

Car Body Painting 2010

Paint Shops Put to the Test

Plant Assessment as a Systematic Approach for more Efficiency and Sustainability in use of Energy and Resources

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Agenda

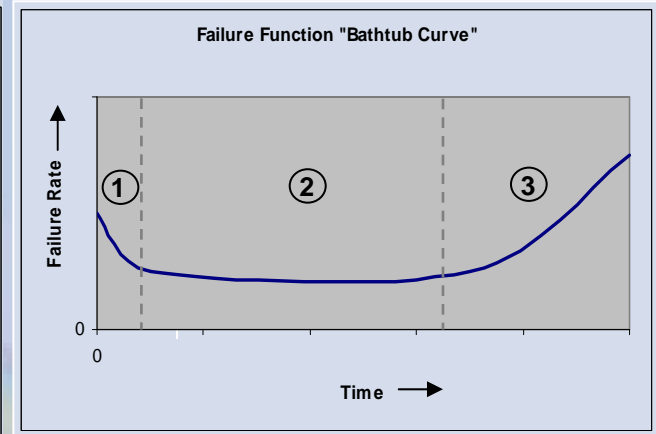
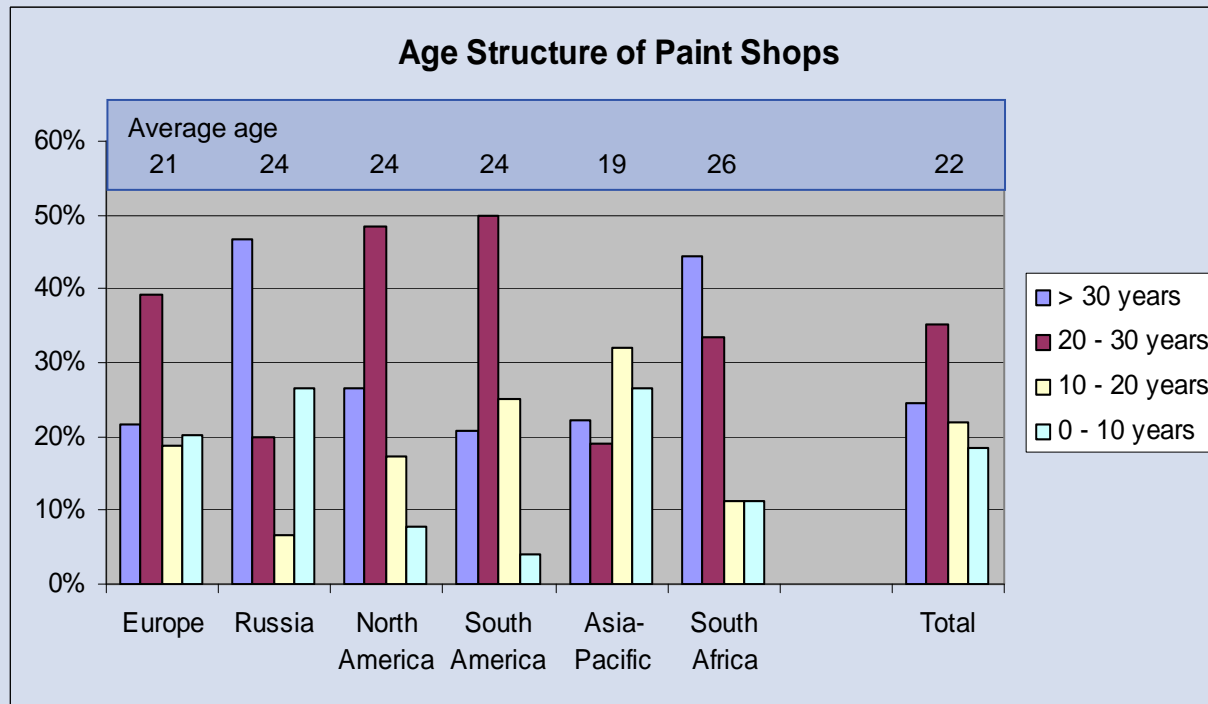
- **Paint shops – Installed base**
- **Plant Assessment: 1st step for improving existing plants**
- **Examples**

Agenda

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Car Manufacturing

Age structure of paint shops



- (1) Early Failure Period
- (2) Intrinsic Failure Period
- (3) Wear out Failure Period

