



HANGON GREEN EFFECT

Lower energy – higher profit

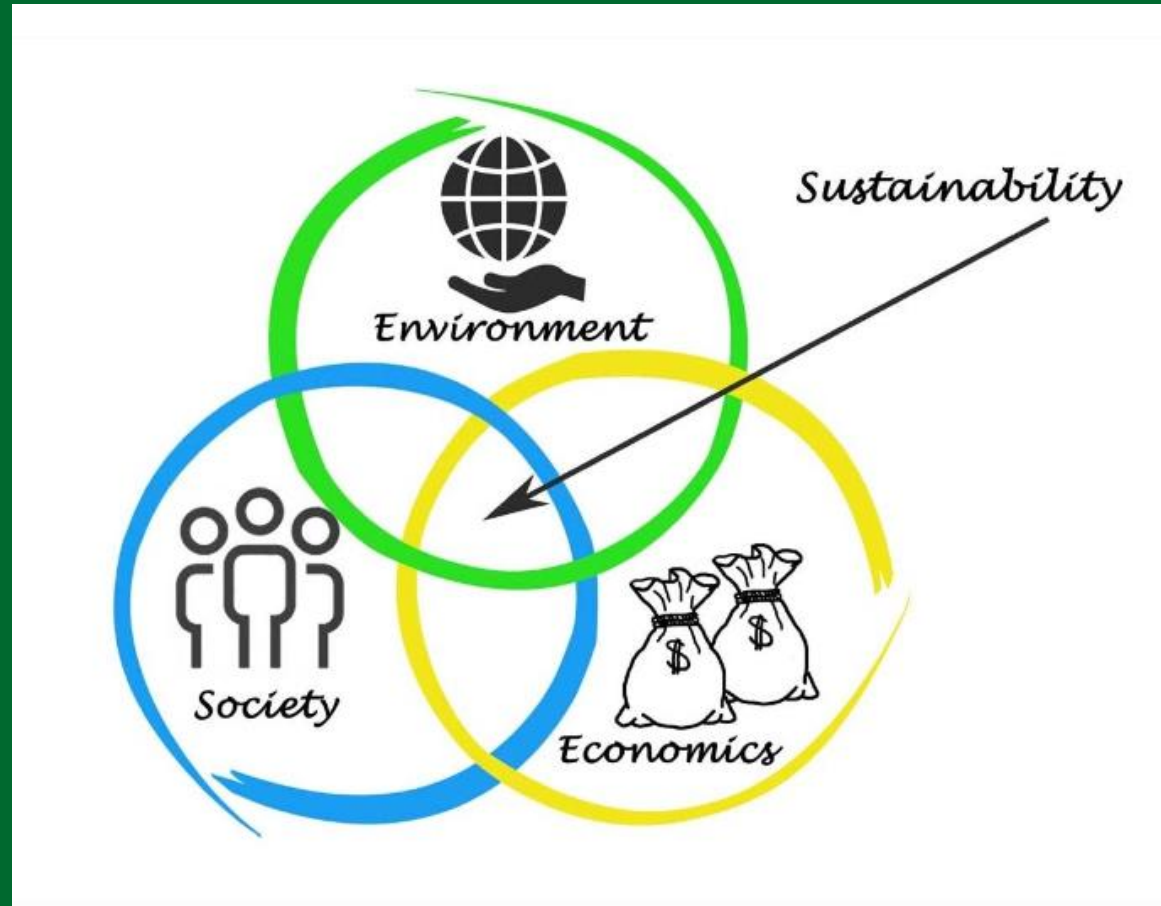
Calculate your HangOn Green Effect at hangon.com

The Green Effect

VOM & ION - Let's go sustainable together - Oct 7th 2022

1. Sustainability – our definitions and research
2. The HangOn Green Effect – Energy constant
3. Calculating the Green Effect – HangOn CCC
4. Example cases
5. Some practical advice
6. Questions?

Sustainability – a balanced approach



TOTAL ENERGY CONSUMPTION RELATED TO HANGON'S PRODUCT



1%

99%

Conclusion

The biggest impact HangOn can make for increased sustainability is to help our customers to increase the efficiency in their coating processes!

