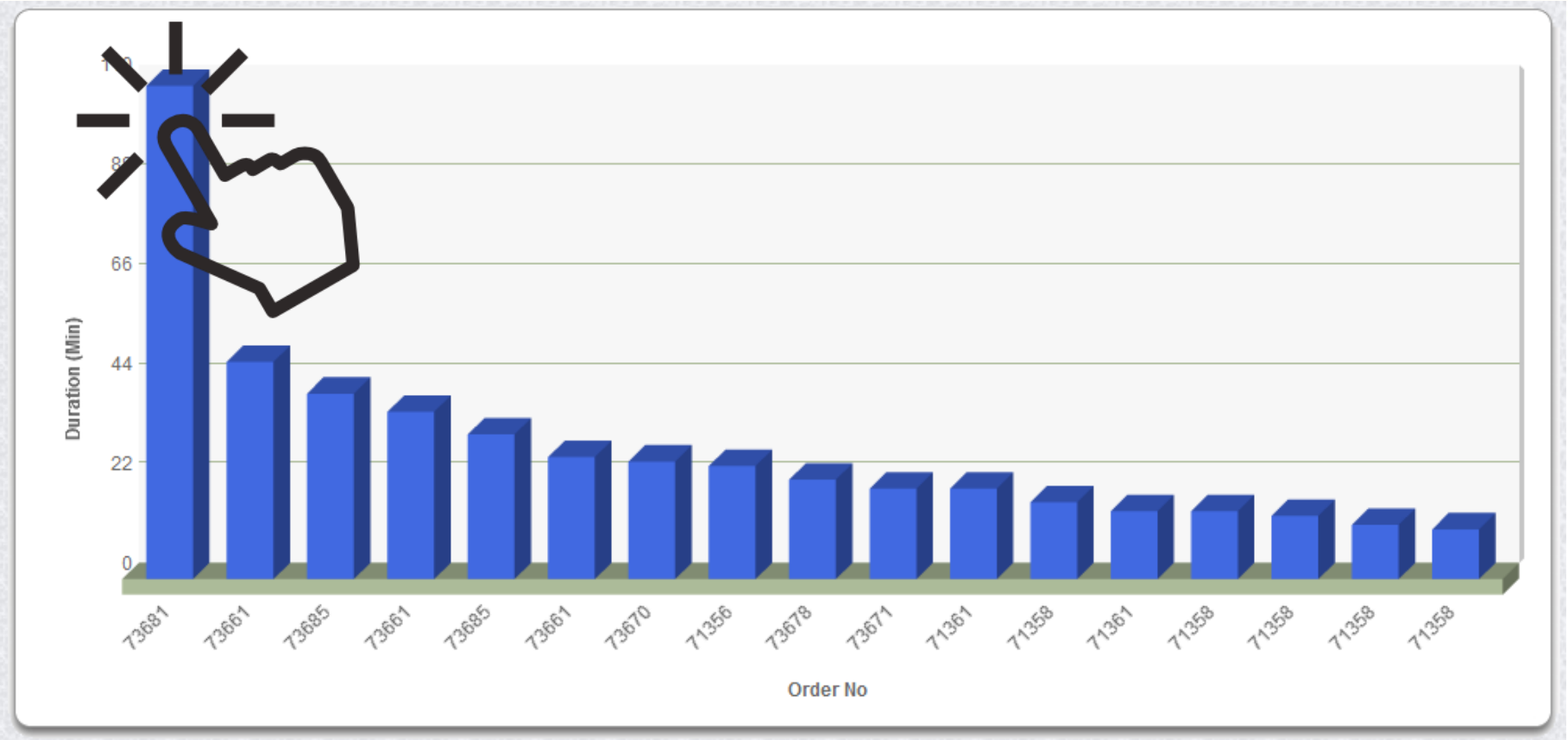

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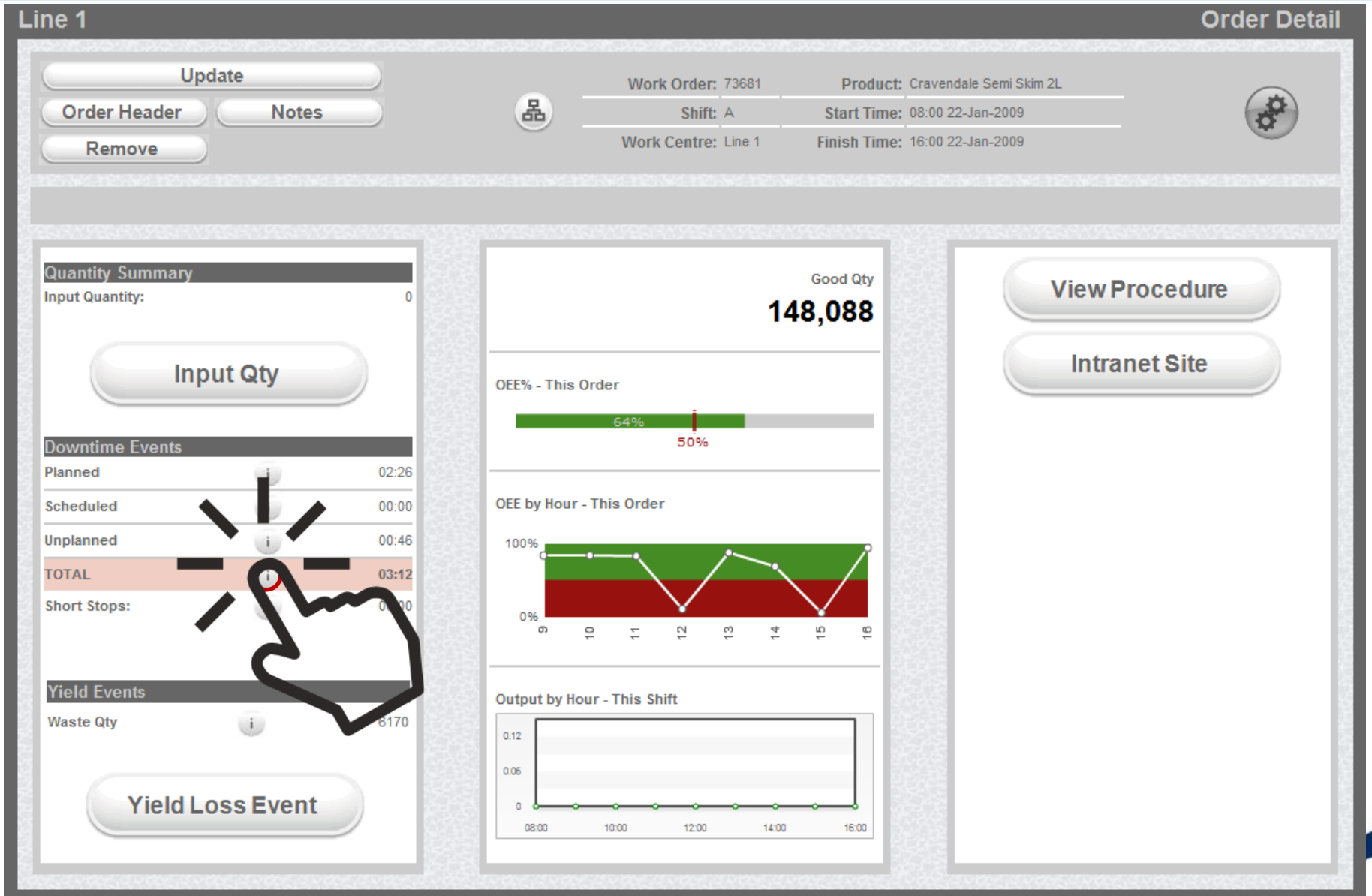