60 % of all paint shops are older than 20 years



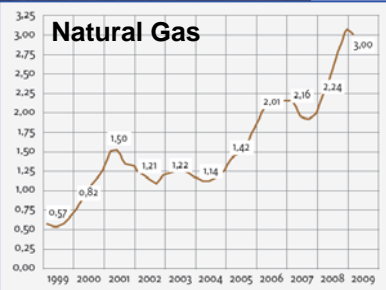
Car Manufacturing

Developments in the last 30 years: Product






Car Manufacturing

Developments in the last 30 years: Energy & Environment

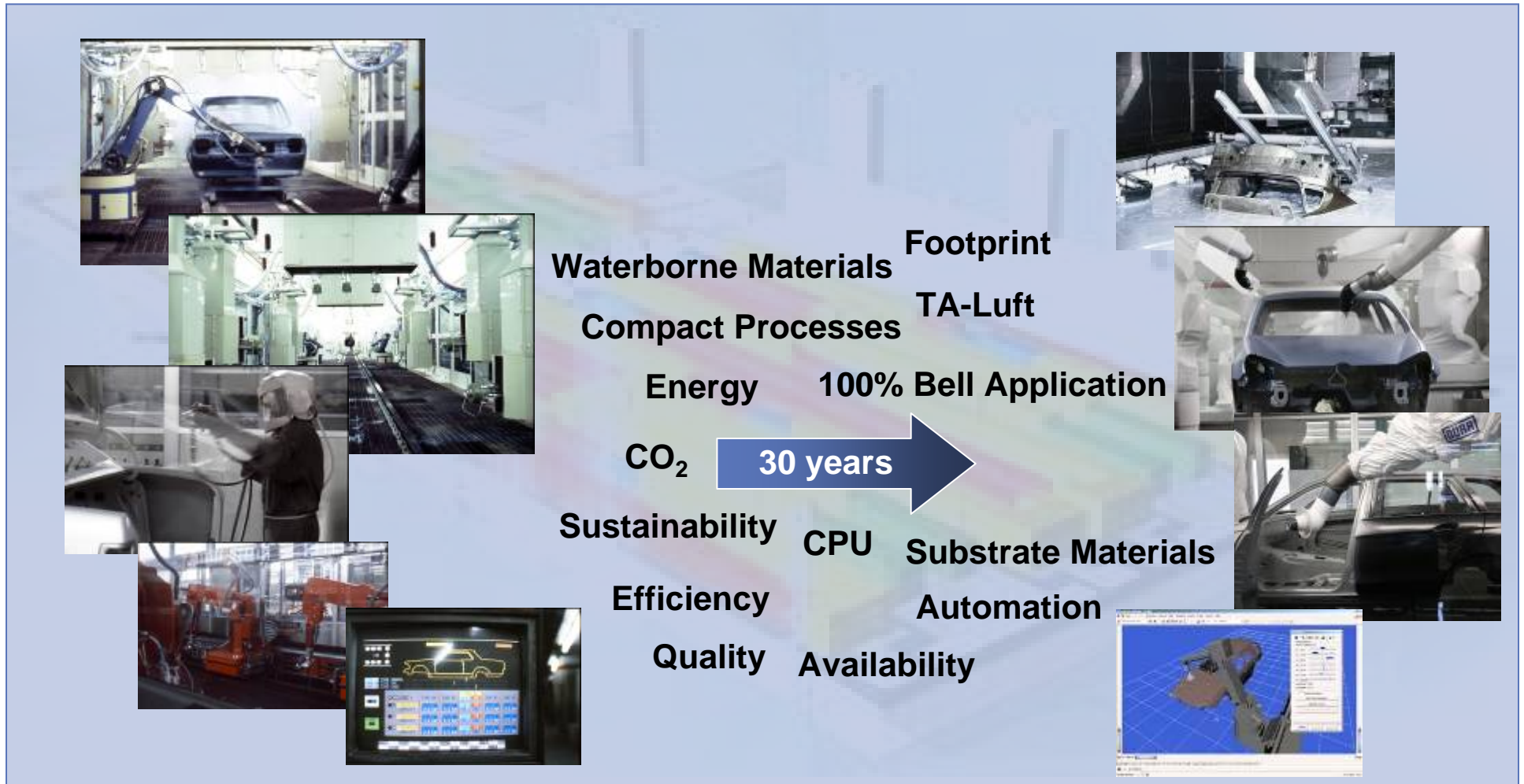
Year	Price
1999	0.57
2000	0.82
2001	1.50
2002	1.21
2003	1.22
2004	1.14
2005	1.42
2006	2.01
2007	2.16
2008	2.74
2009	3.00

30 years

Car Manufacturing

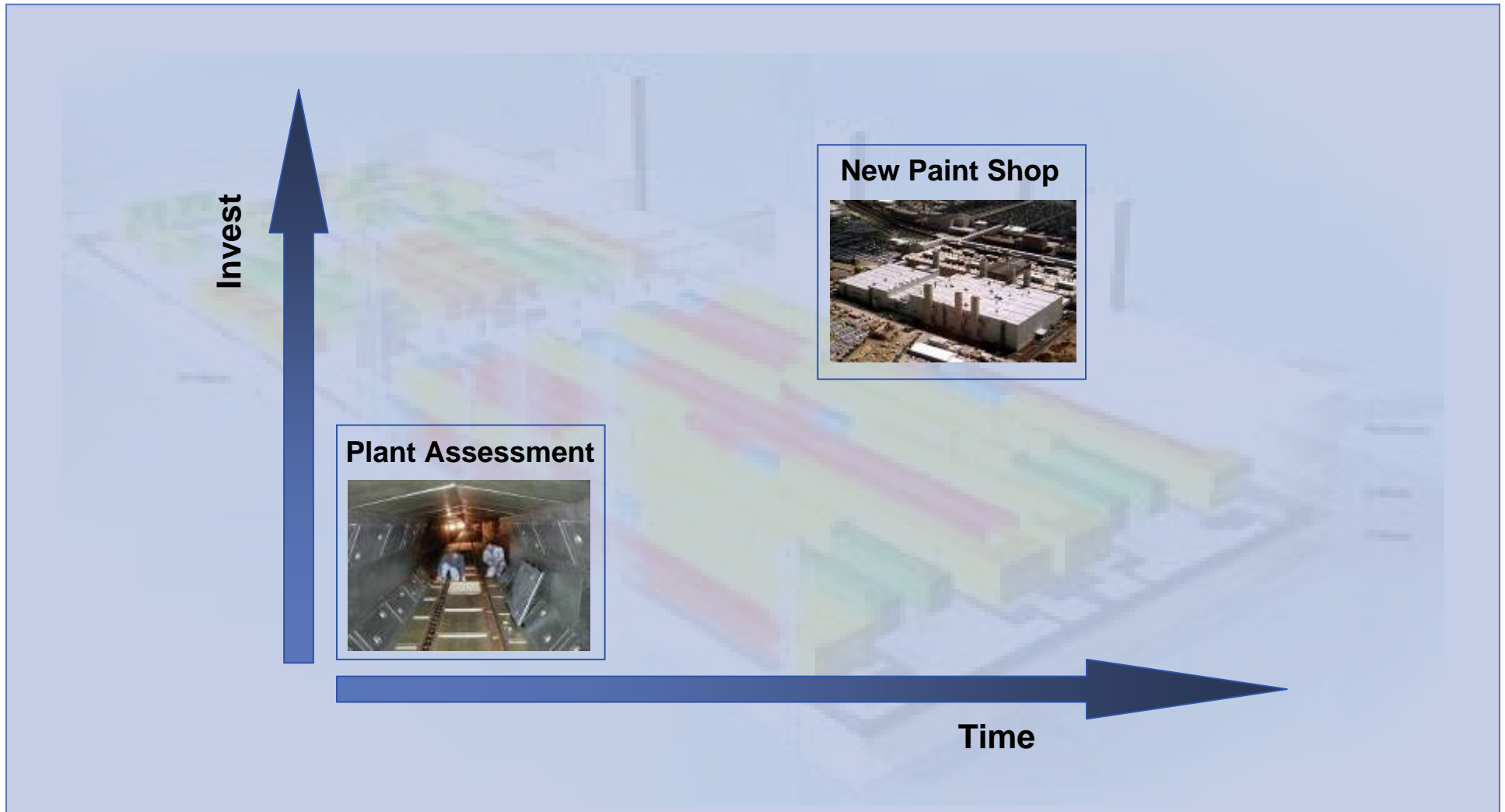
Developments in the last 30 years: Paint process