Report 2022



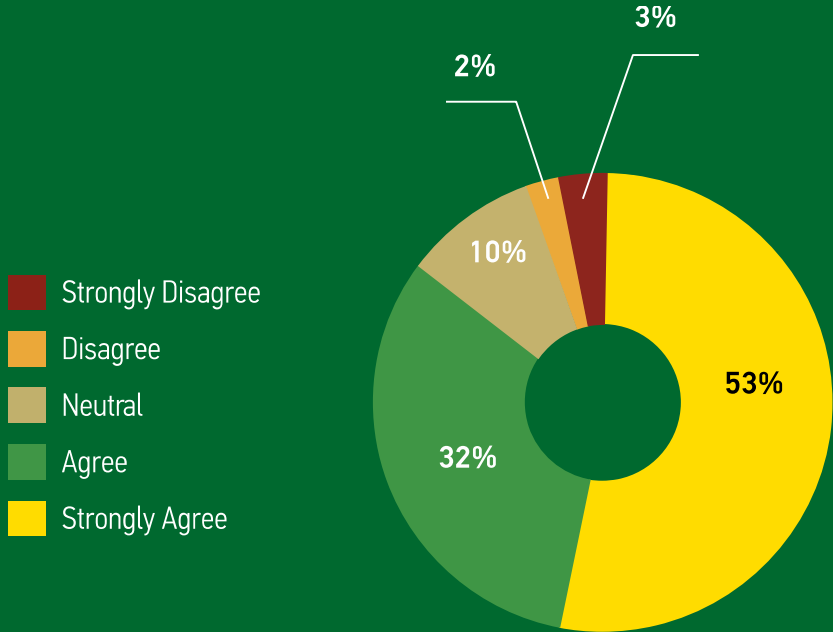
Over 250 recipients from 11 countries in Europe
(Spring 2022)

Report 2022 – Exhibit 1

85 percent say sustainability is important to their company

Replies to the question:

How much do you agree with the following statement: Sustainability is important to my company.



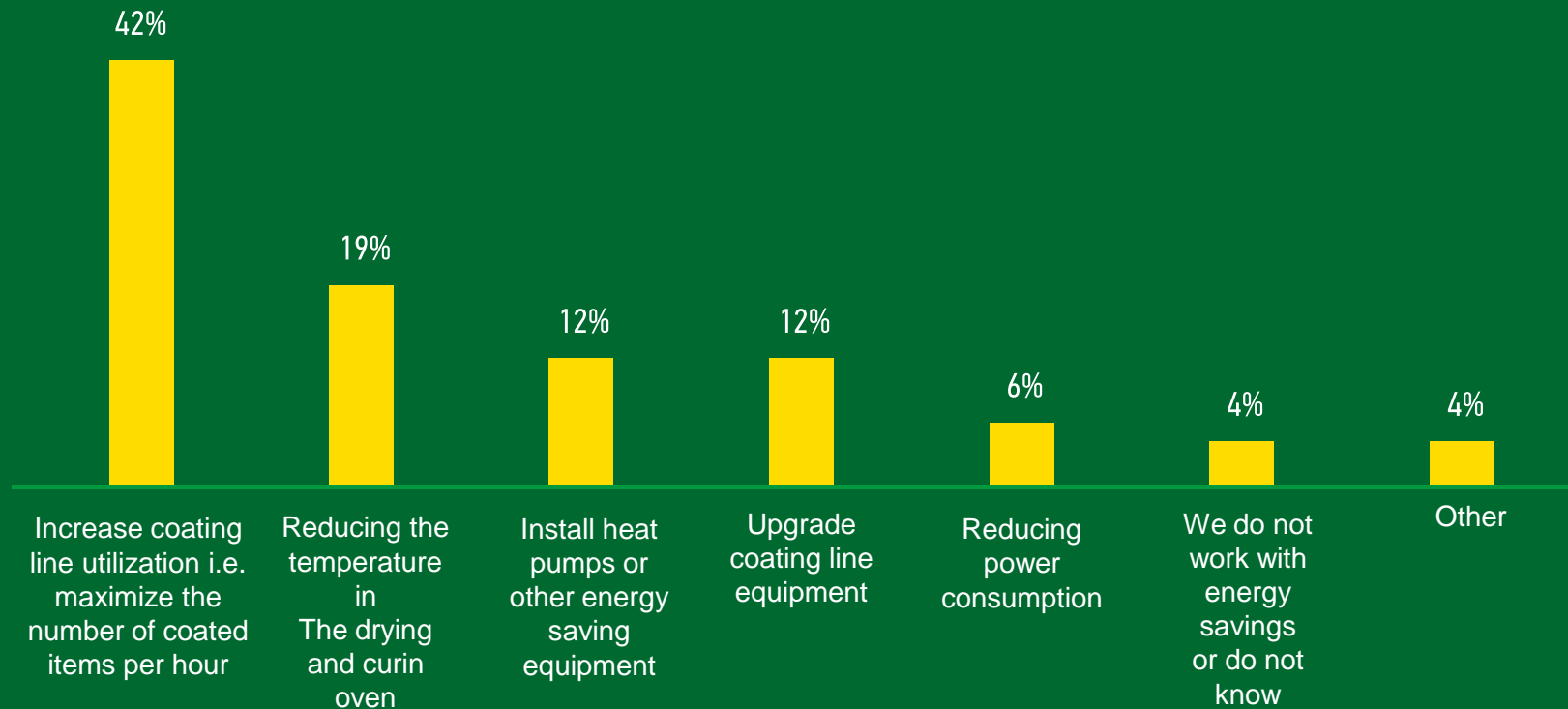
The importance of sustainability in the coating industry is clear, with a majority (85 percent) of respondents saying that sustainability is important to their company. [\(See Exhibit 1\)](#)

