SOLVING EFESO
STRATEGY IN ACTION

KONFERANS

Üretim Sürekliliğinin İhmal Edilen Faktörü: Bakım

taysad

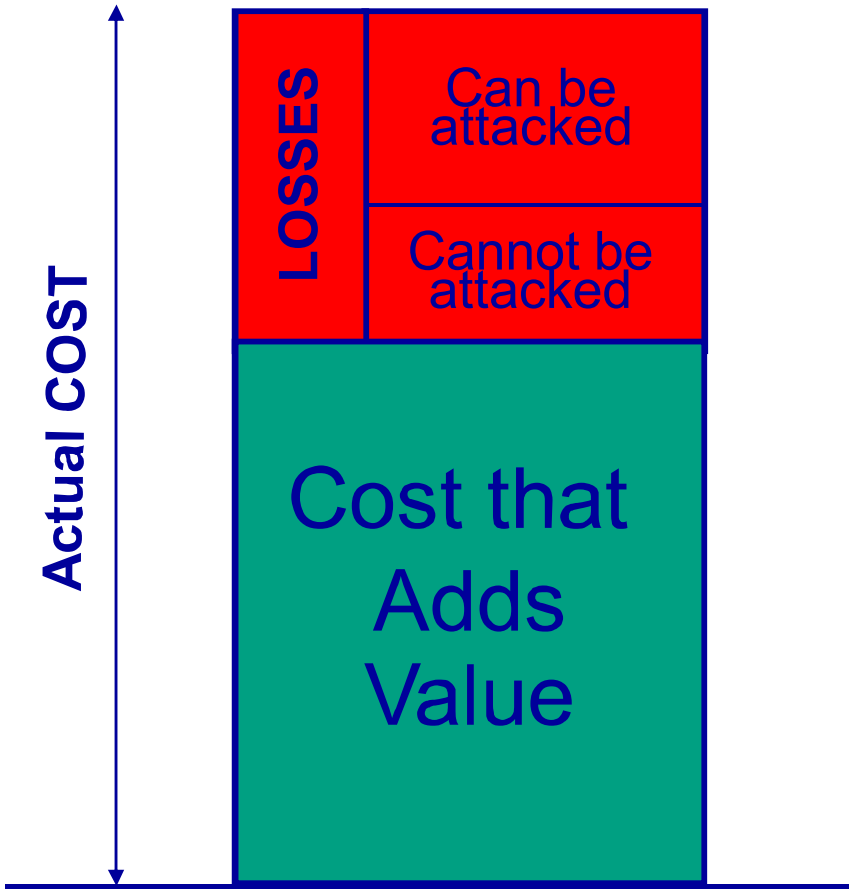
grupas

Achieving Zero Breakdowns

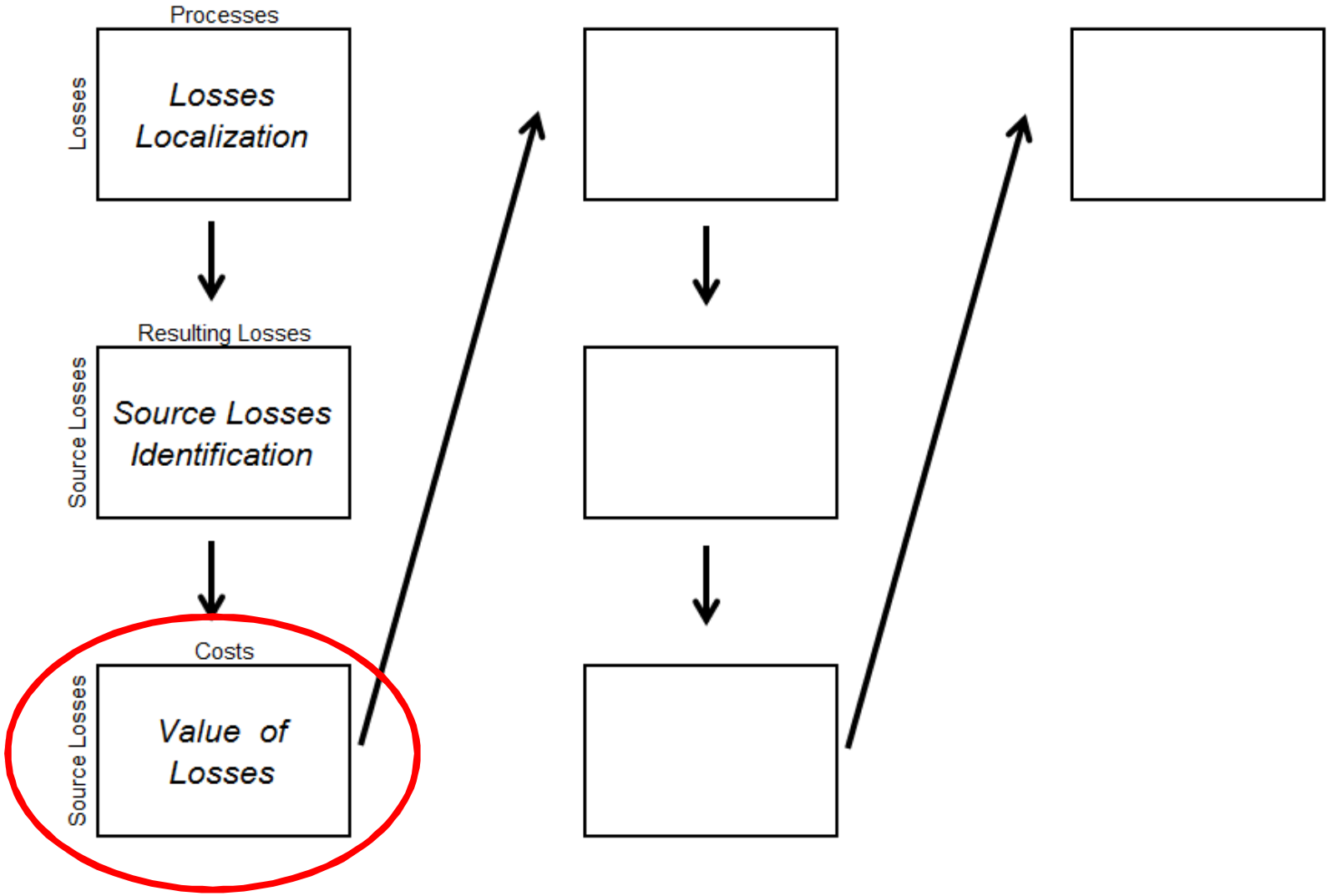
Istanbul, 12 December 2014

Virginio Peluzzi

A Loss is a Cost that does not add any value but that the Company pays for it



How to evaluate the impact of the MAINTENANCE on the Costs