Agenda

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- Examples

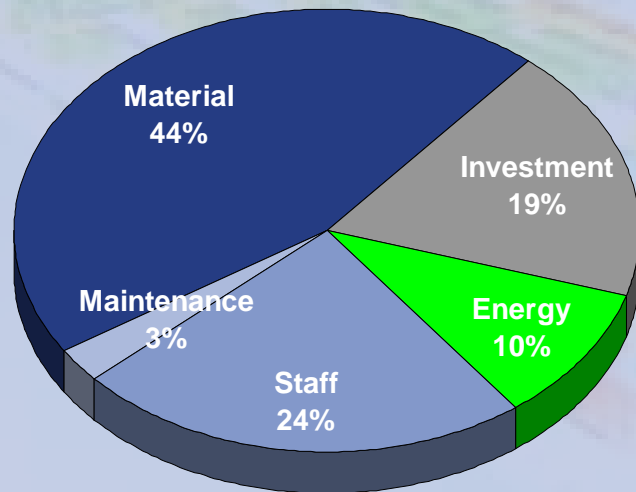
Plant Assessment vs. New Paint Shop



CPU: Influencing Factors & Saving Potentials



Effects (Example: Top Coat)



CPU 195 €

- 10% material usage

CPU Reduction: 8,50 €
Saving potential: 1.275.000 €/a

- 20% energy consumpt.

CPU Reduction: 4 €
Saving potential: 600.000 €/a

+ 5% first run increase

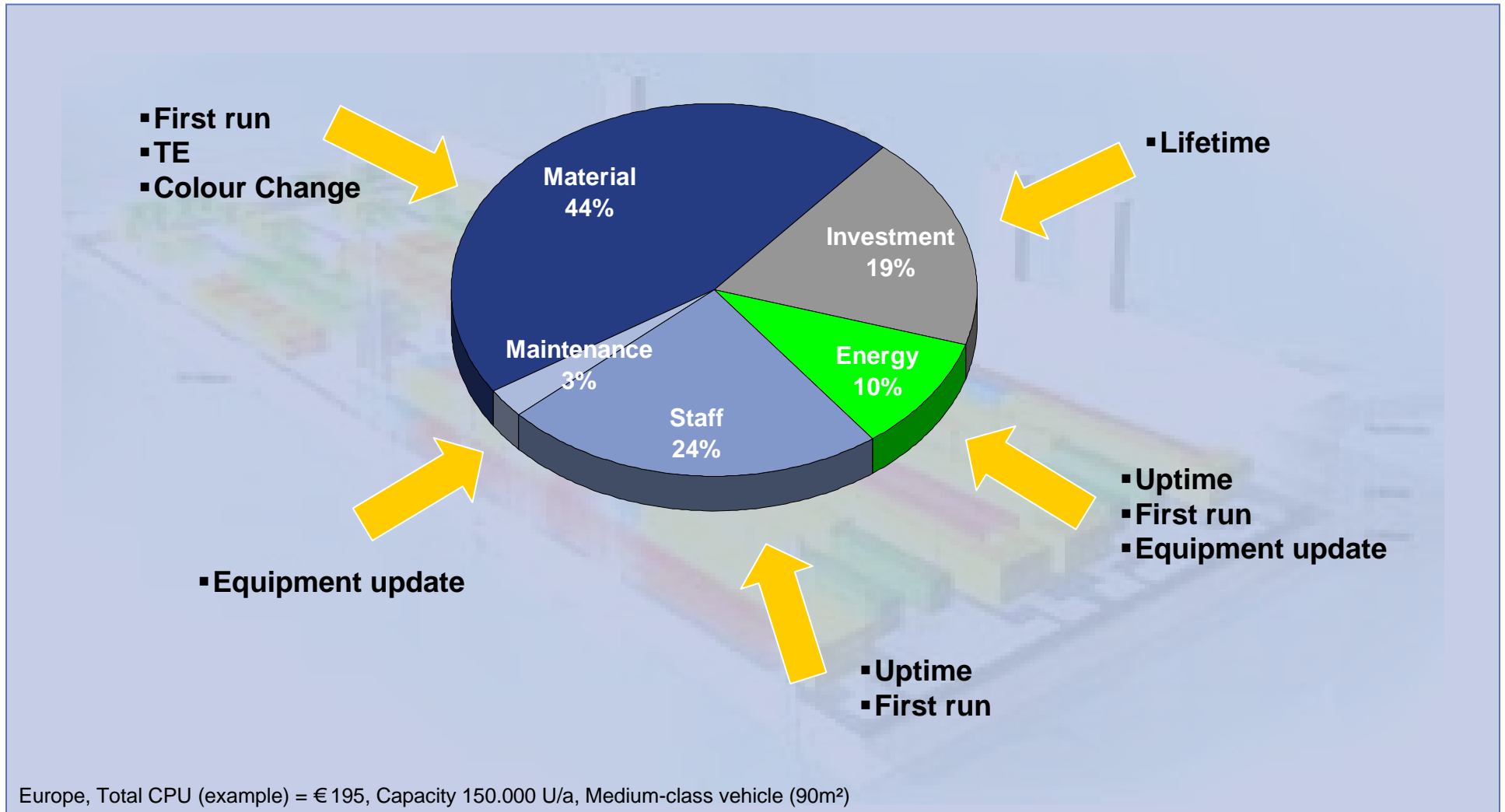
CPU Reduction: 9 €
Saving potential: 1.350.000 €/a