Report 2022 – Exhibit 4

The most efficient way to reduce energy consumption: increasing coating line utilization

Replies to the question:

What would be the most efficient way to reduce energy consumption in your coating line? Select the most important option.



Things to consider (PCI)

- » There are no easy or inexpensive solutions to reduce CO2 in Powder Coating operations
- » Reducing emissions will likely involve some form of an "many of the above" strategies
 - » Equipment change
 - » Substrate changes
 - » Chemistry/formulation changes
 - » Process changes
- » Driving efficiencies is the easiest and most economical path

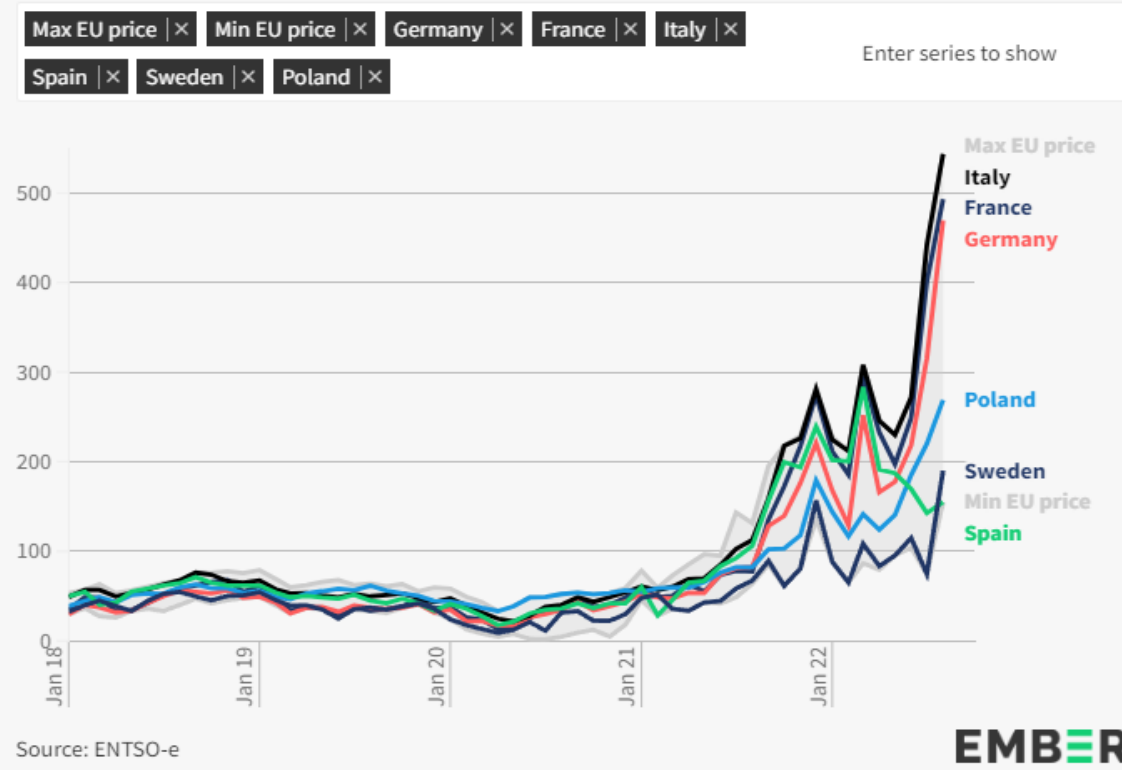
Source: PCI webinar 2022-08-10



Current events

Average monthly wholesale electricity prices

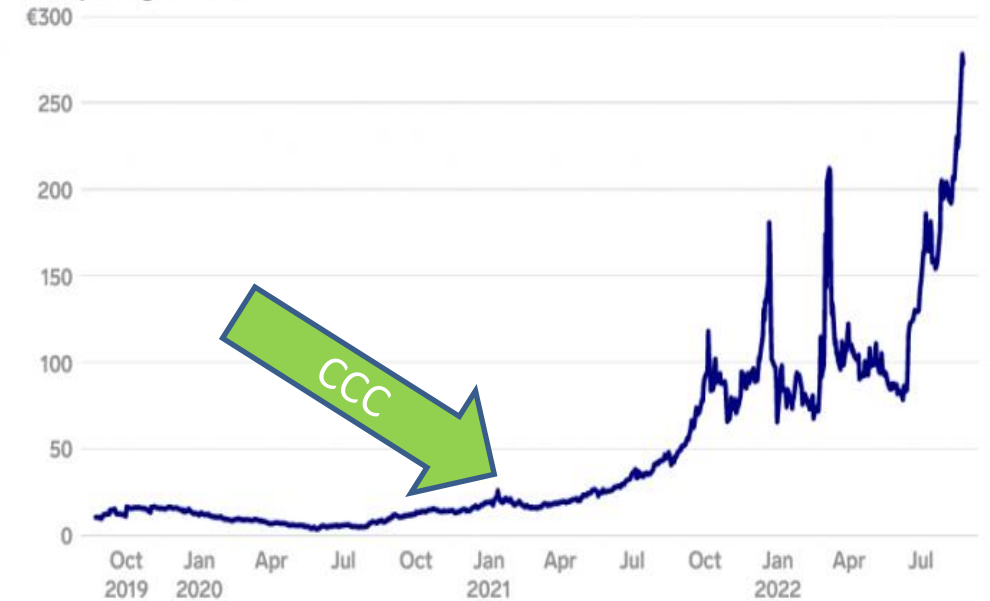
€ per megawatt hour



European natural gas prices have skyrocketed

Dutch TTF natural gas front month futures

Euros per megawatt hour



HangOn Green Effect - Background

Energy consumption in a coating line explained

With surface treatment expert Anders Jansson, Meyer & Hjort AB