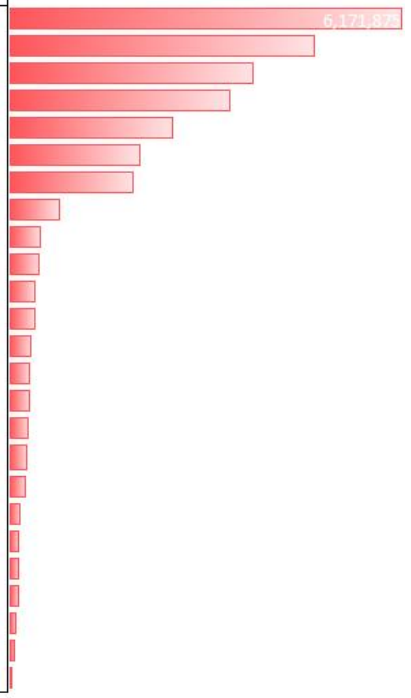
The Cost - Loss Matrix

Costs

Direct Material	Direct Manpower	Indirect Material	Energy	Equipment Depreciation	Indirect Manpower

Losses

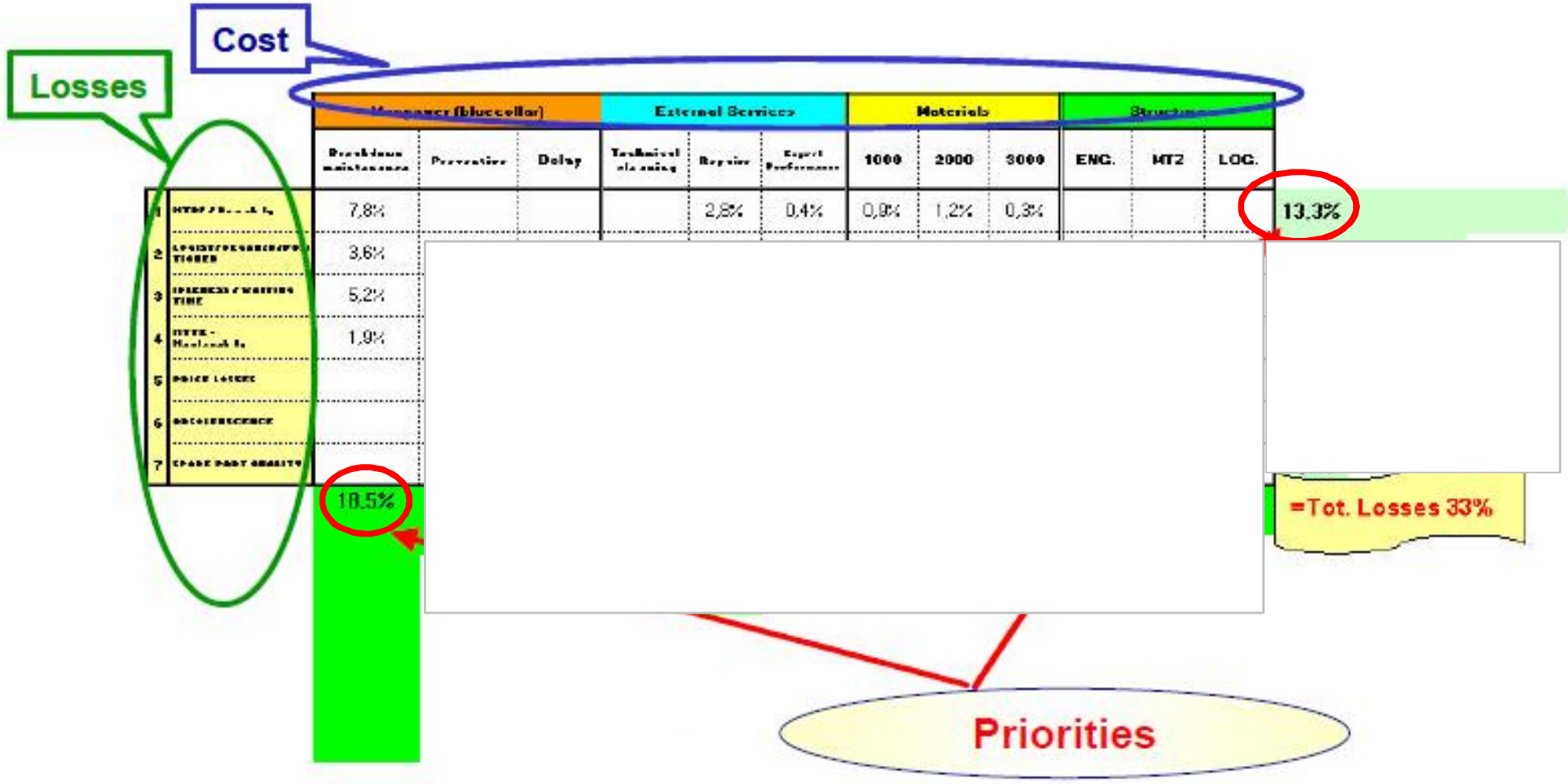
Value of a specific LOSS which affects a specific COST



Impact of Maintenance – Automotive case, driveline, 2010, *% of TRANSFORMATION COSTS*