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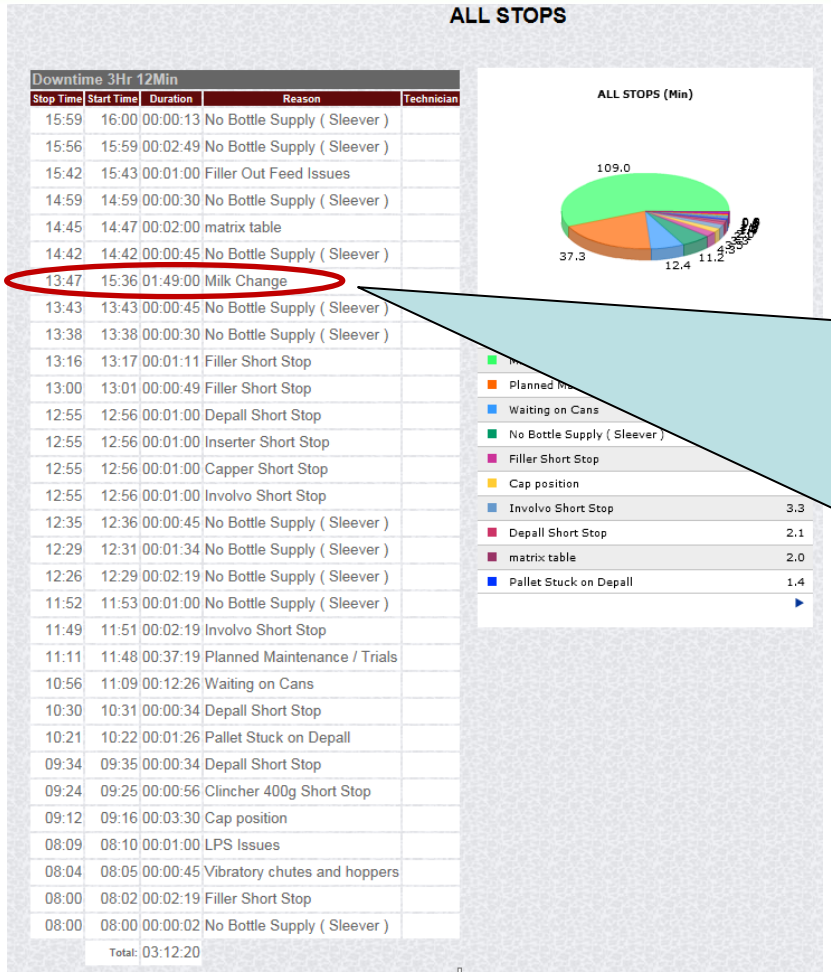

ALL STOPS

Downtime 3Hr 12Min

Stop Time	Start Time	Duration	Reason	Technician
15:59	16:00	00:00:13	No Bottle Supply (Sleever)	
15:56	15:59	00:02:49	No Bottle Supply (Sleever)	
15:42	15:43	00:01:00	Filler Out Feed Issues	
14:59	14:59	00:00:30	No Bottle Supply (Sleever)	
14:45	14:47	00:02:00	matrix table	
14:42	14:42	00:00:45	No Bottle Supply (Sleever)	
13:47	15:36	01:49:00	Milk Change	
13:43	13:43	00:00:45	No Bottle Supply (Sleever)	
13:38	13:38	00:00:30	No Bottle Supply (Sleever)	
13:16	13:17	00:01:11	Filler Short Stop	
13:00	13:01	00:00:49	Filler Short Stop	
12:55	12:56	00:01:00	Depall Short Stop	
12:55	12:56	00:01:00	Inserter Short Stop	
12:55	12:56	00:01:00	Capper Short Stop	
12:55	12:56	00:01:00	Involvo Short Stop	
12:35	12:36	00:00:45	No Bottle Supply (Sleever)	
12:29	12:31	00:01:34	No Bottle Supply (Sleever)	
12:26	12:29	00:02:19	No Bottle Supply (Sleever)	
11:52	11:53	00:01:00	No Bottle Supply (Sleever)	
11:49	11:51	00:02:19	Involvo Short Stop	
11:11	11:48	00:37:19	Planned Maintenance / Trials	
10:56	11:09	00:12:26	Waiting on Cans	
10:30	10:31	00:00:34	Depall Short Stop	
10:21	10:22	00:01:26	Pallet Stuck on Depall	
09:34	09:35	00:00:34	Depall Short Stop	
09:24	09:25	00:00:56	Clincher 400g Short Stop	
09:12	09:16	00:03:30	Cap position	
08:09	08:10	00:01:00	LPS Issues	
08:04	08:05	00:00:45	Vibratory chutes and hoppers	
08:00	08:02	00:02:19	Filler Short Stop	
08:00	08:00	00:00:02	No Bottle Supply (Sleever)	
	Total:	03:12:20		

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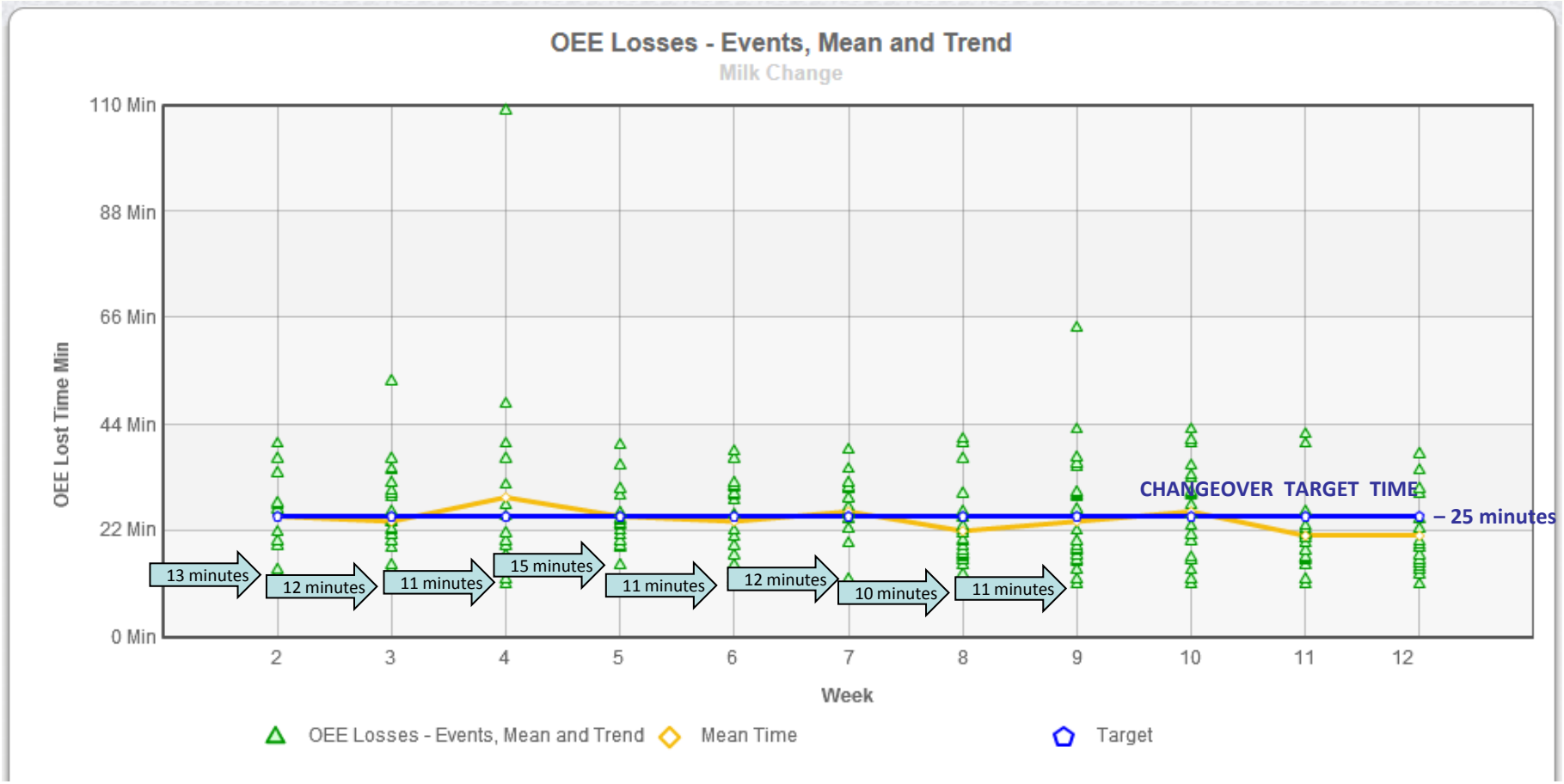
2. Identifying and Delivering Improvement Projects