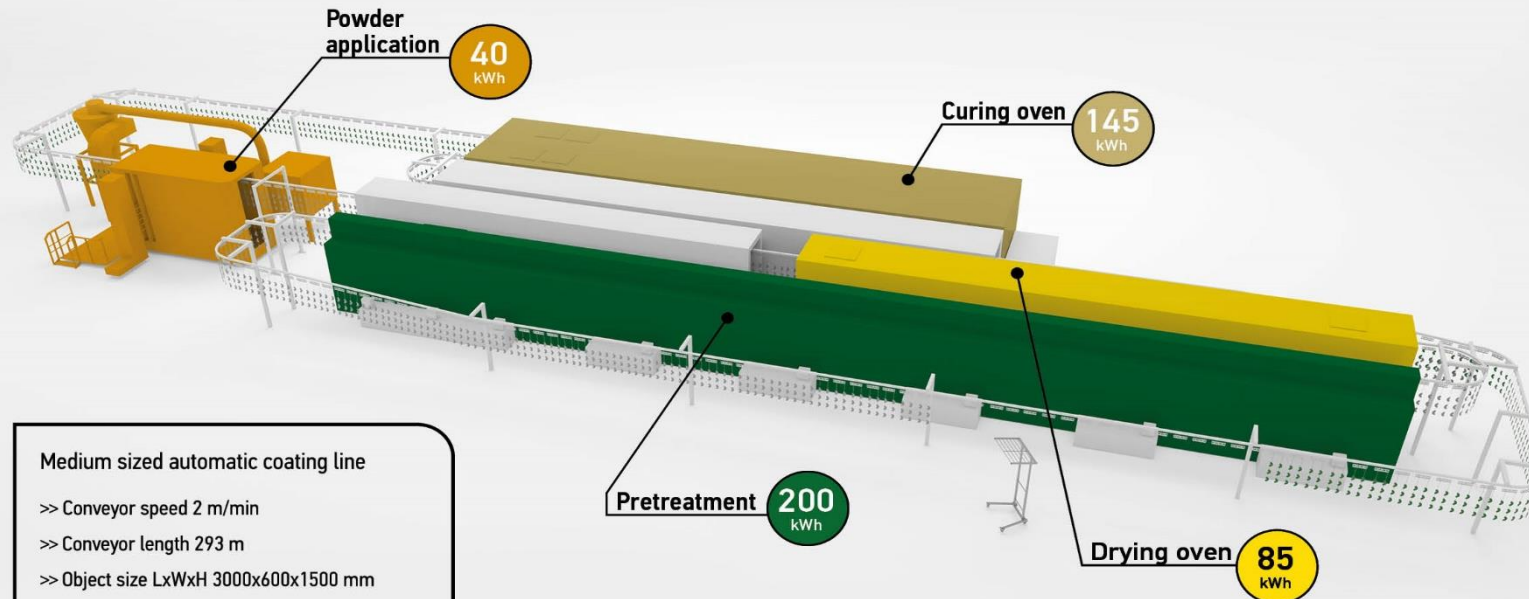


Did you know that you can auto translate the videos into your language?

[Watch tutorial >](#)

Medium sized coating line – energy consumption

ENERGY CONSUMPTION IN A COATING LINE



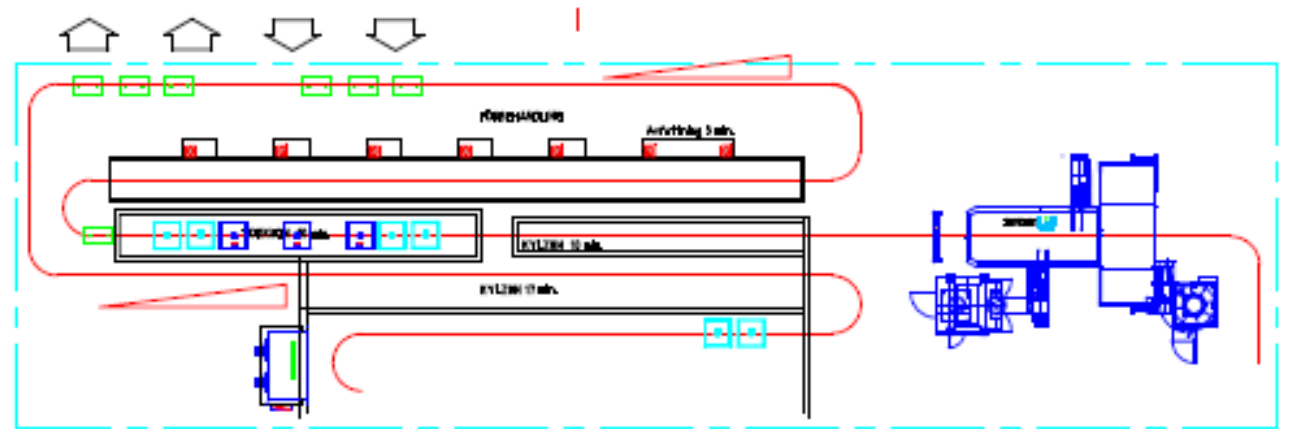
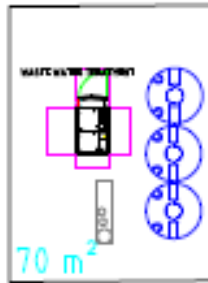
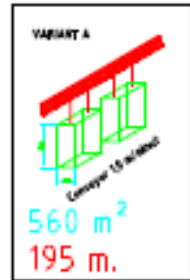
Medium sized automatic coating line

- >> Conveyor speed 2 m/min
- >> Conveyor length 293 m
- >> Object size LxWxH 3000x600x1500 mm
- >> Object flow 850 kg/h