COSTS / LOSSES	Labour 47,0%						Outsourcing 19,3%			Materials 12,2%			Staff 18,7%			Other 2,8%	
	Breakdown mtc	Planned	Tooling	Preventive	Outside contract	Warehouse people	Cleaning	Repairs	Extraord. Mtc	CR8	CR5 Store	CR1	ENG.	MTZ	LOG.	altri	TOT
Idling	3,2%	1,3%	0,5%	0,3%	0,0%	0,9%											6,3%
Logistics/Organisation	3,7%	0,5%		0,2%									0,5%	0,2%	0,2%		5,3%
MTBF / Rel.	8,6%							2,1%	3,4%	1,2%	2,2%						17,5%
MTTR / Maint.	1,3%	1,1%	0,7%										1,3%	0,4%			4,9%
Spare part quality											0,3%						0,3%
Inadequate stock management																	0,0%
Obsolescence											0,4%						0,4%
Sheer losses										0,0%	0,0%	0,0%					0,0%
Exceeding purchases										0,0%							0,0%
Wrong technical specs										0,0%							0,0%
Price losses							0,2%		0,3%								0,6%
TOT LOSSES	16,8%	2,9%	1,2%	0,5%	0,0%	0,9%	0,2%	2,1%	3,8%	1,2%	2,8%	0,0%	1,9%	0,6%	0,2%		35,2%

Impact of Maintenance – Automotive case, engines, 2011, *% of TRANSFORMATION COSTS*



Impact of Maintenance – Medical Technology case, components, 2011, *% of LOSSES*

Fig. 4.2-3 Cost – Loss Matrix

What is a BD

An UNPLANNED stop of a system that:

Has a duration of more than 15 minutes

OR

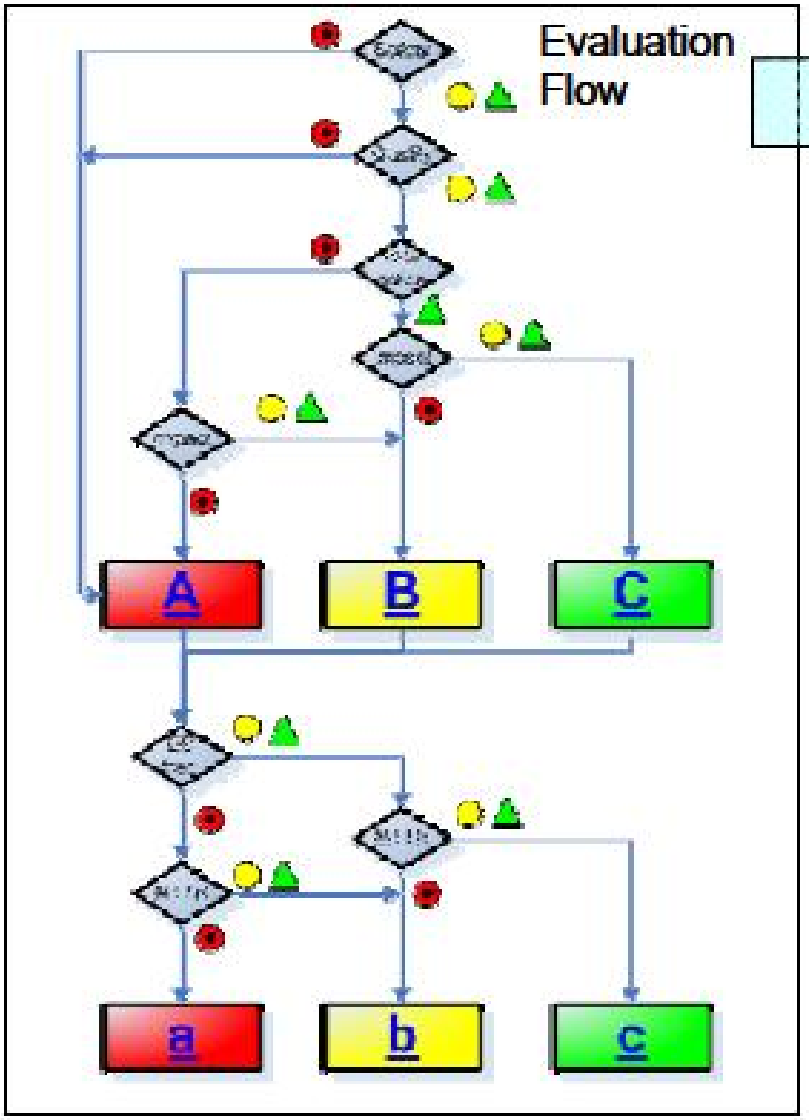
Requires an intervention of the Maintenance