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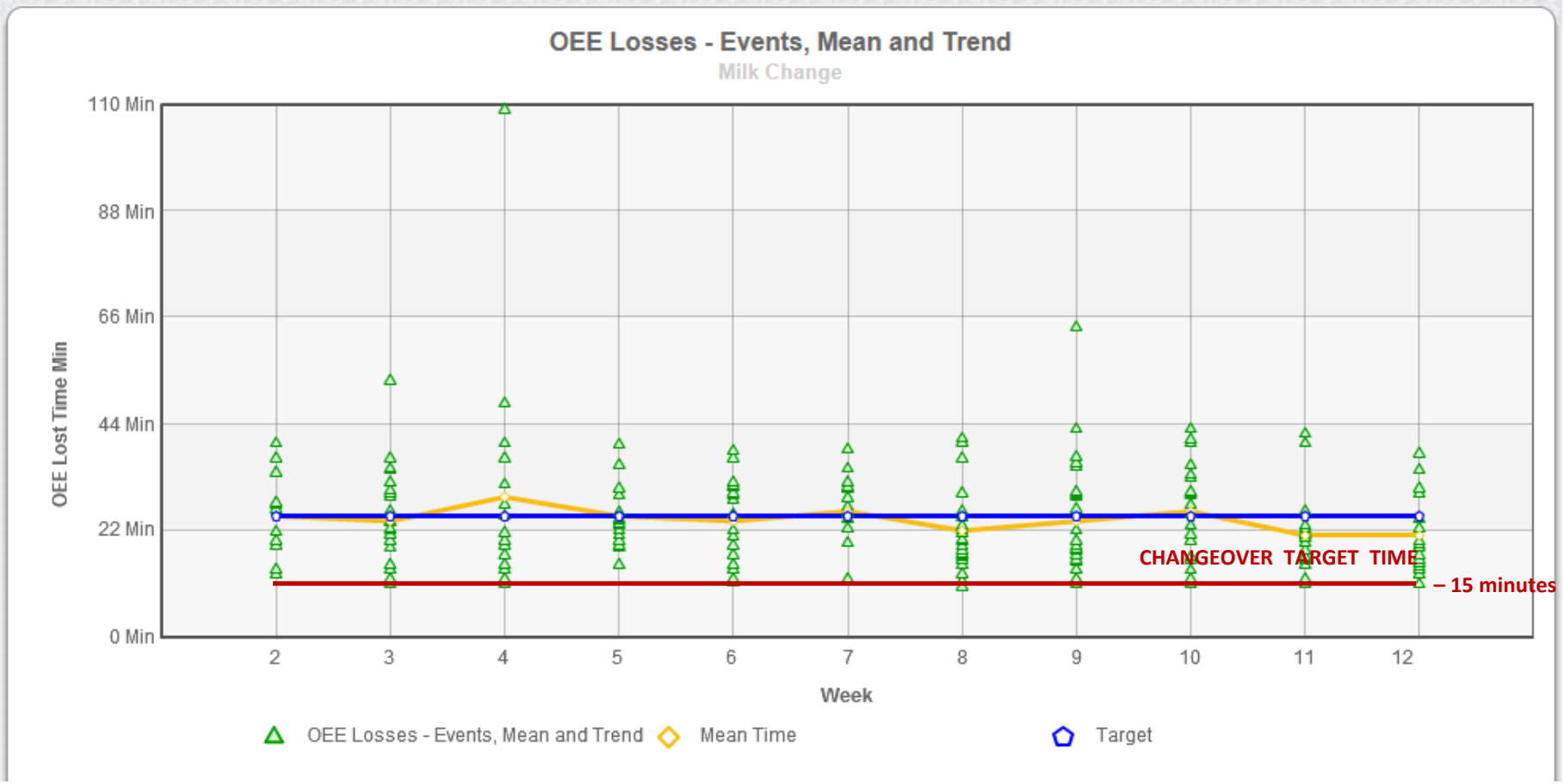

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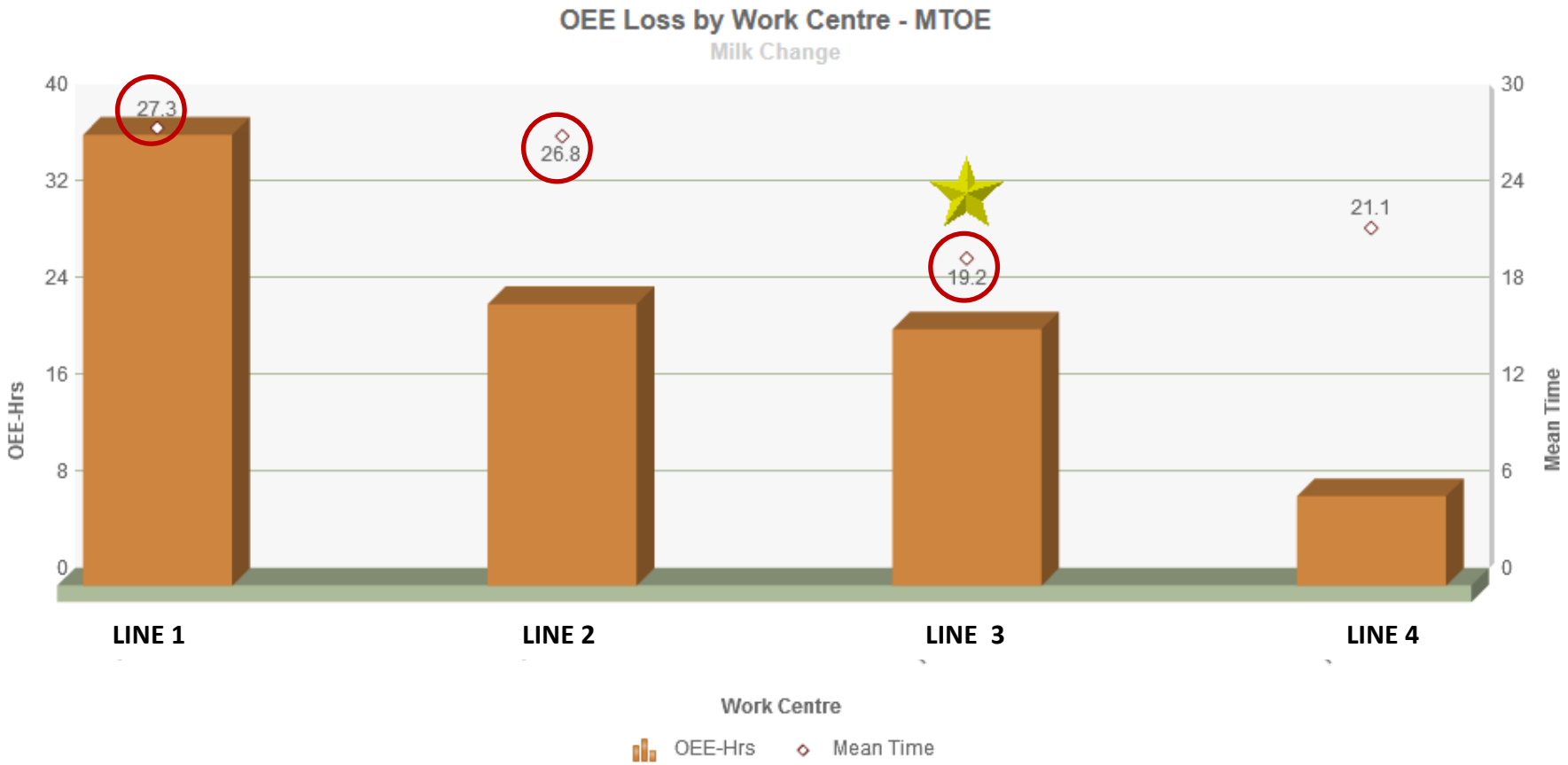