Energy losses in a coating line

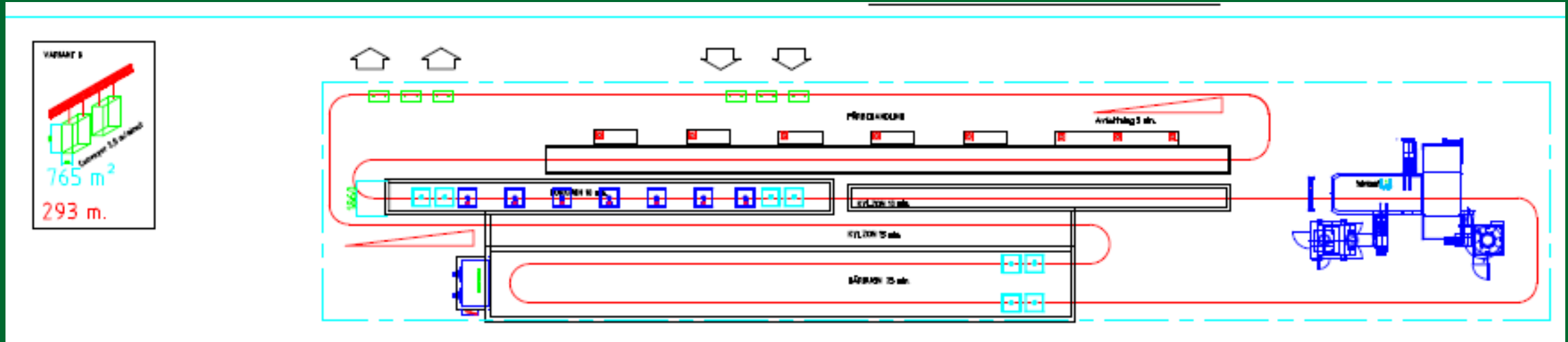


Small - Powder Coating Line



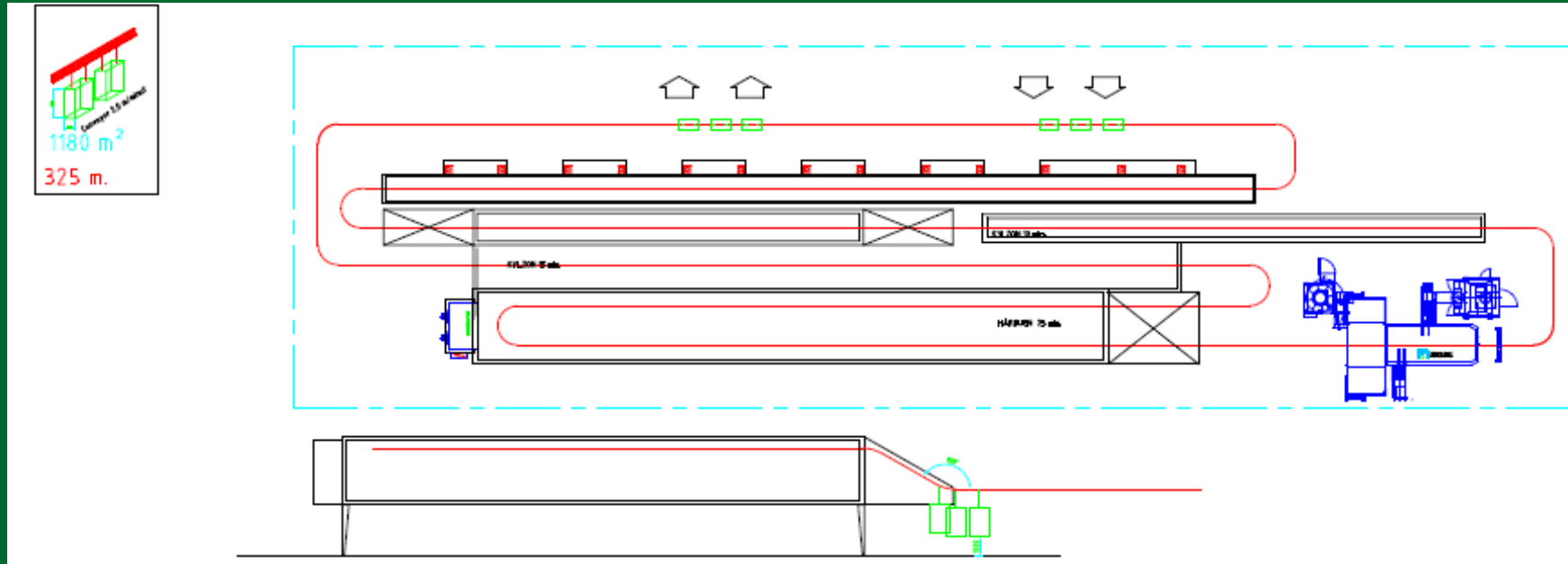
- » Conveyor length 195 m
- » Object size LxWxH 3000x600x1500 mm
- » Conveyor speed 1 m/min.
- » Investment cost 1,2 MEUR