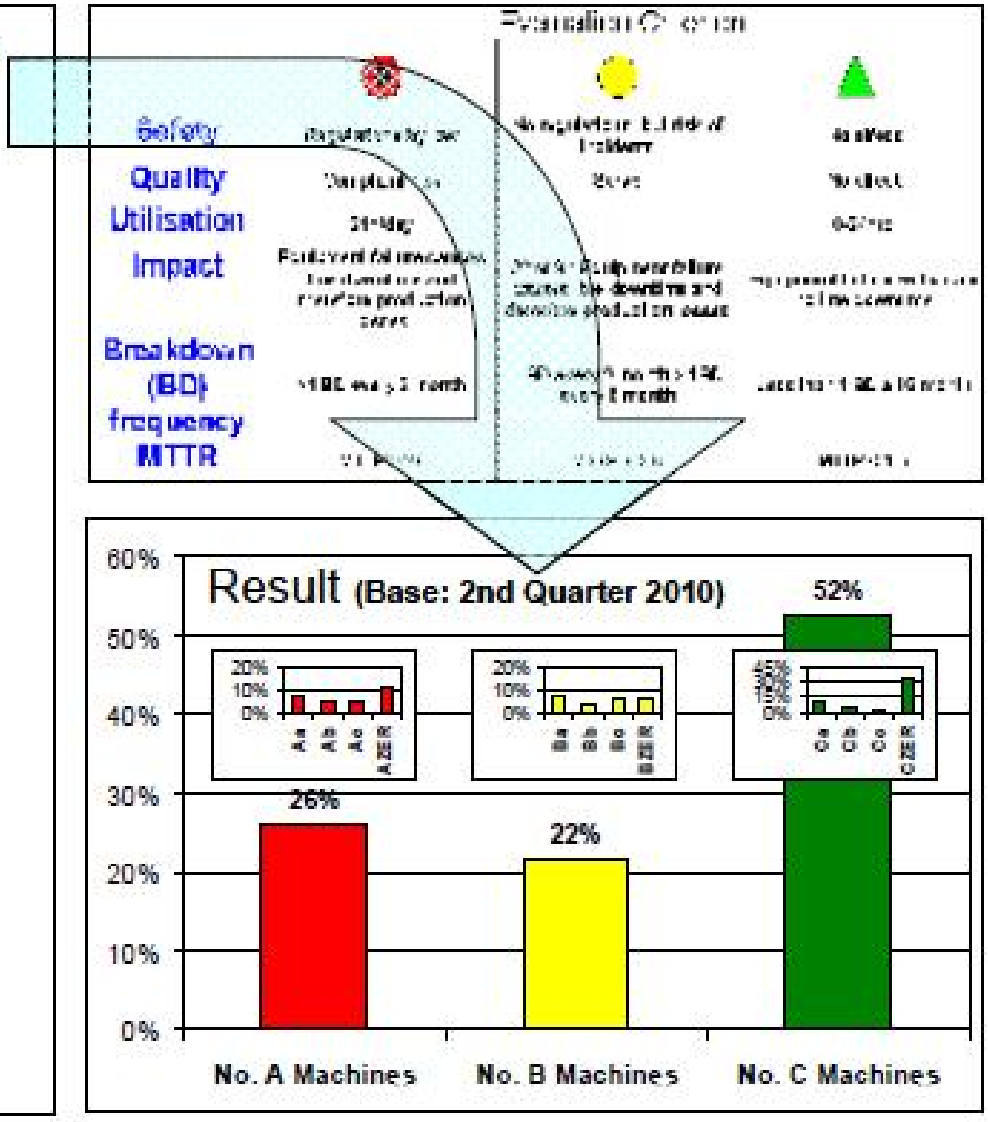
OR

Requires the replacement of a component

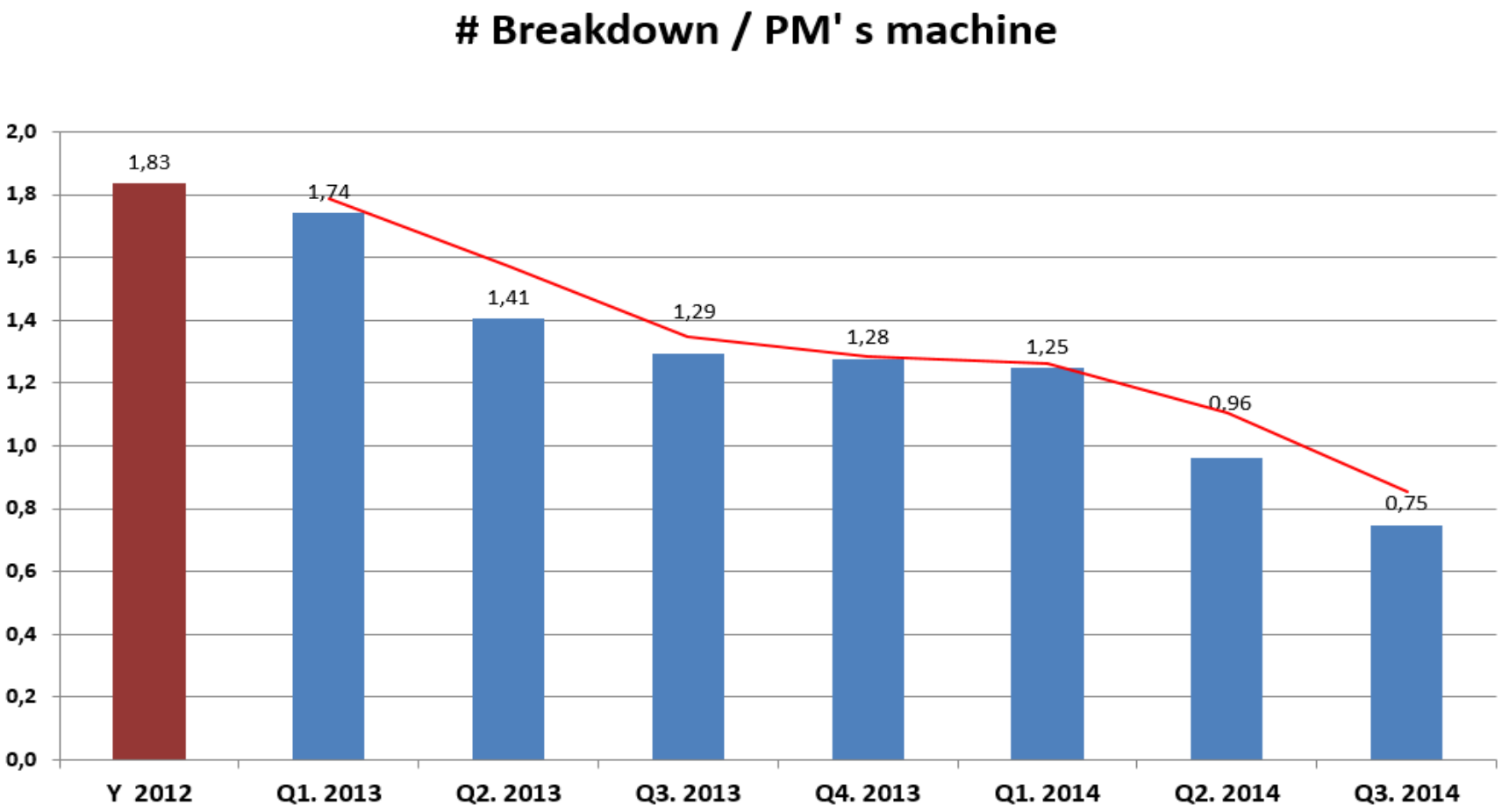
OR A COMBINATION OF ALL THESE THREE CHARACTERISTICS

Map and classify the Machines!