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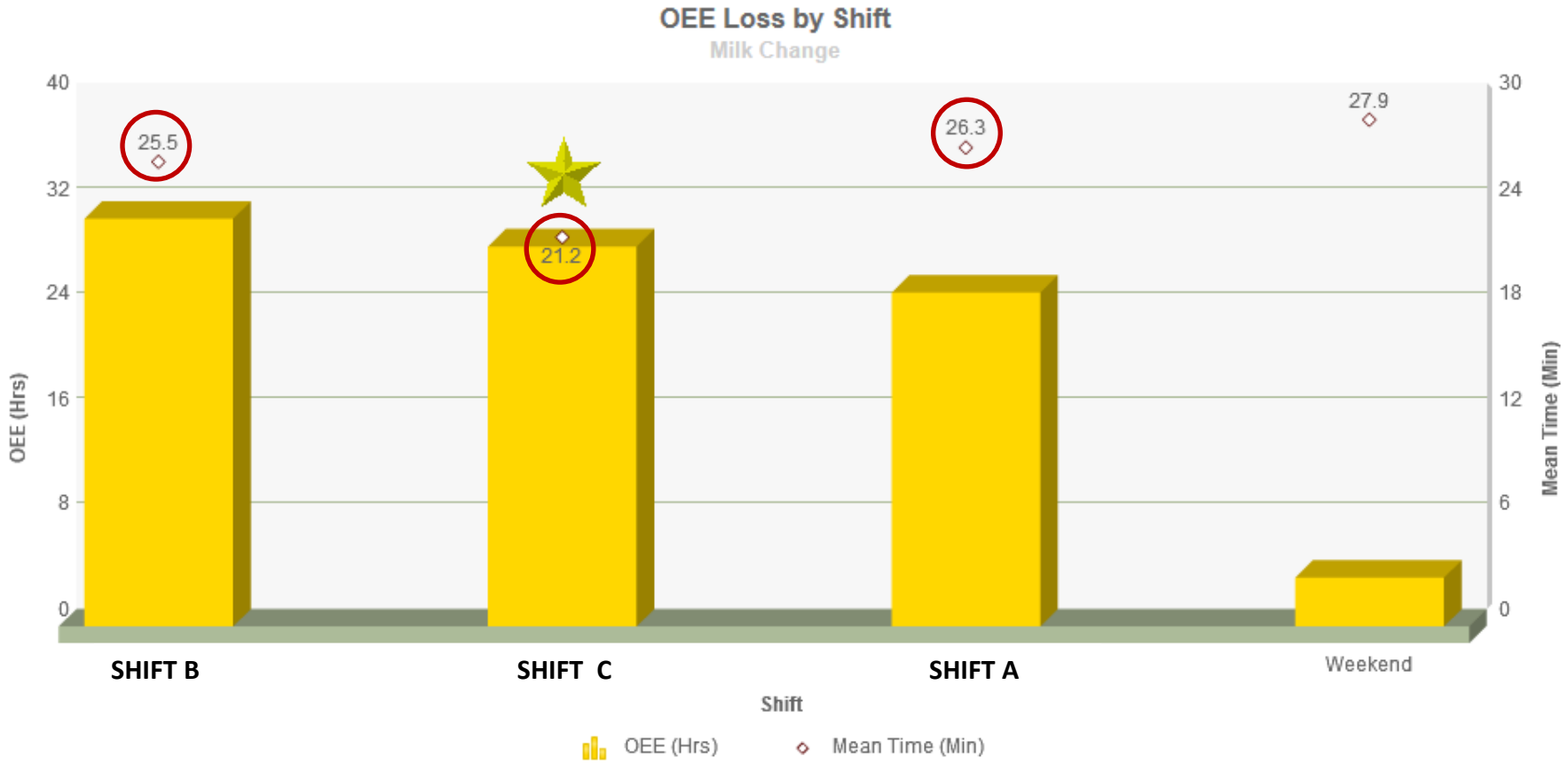

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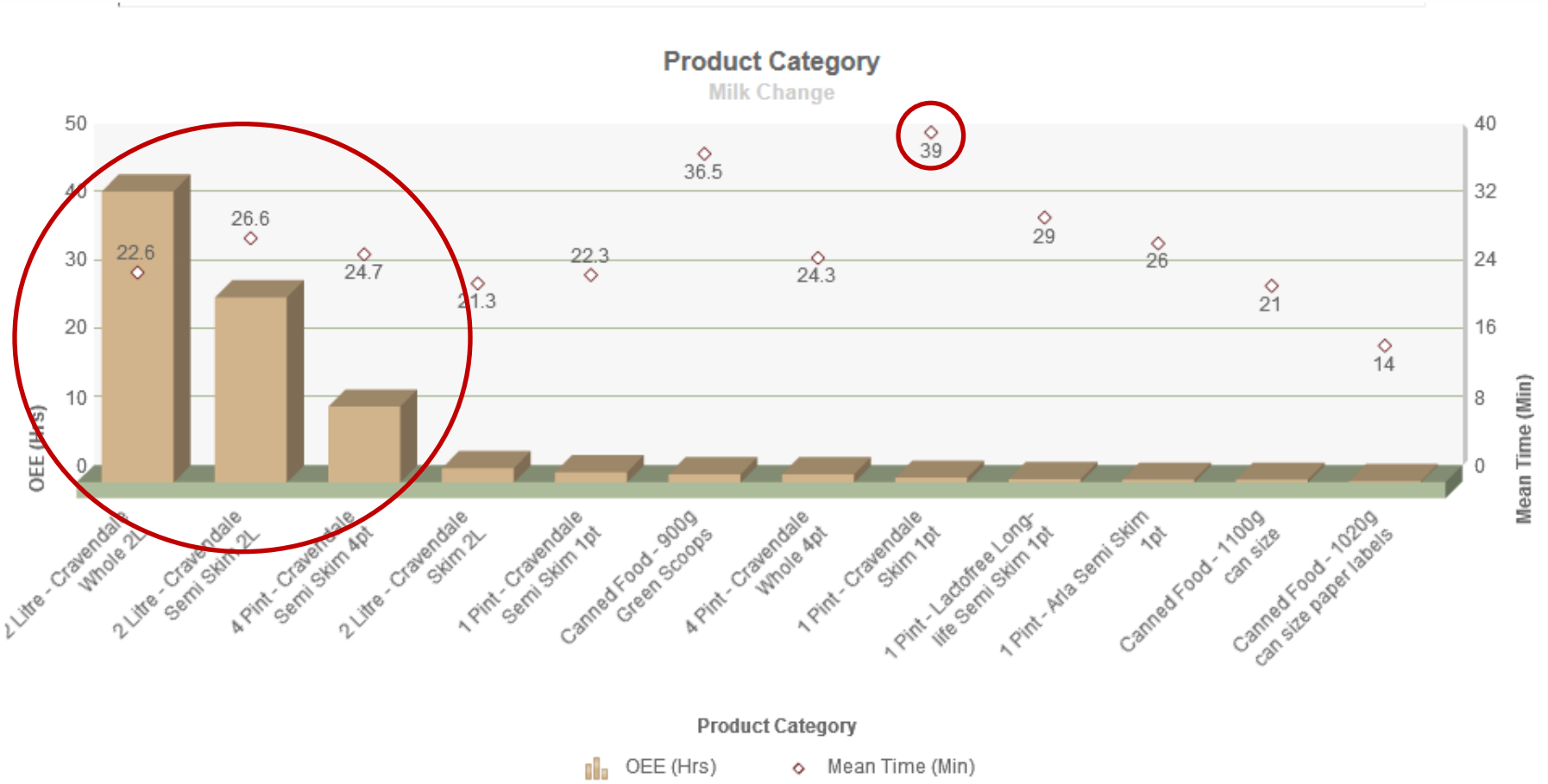

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2. Identifying and Delivering Improvement Projects

The Project Mandate :

- Set the Changeover Time Target at 15 minutes.