Medium - Powder Coating Line



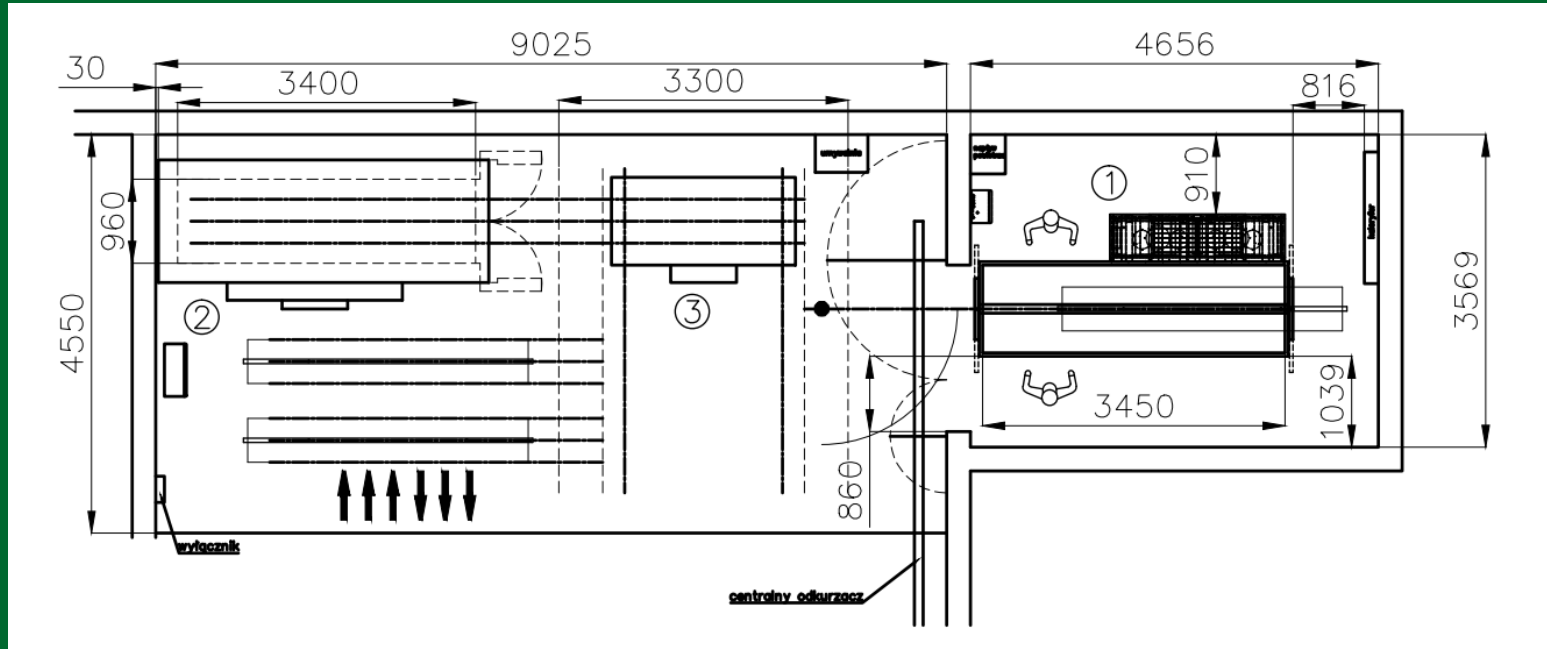
- » Conveyor length 293 m
- » Object size LxWxH 3000x600x1500 mm
- » Conveyor speed 2 m/min
- » Investment cost 1,4 MEUR

Medium line with camel back oven



- » Conveyor length 325 m
- » Object size LxWxH 3000x600x1500 mm
- » Conveyor speed 2,5 m/min
- » Investment cost 1,5 MEUR

Manual - Powder Coating Line



- » Object size LxWxH 3000x200x1500 mm
- » Conveyor speed 0,32 m/min (average)
- » Investment cost 100 kEUR

Investment cost

- » Total investment cost
- » Automatic line S/M/M+ /L and a Manual line
- » Cost per part

Anskaffningskostnad 2020

Bas: conveyor, förbehandling, ugnar, sprutbox, styr, el, installation.

Conveyor, stål	450 000	625 000	700 000 kr	800 000
Förbehandling	1 775 000	2 200 000	2 800 000 kr	2 625 000
Torkugn	450 000	530 000	550 000 kr	630 000
Automatbox	2 500 000	2 700 000	2 800 000 kr	3 000 000
Härdugn	550 000	750 000	780 000 kr	1 100 000
Styr	950 000	950 000	900 000 kr	950 000
El-installation	650 000	700 000	650 000 kr	800 000
Montage, frakt, proj	1 400 000	1 800 000	2 000 000 kr	2 300 000
Summa SEK	8 725 000	10 255 000	11 180 000 kr	12 205 000

Övr: kylzoner, processventilation, el-panna, mätning o dosering, RO, indunstare.