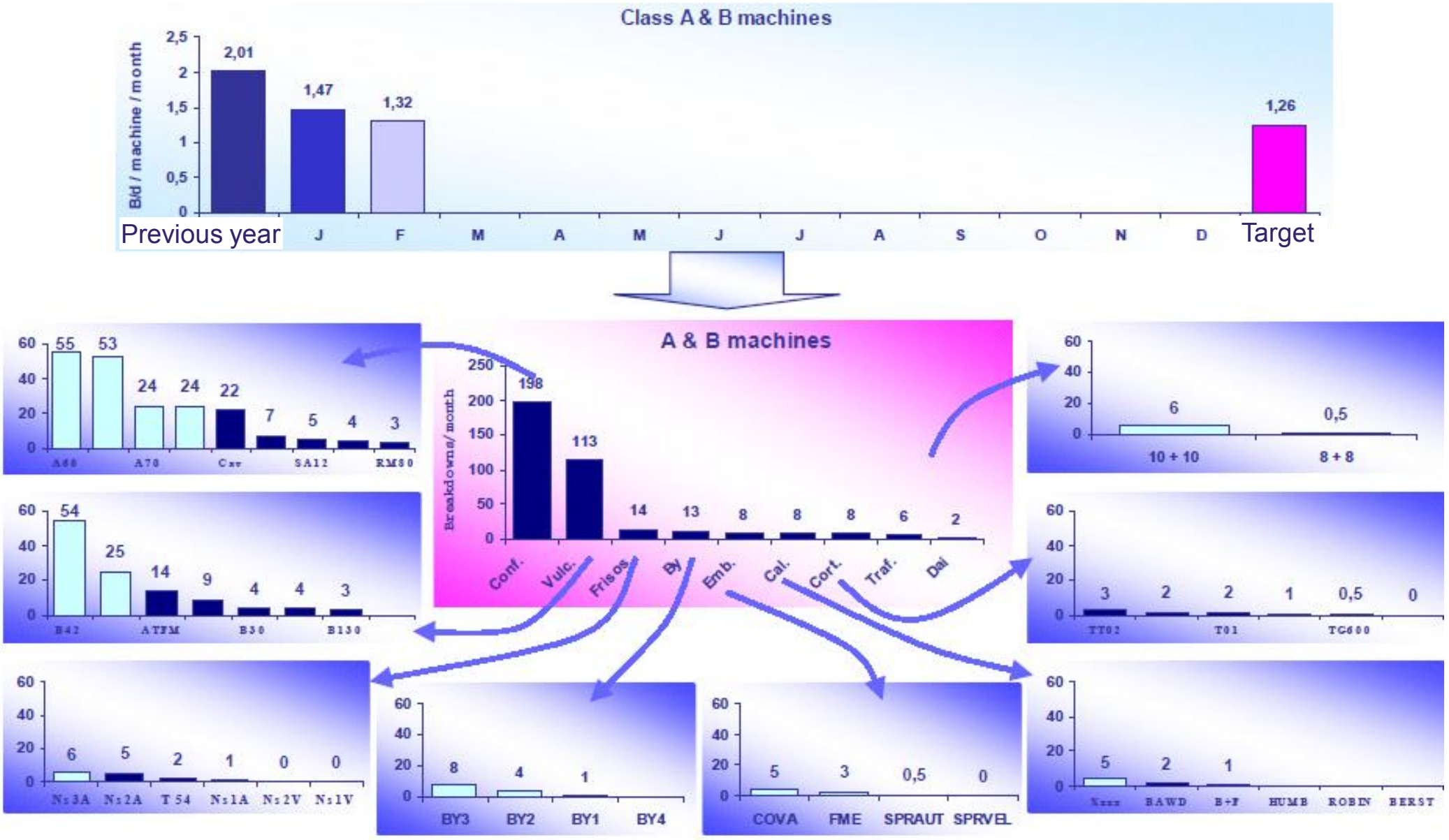




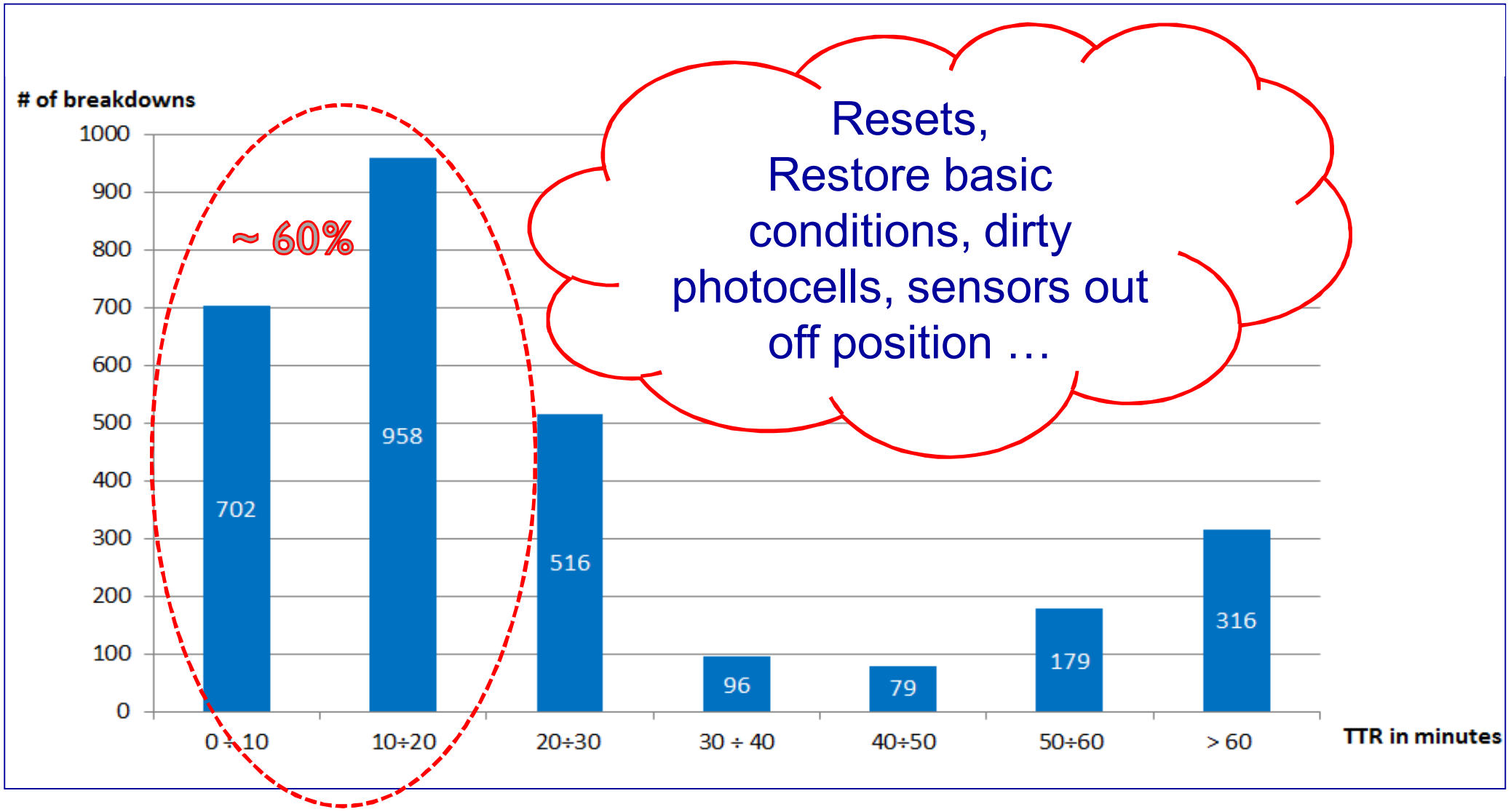
Measure the OCCURRENCE of Breakdowns!