- How do we achieve this ?
  - Configure all Lines as Line 3.
  - Implement ‘Best Practice’ Changeover as Shift C.
  - Focus only on Changeovers for the Top Three products.

- Possibly also SMED Training and Workshops . . .

- **Plan, Do, Check, Act . . .**

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3. Locking in the Gains - CPC

CONDITION-BASED PROCESS CONTROL

Once the Project Teams have delivered a Process Performance Improvement, the challenge is to 'lock-in' this gain.

With more and more projects delivered, it becomes impossible to monitor that any of the hard-won gains have not slipped or reverted.

CPC solves that problem by using 'Condition-Monitoring' to provide a watchful eye that the process condition does not deviate from capability, communicates and escalates the issue if it is not resolved, and confirms that the fix has indeed resolved the problem and has brought the actual process performance back within its operating capability.

This is 'Locking in the Gains' . . .

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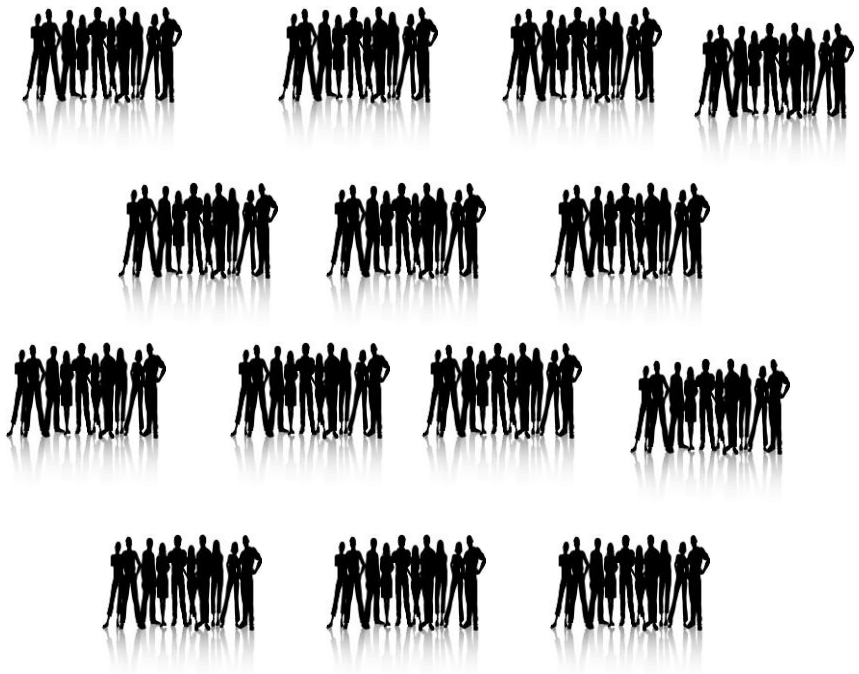
3. Locking in the Gains - CPC