+ 5% uptime increase

CPU Reduction: 6 €
Saving potential: 900.000 €/a

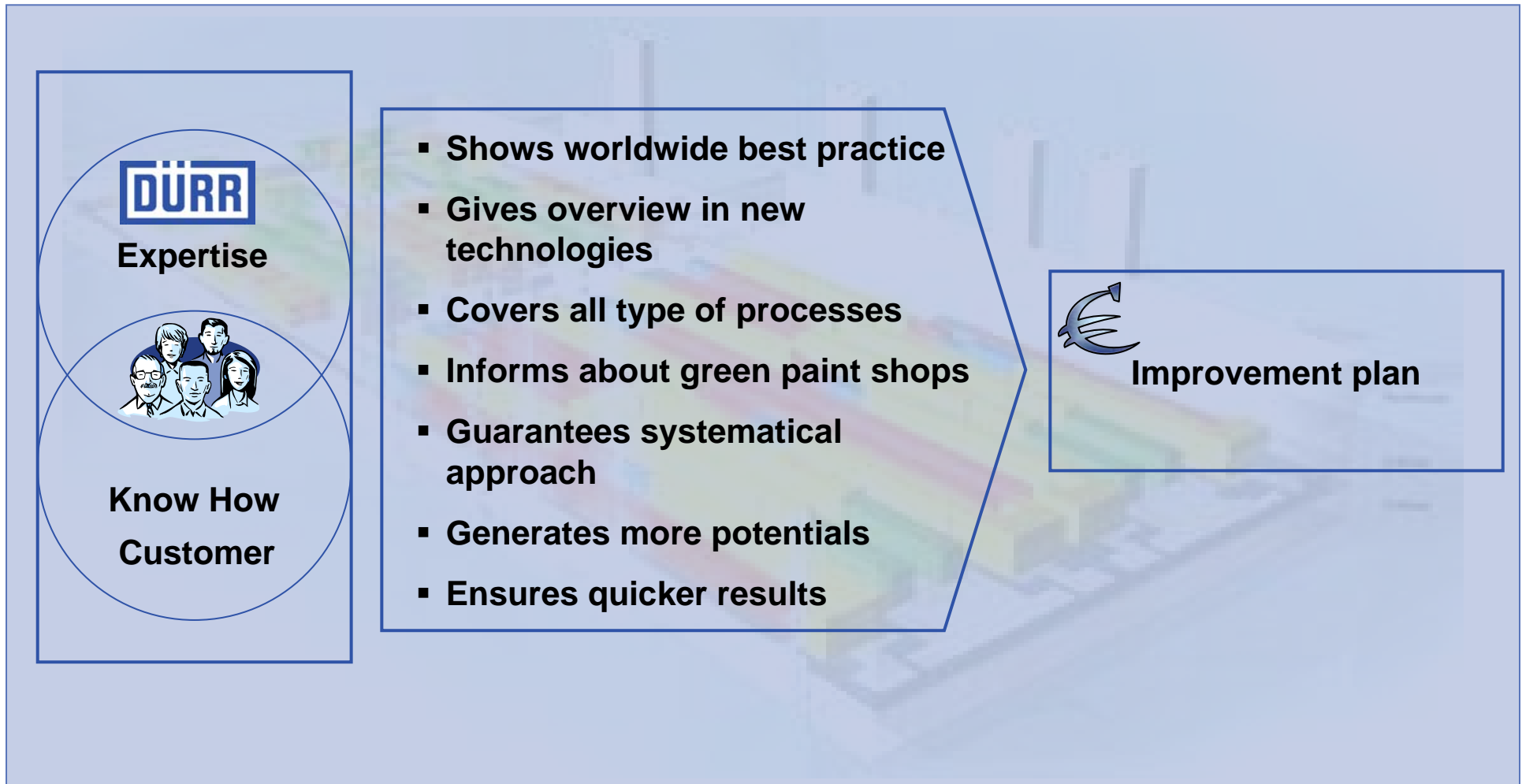
Europe, CPU (Example: Top Coat), Capacity 150.000 U/a, Medium-class vehicle (90m²)