Deploy the Breakdowns!



Breakdowns are not all the same!



Learn how to analyse the Breakdowns! *(example)*

Machine	Elect. Motor
Date	01/01/2008
Shift	1

Time of breakdown	11.04
Time of intervention	12.23
Time to repair	3 hours
Time to start-up	16.00

Production Operat.	Green
Maintenance Techn.	White
Team	Yellow

Maint. Technician & Maint. Manager (*in case of systematic BD analysis*)

What happened and where (section/subassembly)

Grease and carbon black were found in the motor
A major leak occurred in the main shaft bearings

Prior signs before the breakdown

Speed loss
Vibration
Grease leak

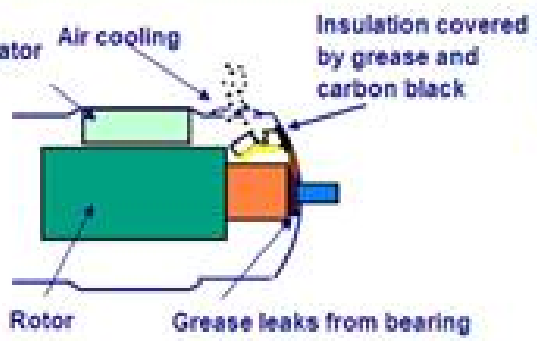
Descr. of the repair interv. (specify component you have worked on) + spare parts used

Insulation on brush bar cleaned and basic conditions restored (insulation level)
Carbon black removed from motor

Failure mode + sketch (use the back of the sheet)

Brush bar broke and motor was stopped as a direct consequence

Sketch



Use the back of the sheet for 5 why analysis on the failure mode identified (Operator + Maintenance Technician)

Root causes	Cat.(*)	Countermeasures
Lack of a filter for cooling air (by design)	1	Install a filter
Lubrication standard not followed (by maintenance)	2	OPL and Technician Training

Were checks already planned to prevent this failure?

Description	By whom	Frequency
General inspection	Electrical technicians	Monthly during the PM shutdown

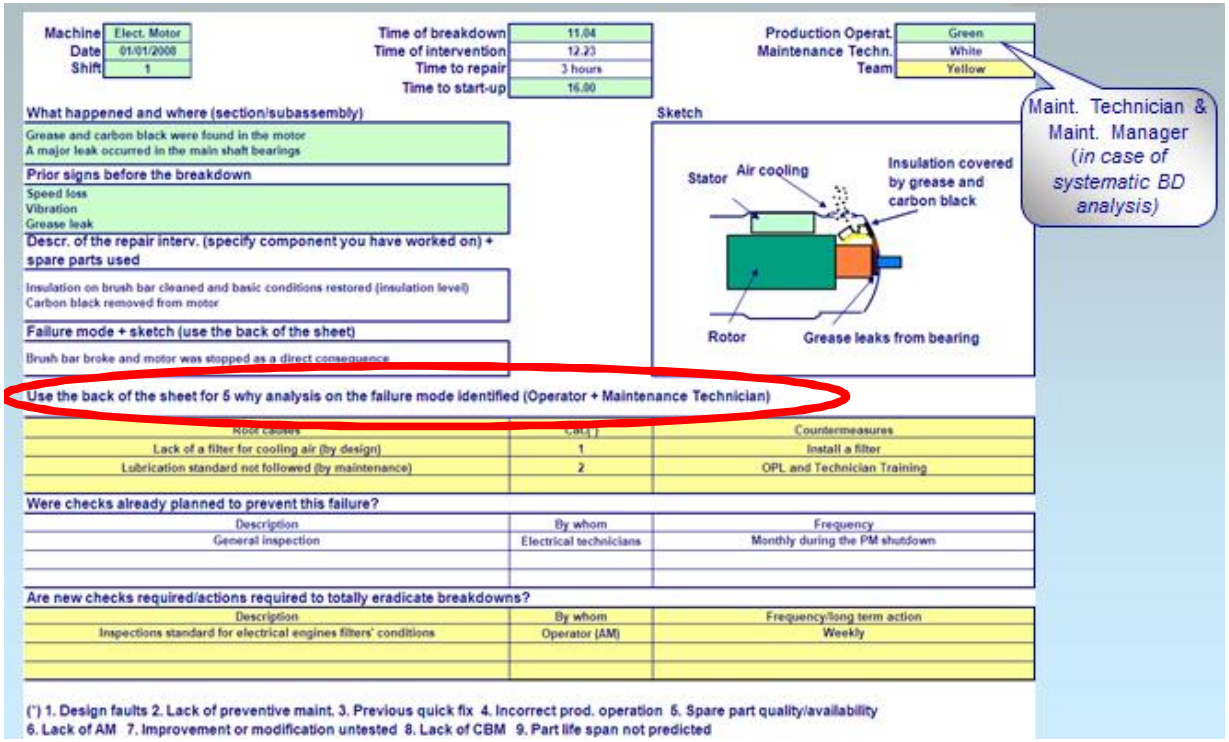
Are new checks required/actions required to totally eradicate breakdowns?