Asset Care Team 142 Heads



136 Heads

+

Asset Care Manager

Asset Care Leader

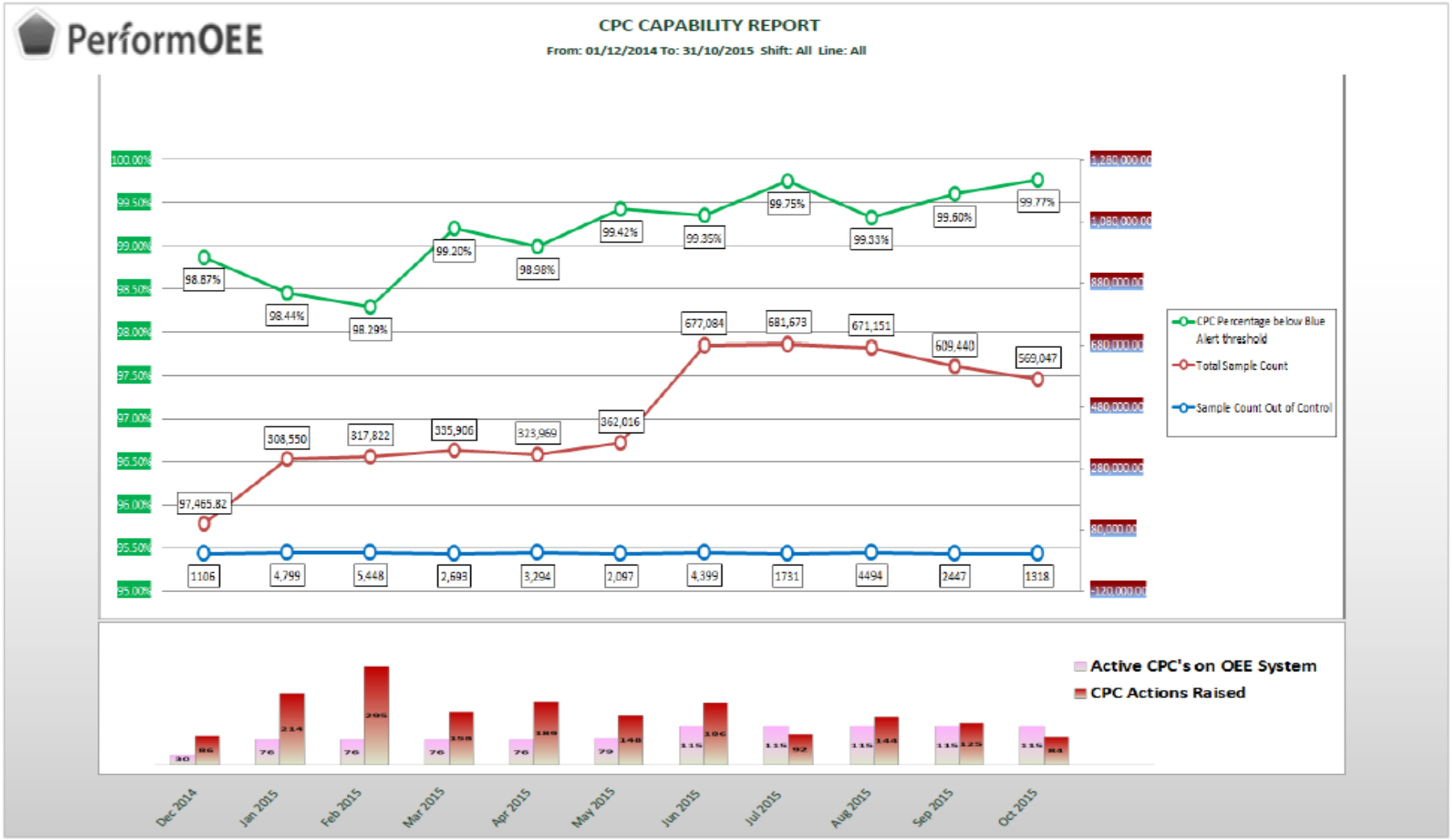
Asset Care Engineer x 2

Asset Care Technician x 2

6 Heads

To monitor the equipment,
we would need 136 Data Analysts

3. Locking in the Gains – CPC Capability



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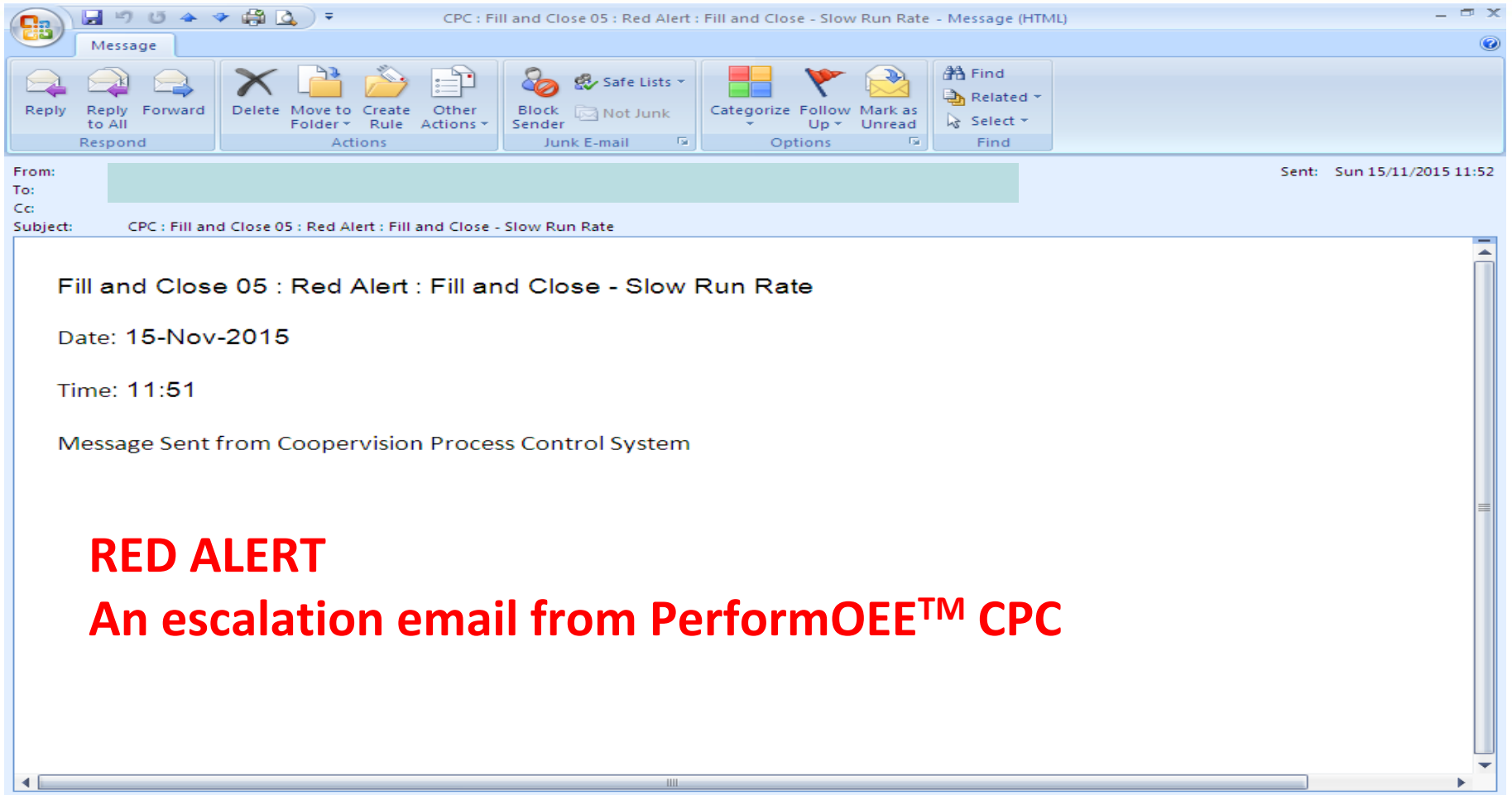
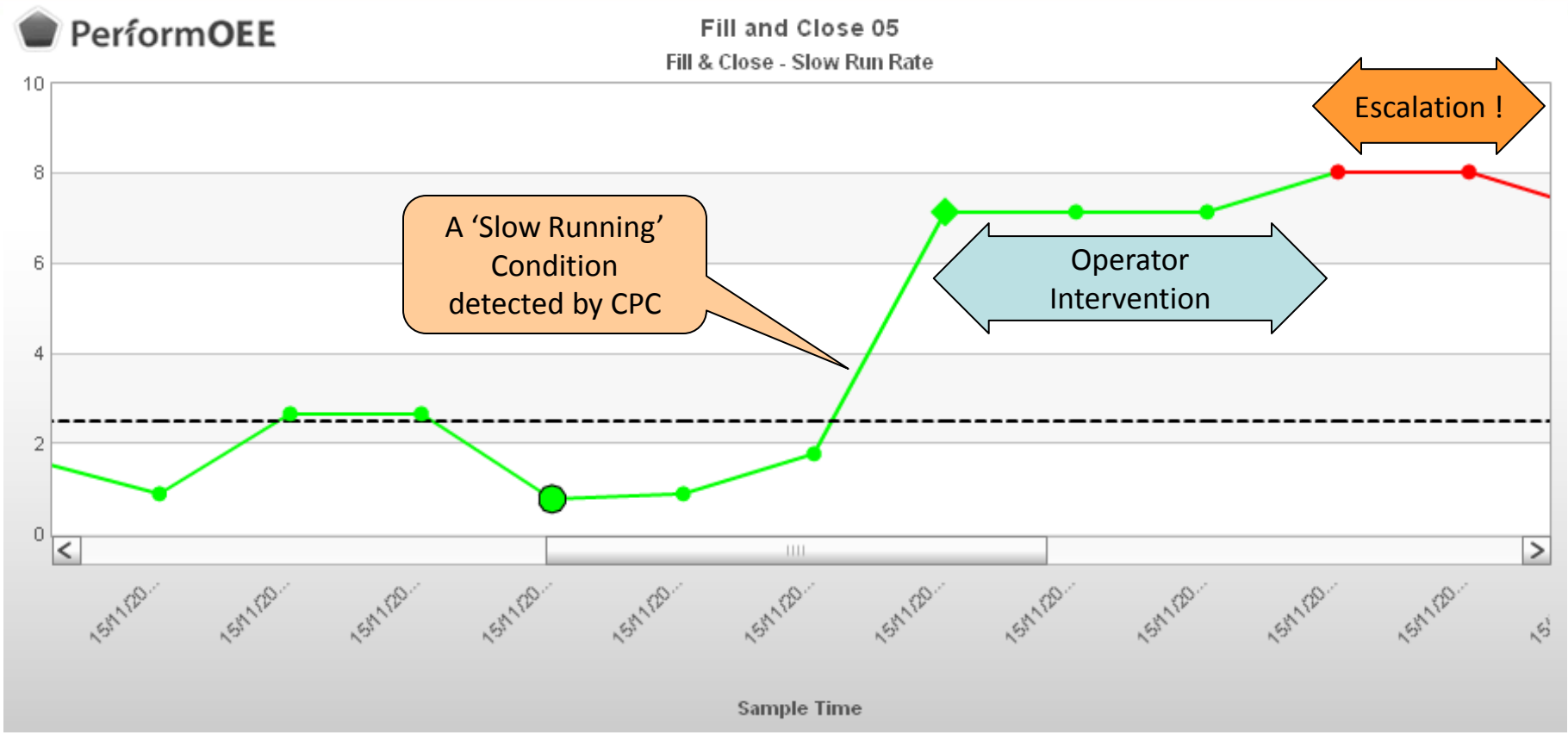
3. Locking in the Gains – CPC Escalation