Plant Assessment: Entry for CPU Reduction



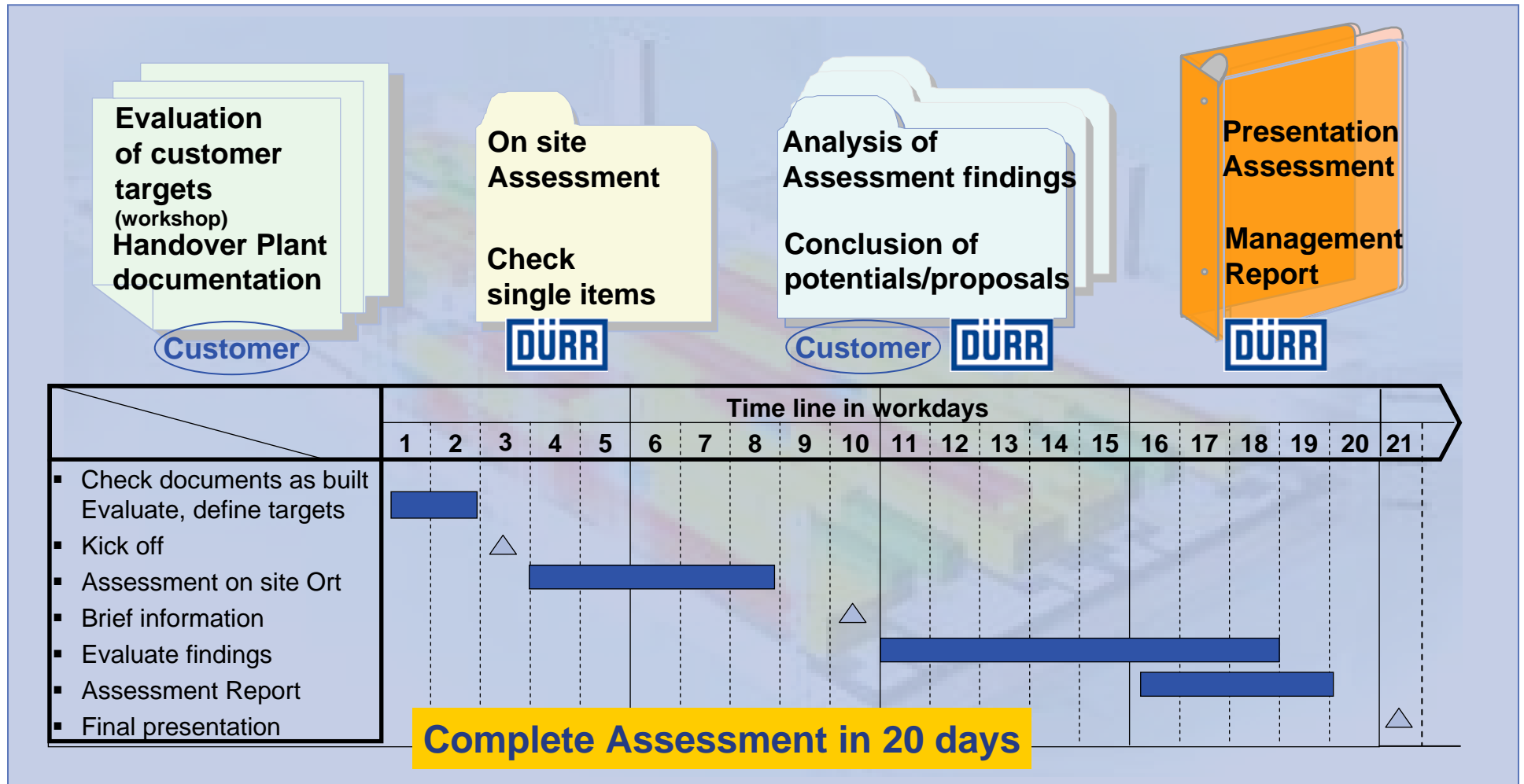
Plant Assessment: Elements & Approach

Teamwork for new ideas



Plant Assessment

Teamwork and expertise ensure quicker results



Plant Assessment

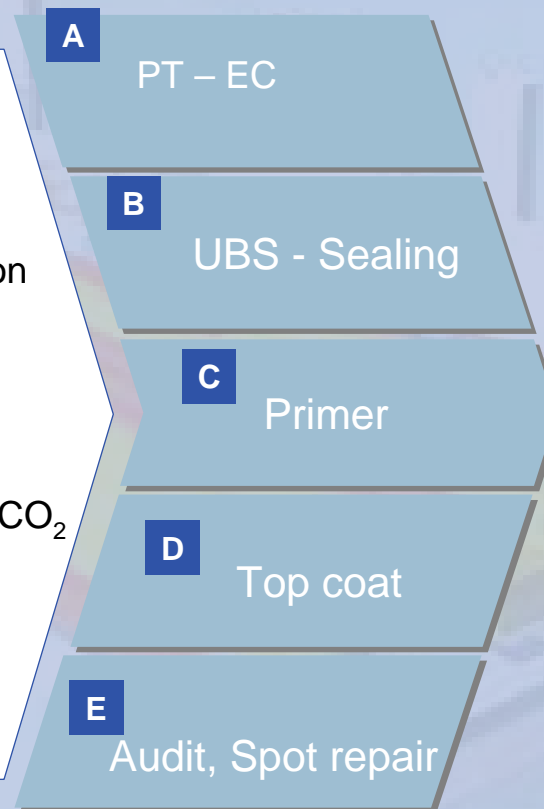
Professional full range guaranteed

Specialists for Assessment

- Process
- Application
- Booth
- HVAC
- Oven
- Conveying
- Control Systems
- SCADA
- Energy Management
- Interfaces / Building
- Environment

Selected targets

- Cost per unit
- Energy consumption
- Longevity
- Quality
- 1st run
- Legal conformity
- Environment H₂O, CO₂
- Availability
- Flexibility
- ...



Additional findings, proposals and conclusion regarding

- **Replacement**
- **Repair**
- **Modification**

to fulfill, to improve to meet customers targets

Plant Assessment



Worksheet: Systematically recorded findings

Location

Situation

Proposal, measure improvement

Level to achieve targets

Plant Assessment

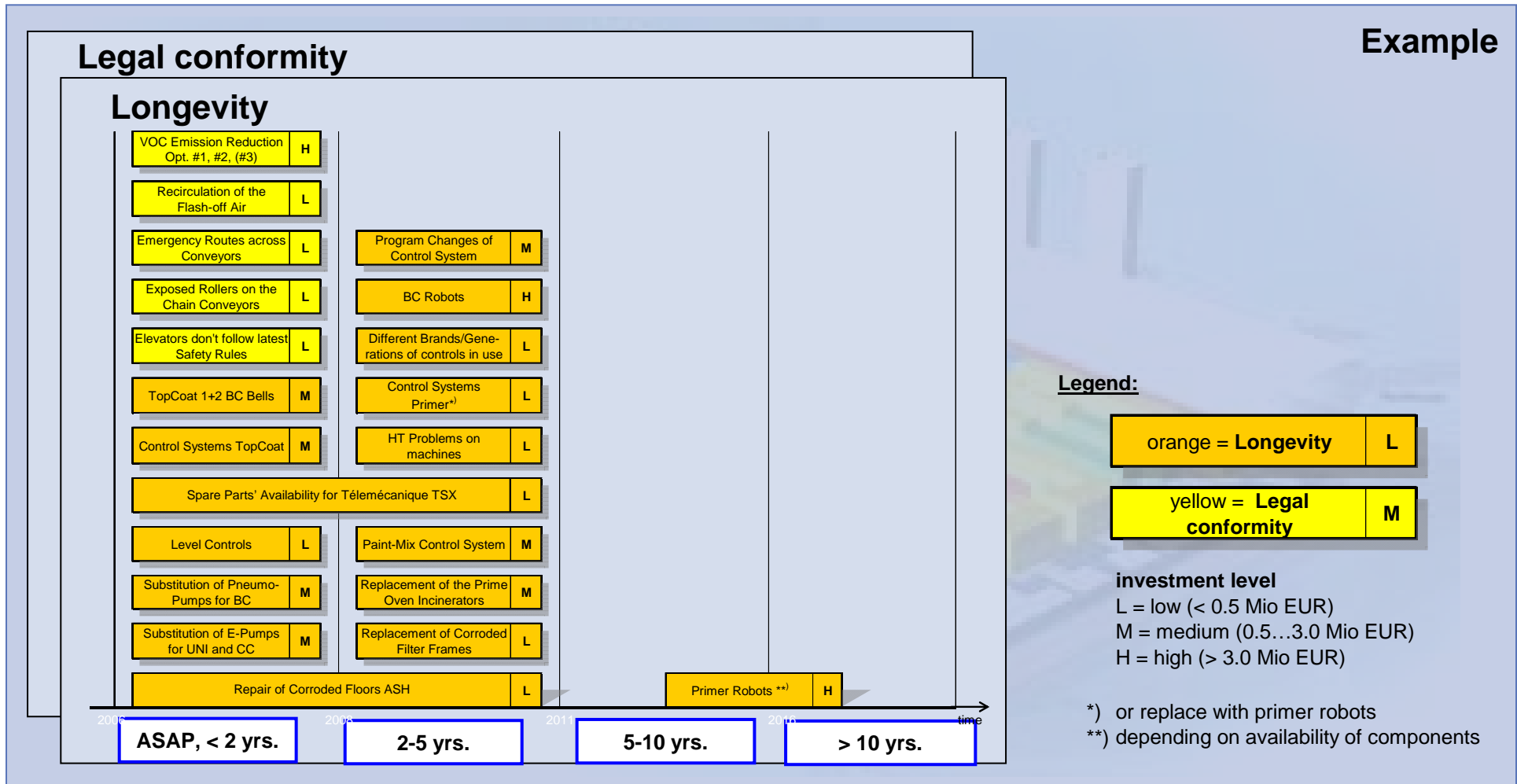
Detailed results: Findings summarized and grouped to subjects