Description	By whom	Frequency/long term action
Inspections standard for electrical engines filters' conditions	Operator (AM)	Weekly

(*) 1. Design faults 2. Lack of preventive maint. 3. Previous quick fix 4. Incorrect prod. operation 5. Spare part quality/availability
6. Lack of AM 7. Improvement or modification untested 8. Lack of CBM 9. Part life span not predicted

Why it is possible to achieve ZERO Breakdowns

The 5 WHY'S ANALYSIS clarifies the root cause(s) of that BD. When you understand ALL the root causes and have eradicated them, that BD will no more occour!!



Machine	Elect. Motor	Time of breakdown	11.04	Production Operat.	Green
Date	01/01/2008	Time of intervention	12.23	Maintenance Techn.	White
Shift	1	Time to repair	3 hours	Team	Yellow
		Time to start-up	16.00		

What happened and where (section/subassembly)

Grease and carbon black were found in the motor
A major leak occurred in the main shaft bearings

Prior signs before the breakdown

Speed loss
Vibration
Grease leak

Descr. of the repair interv. (specify component you have worked on) + spare parts used

Insulation on brush bar cleaned and basic conditions restored (insulation level)
Carbon black removed from motor

Failure mode + sketch (use the back of the sheet)

Brush bar broke and motor was stopped as a direct consequence

Sketch

Maint. Technician & Maint. Manager *(in case of systematic BD analysis)*

Use the back of the sheet for 5 why analysis on the failure mode identified (Operator + Maintenance Technician)

Root causes	Cat.(*)	Countermeasures
Lack of a filter for cooling air (by design)	1	Install a filter
Lubrication standard not followed (by maintenance)	2	OPL and Technician Training

Were checks already planned to prevent this failure?

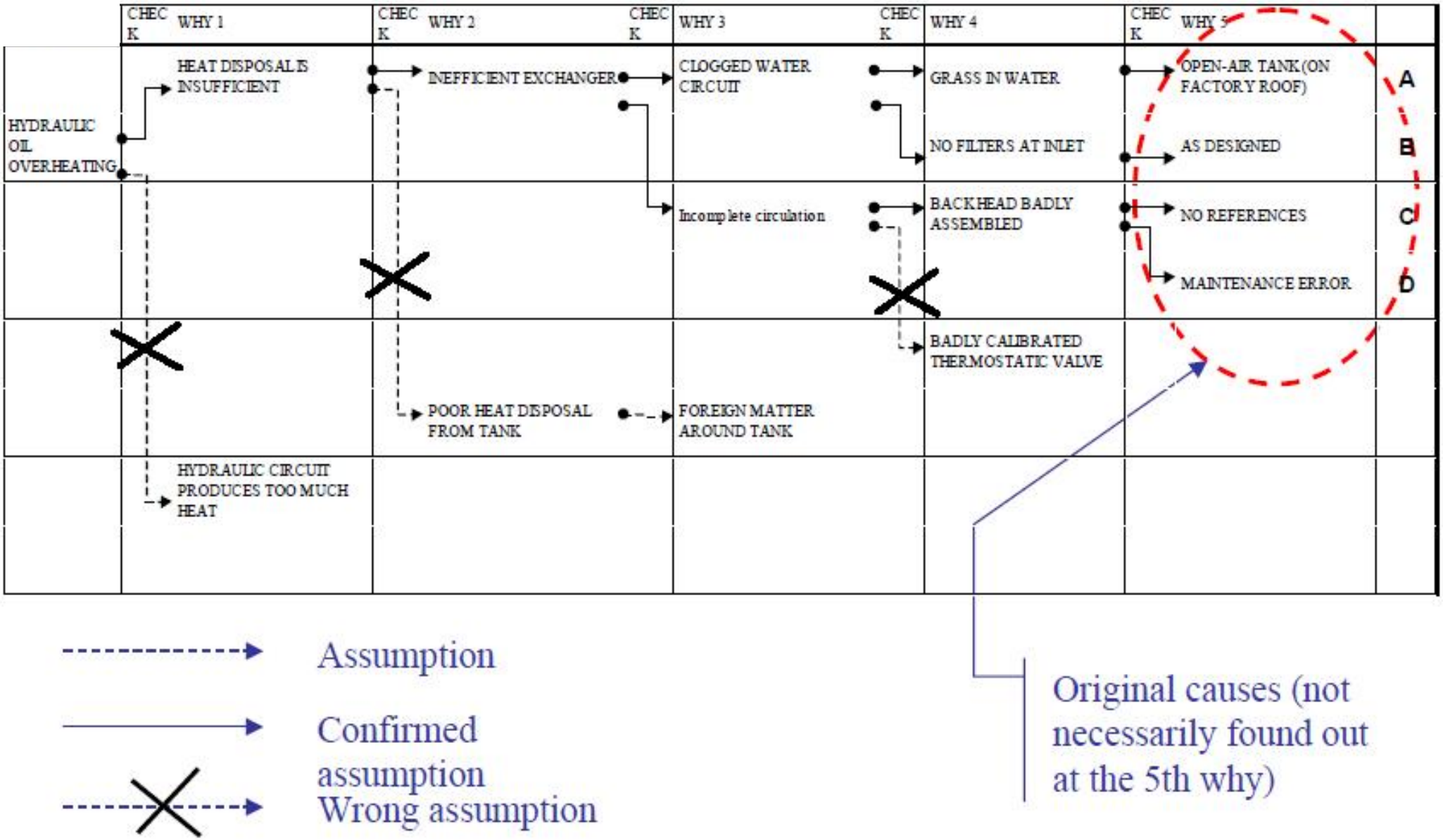
Description	By whom	Frequency
General inspection	Electrical technicians	Monthly during the PM shutdown

Are new checks required/actions required to totally eradicate breakdowns?