3. Locking in the Gains – CPC Operation



Line 5 has slowed down by 7% - running at 93% of capable speed

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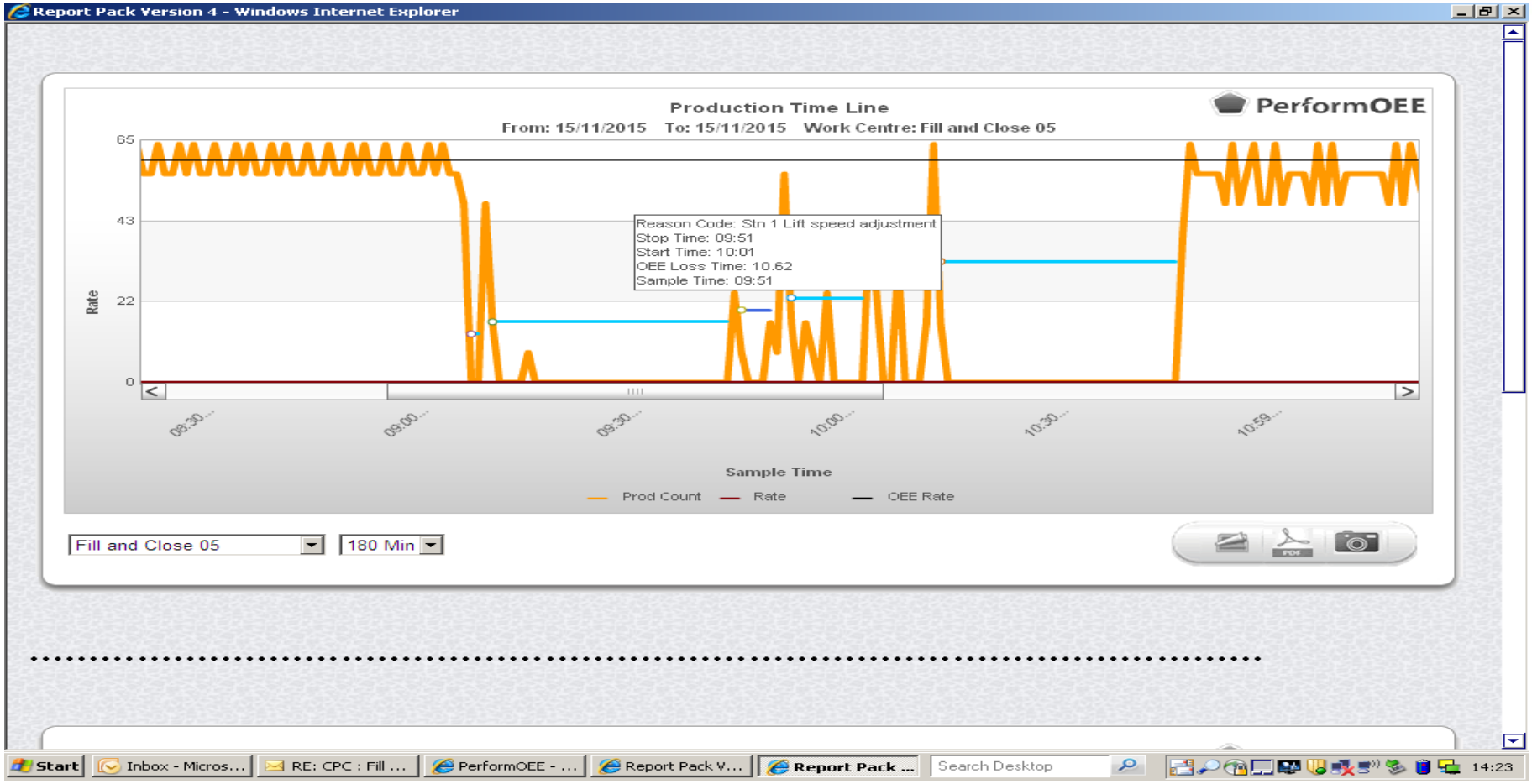
3. Locking in the Gains – CPC Analysis



The PerformOEE™ CPC systems identifies the root-cause

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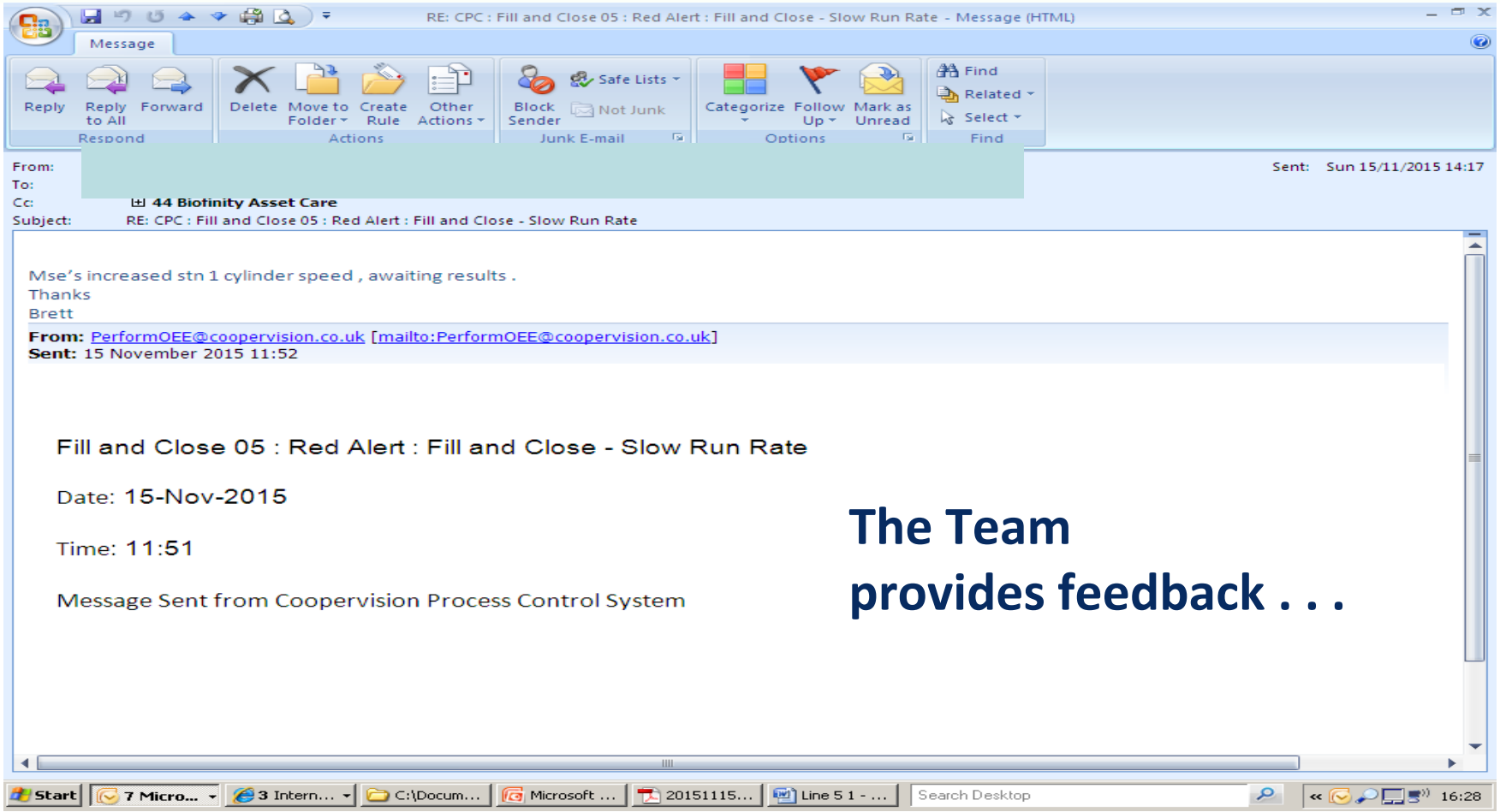
3. Locking in the Gains – CPC



The Team provides feedback . . .