Detailed results work sheets OVEN																
Detailed results work sheets BOOTH																
Detailed results work sheets ENERGY / ENVIROMENT																
Detailed results work sheets CONTROLS																
Detailed results work sheets CONVEYOR																
Id.	Chapter	Blatt Nummerierung			Page No.	Section	Component	Brief description	Measure				Targets		Energy savings	Picture No.
		Chapter	Subtitle	Subsubtitle					Data Sheet Paint shop	Replace	Repair	Modify	Urgent measure	Detailed Study		
Id. N	Id. T	Id. I	Id. F	Id. S	Id. P	Id. C	Id. D	Id. E	Id. M	Id. U	Id. S	Id. R	Id. Q	Id. E	Id. P	
1	4	3			001	4.3.001	Leerschlittenspeicher	ST 290 Schlittenstap	Ersatz erforderlich, alterungsbeding	X				X		
2	4	3			002	4.3.002	Füllerschleifen	Heber Ebene 00, Hub	Hubschlitten Lager defekt		X			X		
3	4	3			003	4.3.003	Wassertrockner	Längsgurt Wassertro	Technik klären		X			X		
4	4	3			004	4.3.004	NAD (Nahtabdichtung)	Werkermitfahrbände	Gurte austauschen	X		X		X		1-3 Werkermit
5	4	3			005	4.3.005	Füllerschleife	Heber 51 / 41	Ersatz von Verschleißteilen		X			X		
6	4	3			006	4.3.006	Fertigstellung	Quergurttörderer	Umbau Quergurttörderer	X		X		X		1-4 Quergurt f
7	4	3			007	4.3.007	VBH- KTL	Verbindende FT VBH	Ersatz erforderlich, alterungsbeding	X				X		
8	4	3			008	4.3.008	VBH	VBH Antriebsstation	Kettentausch u. Zahnräder	X		X		X		
9	4	3			009	4.3.009	DL 3	Antriebsstation SPK-	Reinigung notwendig		X			X		
10	4	3			010	4.3.010	DL 3 Klarlack	Spritzkabine FT Klarl	Verschleiß an Ketten u. Zahnradern		X			X		
11	4	3			011	4.3.010	DL 3 Klarlack	Spritzkabinen	Ersatz von Verschleißteilen			X		X		
12	4	3			012	4.3.010	KTL Trockner	Trockner FT	Reparatur zwingend erforderlich, sofort	X	X			X		
13	4	3			013	4.3.011	KTL Trockner	Trockner FT Rollenb	Lackaufbau auf Tragrollen	X				X		
14	4	3			014	4.3.011	Heber Schleusen	Heißbereichsheber	Überprüfung Verbindungselemente		X			X		
15	4	3			015	4.3.012	DL Trockner	Trockner FT	einseitige Abnutzung Führungsleisten		X			X		
16	4	3			016	4.3.012	Fertigstellung	Rollenbahn Arbeitsp	Arbeitssicherheitsaspekte			X		X		
17	4	3			017	4.3.013	Trockner	Heißbereichsheber	Karosserverschmutzung	X				X	X	
18	4	3			018	4.3.013	VBH	Verriegelungsprüfung	Nachrüstung Skid-Klammerung			X		X	X	
19	4	3			019	4.3.014	VBH	VBH- Kette	Kettentausch u. Zahnräder	X		X		X		
20	4	3			020	4.3.015	VBH	VBH Pendelübergab	Ablaufoptimierung Übergabe		X			X		
21	4	3			021	4.3.016	Fördertechnik VBH 05	VBH Pendel	Pendeltausch	X				X		Rollenbahn Ar
22	4	3			022	4.3.017	KTL	KTL Pendel	Pendeltausch	X				X		
23	4	3			023	4.3.018	KTL Fördertechnik KT	Antriebsstationen KT	Kettenräder tauschen	X		X		X		
24	4	3			024	4.3.019	DL 2	HT Heber	Entkopplung Heber / Trocknergehäuse			X		X		

- Definition of measures for replacement, repair and modification
- Evaluate potentials for each measure according to the customer's targets

Plant Assessment

Management summary (example): Urgent measures per target – classified



Plant Assessment

Management summary: High potentials reducing CPU per target – classified

Quality		CPU					
		ROI = short < 1 yr		ROI = medium 1 ... 3 yrs.		ROI = long > 3 yrs.	
Le		Recirculation of the Flash-off Air	L	Hot Air Seals on the Topcoat Ovens	M	Visualization Appl. / Equipm. / Conveyor	M
		Clearcoat Spray Booth Down Draft Reduction	L	Energy Saving Potential Spraybooth Abatement	L	Process & Conv. Controls	L
		Spraybooth Operating Window	L	Skid cover Spray Booth	L	Program Changes of Control System	L-M
		Removal of the Black Out Line	L	Humidifier Water Management System	M	Primer Robots	H
				BC Robots	H	TopCoat 1+2 BC Bells	M
Legend:		Energy Savings	L	investment level L = low (< 0.5 Mio EUR) M = medium (0.5...3.0 Mio EUR) H = high (> 3.0 Mio EUR)		Maintenance	M
		Plant Availability	M			Application	M