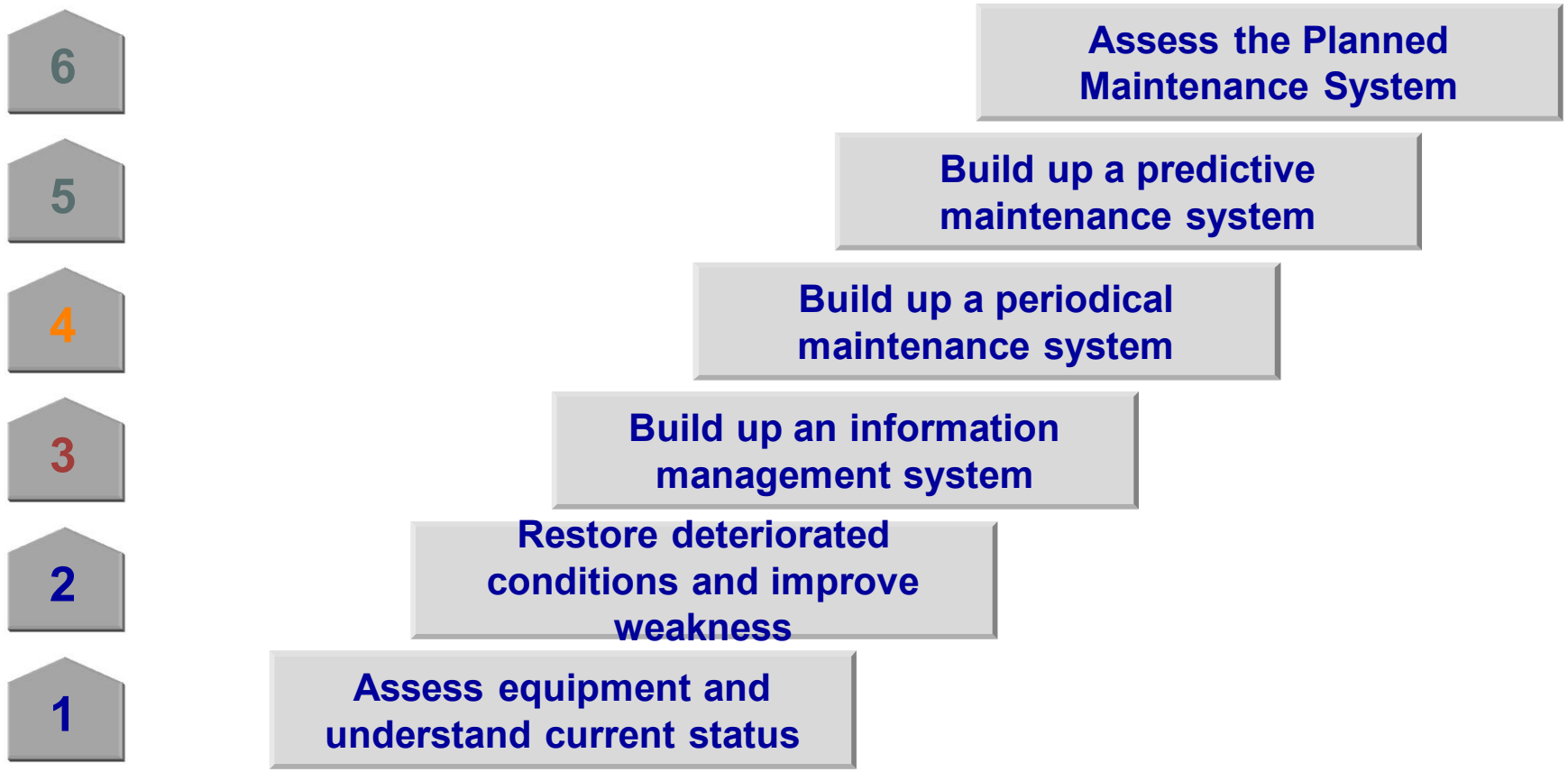
Description	By whom	Frequency/long term action
Inspections standard for electrical engines filters' conditions	Operator (AM)	Weekly

(*) 1. Design faults 2. Lack of preventive maint. 3. Previous quick fix 4. Incorrect prod. operation 5. Spare part quality/availability 6. Lack of AM 7. Improvement or modification untested 8. Lack of CBM 9. Part life span not predicted

5 Why's Analysis *(example)*



The 6 steps of Planned Maintenance according JIPM



The 7 steps of Autonomous Maintenance according JIPM

AM and PM together with 4 phases

PM Phases / Pillars	1 Stabilise failure intervals	2 Lengthen equipment life	3 Periodically restore deteriorated conditions	4 Predict equipment life
Autonomous Maintenance	**Step 1:** Initial cleaning **Step 2:** Eliminate sources of dirt and hard-to - clean & inspect areas **Step 3:** Create and maintain cleaning, inspection & lubrication standards	**Step 4:** General inspection	**Step 5:** Autonomous inspection	**Step 6:** Standardisation **Step 7:** Autonomous management
Planned Maintenance	**Step 1:** Assess equipment and understand current status			
	Step 2: Restore deteriorated conditions and improve weakness		Establish as corrective maintenance	**Step 6: Assess the Planned Maintenance**
		Step 3: Build up an info management system	Establish as periodic maintenance	
			Step 4: Build up a periodical maintenance system	**Systematic Planned Maintenance**
				Step 5: Build up a predictive maintenance system

Results of our Customers

For obvious reasons of confidentiality and protection of data, the results achieved by our Customers are not distributed with these proceedings but only displayed during the presentation

RESULTS

(1) Business indicator	KGI (Key Goal Indicator)	
• Net income to sales	3 times	Electronic parts
• Ordinary profit ratio	5 times	Forgings
• Manufacturing P/L improvement rate	2.3 times	Ceramics
(2) Key performance	KPI (Key Performance Indicator)	
① Productivity		
• Labor productivity	2.3 times	Transportation equipment
• Overall equipment efficiency	97%	Automobile parts
• Number of equipment failures	1/100	Automobile parts
② Quality		
• Complaints	zero	Ceramics
• Overall non-defective rate	95%	Electronic parts

Source: JIPM, Dec 2013, Survey conducted among 300 Companies TPM Awarded, period 2000-2011