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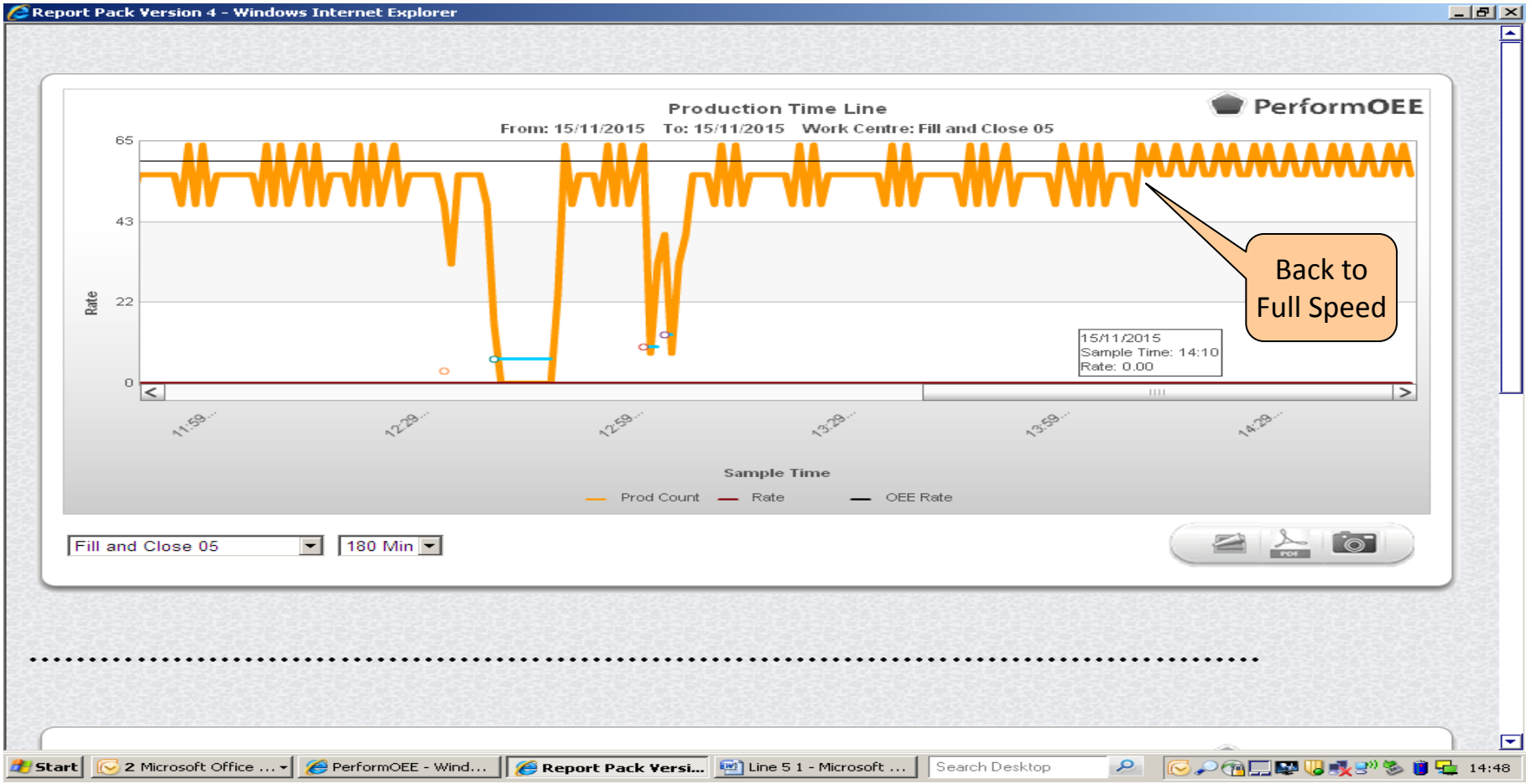
3. Locking in the Gains – CPC



Line 5 is adjusted back to Full Speed

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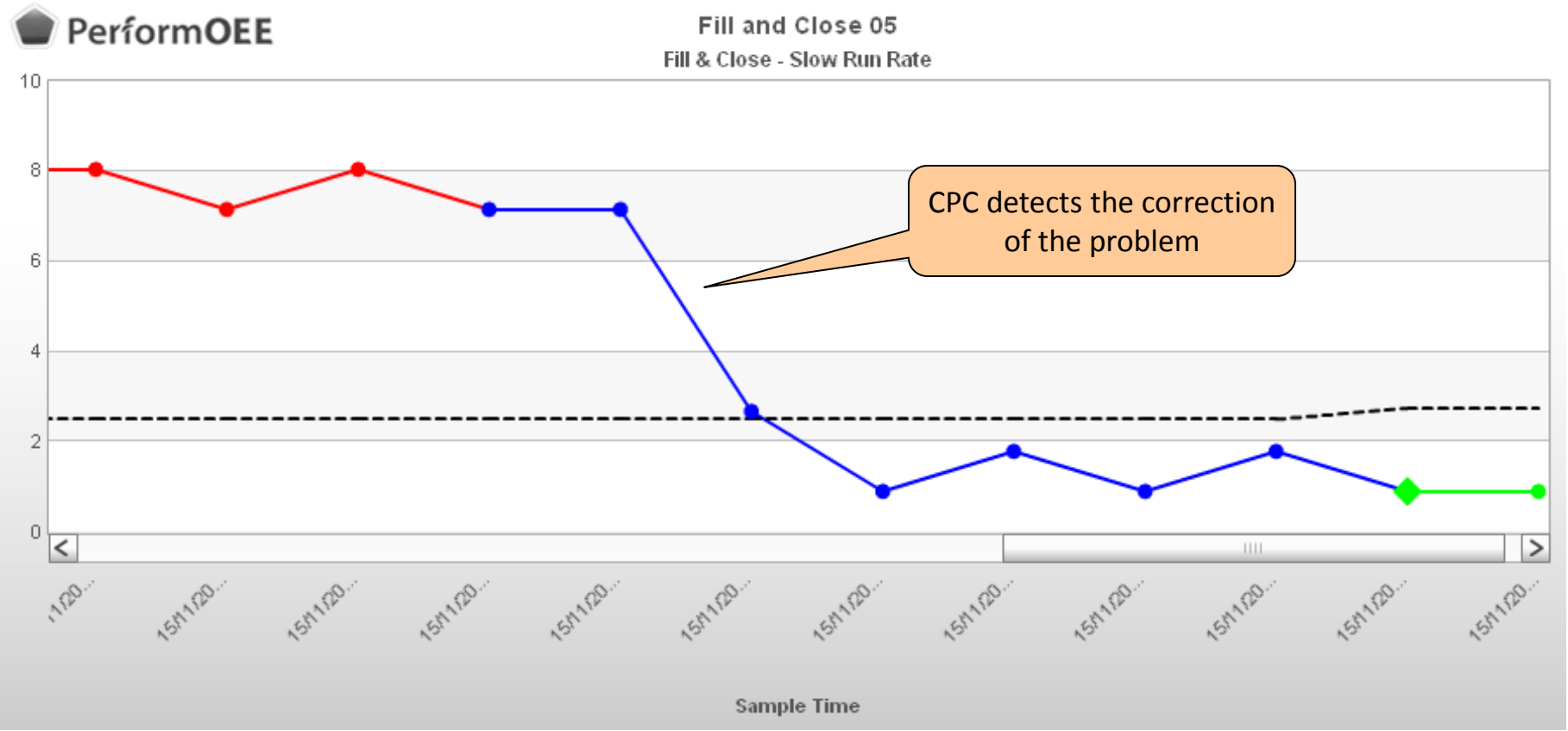
3. Locking in the Gains – CPC



PerformOEE™ CPC confirms that the Line is back under control

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We call this

“ The Science of Manufacturing ”

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Take Aways . . .

1. If you're not already using OEE as a Key Performance Indicator, it is highly likely that you are missing out on significant performance improvement opportunities :
   Improve Competitiveness, Increase Output, Reduce Costs.

2. If you are using OEE, remember the three fundamentals :
   - **Realtime Management**, **Improvement Projects** and **Lock-in.**

3. And if you have already got a handle on what I've discussed :
   – Fair Dues ! Well Done ! You're ahead of the pack . . .

   – When can I visit your Manufacturing Plant ?

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THANK YOU

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