Example

Plant Assessment

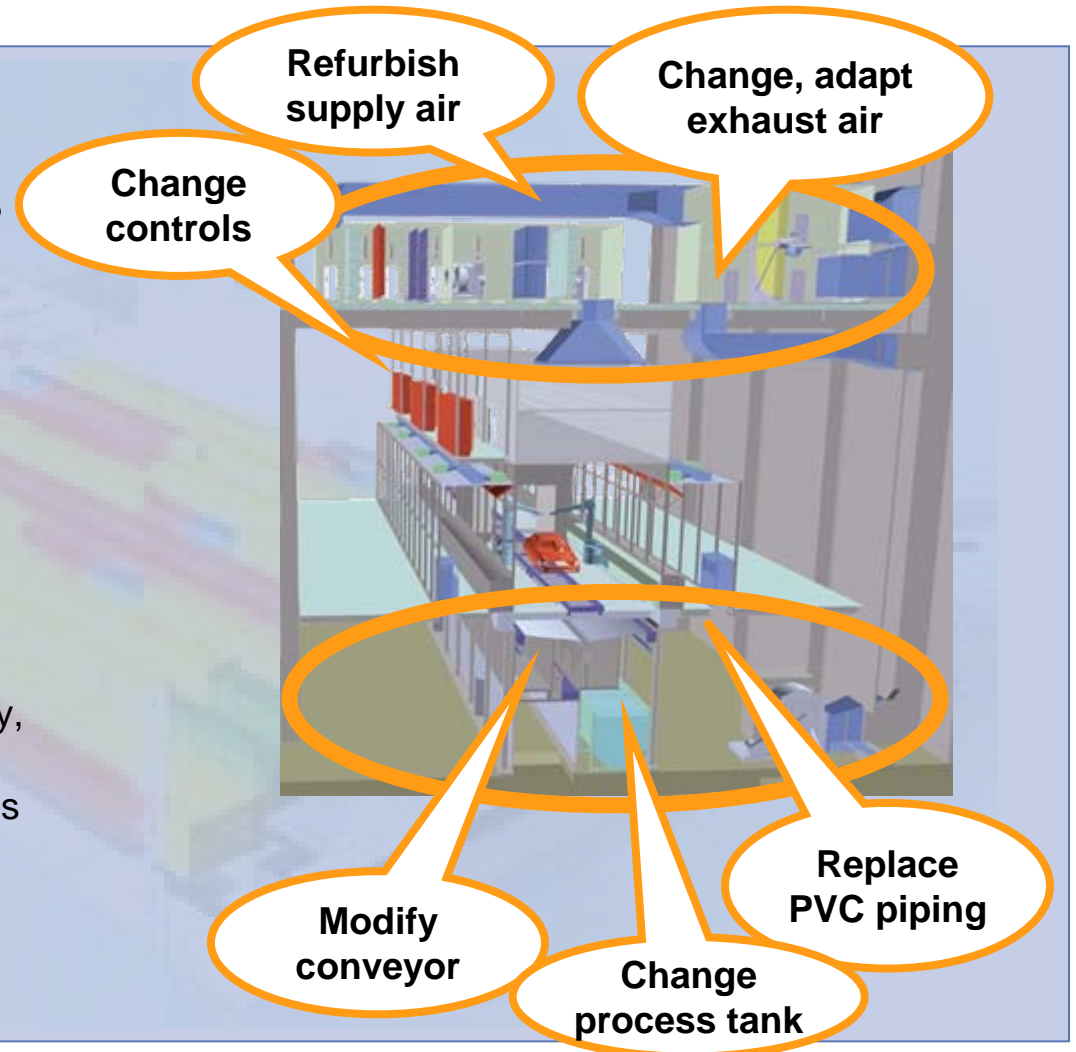
Result overview

Complete list of findings to single items and main conclusions grouped to

- Process
- Application
- Energy Management
- Environment
- Conveyors
- Controls

Management summary selected to

- URGENT – Actions: Focus on legal conformity, lifetime, uptime
- POTENTIAL – Actions: Focus on modifications reducing CPU



Agenda

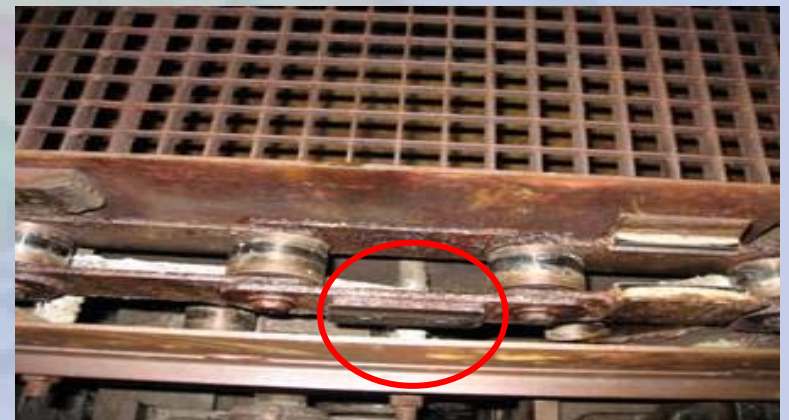


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Examples (1)

Repair of Chain Conveyor

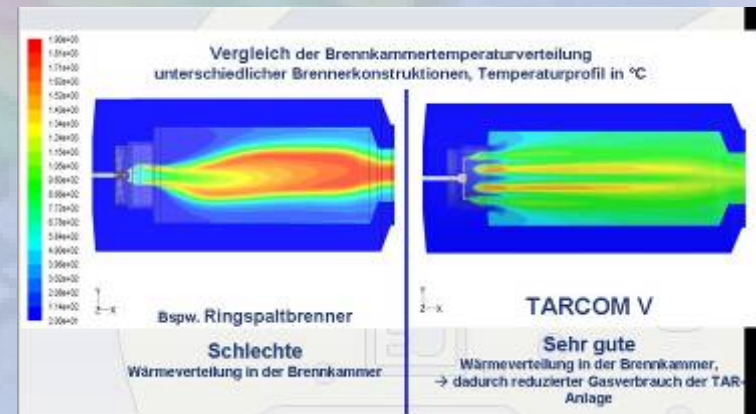
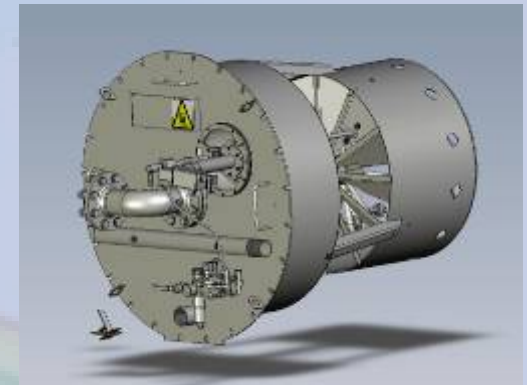
- **Target** Safeguarding of running production
- **Measures** Exchange of chain guidings
- **Budget** Low
- **Result** Avoiding of investment
Lifetime extended until 2020



Examples (2)

Burner Replacement

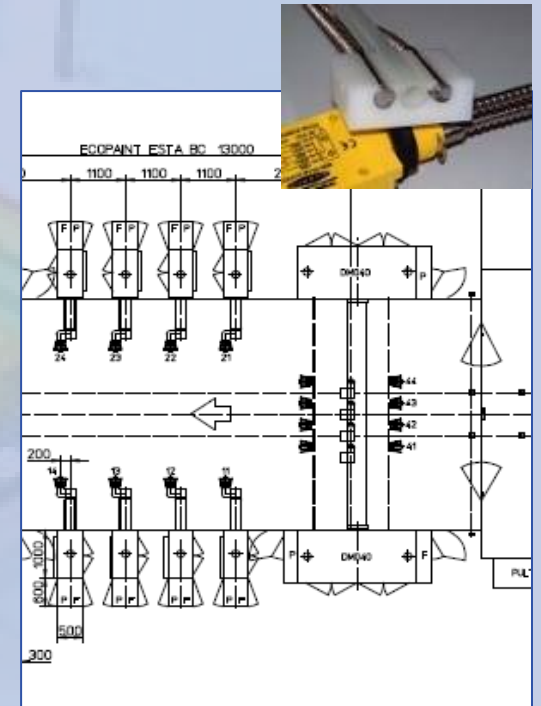
- **Target** Reduction of process temperature
Attainment of emissions values
- **Measures** Installation of new burner
- **Budget** Low
- **Result** Reduction of temperature by approx. 20° C
Reduction of Energy consumption
by approx. 5 – 8%



Examples (3)

Fill Stop Sensor for BC-ESTA

- **Target** Reduction of paint losses during prepainting
- **Measures** Installation of 18 sensors, commissioning
- **Budget** Low
- **Result** € 98.000 savings/a per zone



Examples (4)

Upgrade *EcoBell2 M* to *EcoBell2 HX* for Bumper Painting

- **Target** More flexibility for a wide colour palette
- **Measures** Installation of a prop-valve for a second shaping air, exchange of atomizer housing with an integrated shaping air ring, new bearing unit, bell cup
Modification of four BC robots and one CC robot
- **Budget** Low
- **Result** 15% higher TE
“Difficult” colours now applicable
Brush width before upgrade: 300 – 450 mm
Brush width after upgrade: 50 – 500 mm

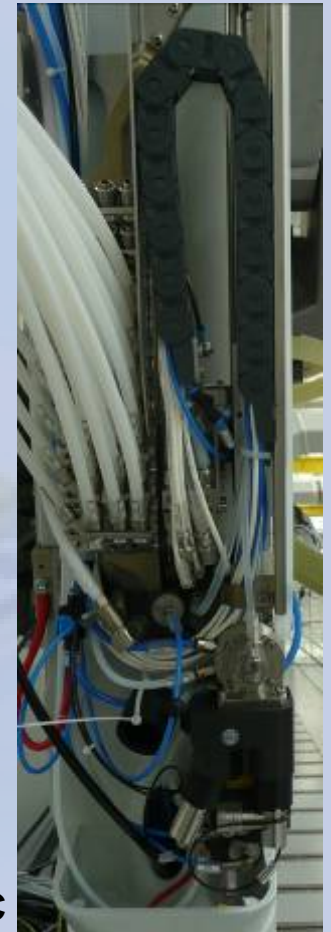


EcoBell2 HX

Examples (5)

Exchange of Colour Changer System in 9 BC-Robots

- **Target** Reduction of paint losses during prepainting
- **Measures** Installation of a colour change system with significant reduced colour change loss
- **Budget** Medium
- **Result** € 70.000 savings/a per zone
Shorter colour change time



EcoLCC

Examples (6)

Exchange of Canister Type Atomizer to *EcoBell* ICC in Primer Zone

- **Target** Reduction of complexity and maintenance costs
Increase of process time
- **Measures** Exchange of atomizer, installation of the multi-pump paint dosing system, installation of regulators for shaping air and turbine speed, installation of HT controller and cascade
- **Budget** Medium
- **Result** Approx. 6 sec (14%) more process time
Significant reduced maintenance costs



*EcoBell*2 ICC

Examples (7)

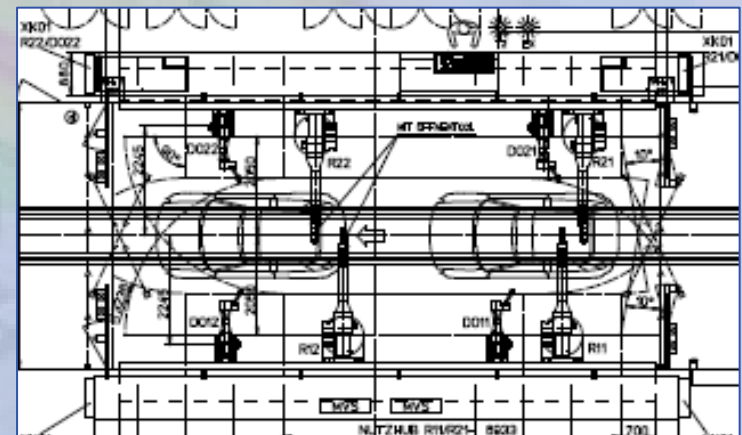
Automation of CC Interior Application

- **Target** Reduction of overspray losses

- **Measures** Installation of 4 robots and 4 opener in the manual zone

- **Budget** High

- **Result** € 1.080.000 savings/a per zone
 Quality improvement



Efficiency and Sustainability in use of Energy and Resources:

- Also required for existing paint shops
- Plant assessment enables a cost efficient implementation