Kylzon1	160 000	200 000	260 000 kr	320 000
Kylzon 2	250 000	300 000	370 000 kr	450 000
Processventilation	900 000	950 000	950 000 kr	950 000
El-panna	300 000	300 000	300 000 kr	300 000
Mätsning, dosering, oljeavskiljning	75 000	75 000	75 000 kr	75 000
RO	200 000	200 000	200 000 kr	200 000
Indunstare kompl.	1 500 000	1 500 000	1 500 000 kr	1 500 000
Summa 2 SEK	3 385 000	3 525 000	3 655 000 kr	3 795 000

Summa exkl box	9 610 000 kr	11 080 000 kr	12 035 000 kr	13 000 000 kr
Summa inkl box	12 110 000 kr	13 780 000 kr	14 835 000 kr	16 000 000 kr
Yta	560 m²	765 m²	1180 m²	1245 m²

Energy consumption

- » Complete energy calculation
- » Automatic line S/M/M+/L/Manual
- » energy use per part

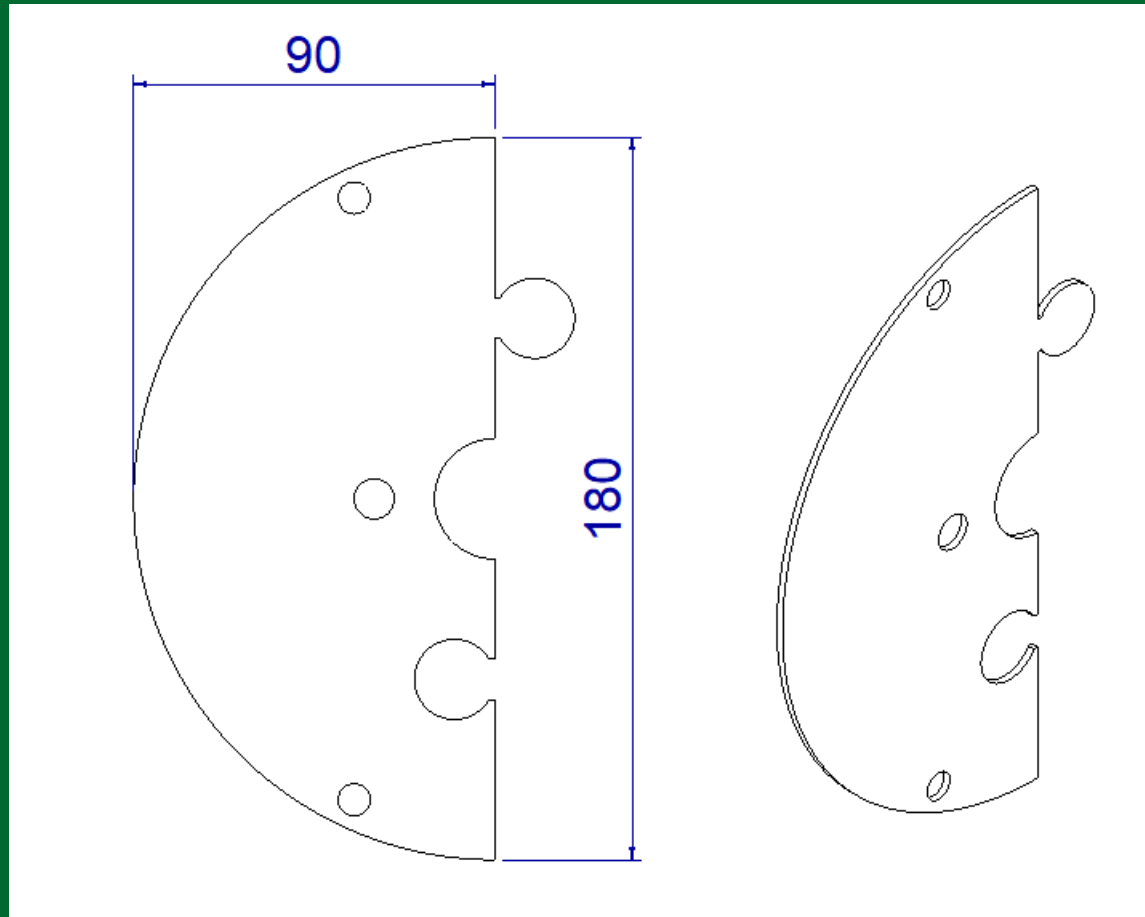
HangOn 2020-08-26		Line A 1,0 m/min.	Line B 2,0 m/min.	Line B2 2,5 m/min.	Line C 3,0 m/min.	
Värmeffekt enl beräkningar	kW	356	492	458	593	
Materialflöde kedja	kg/h	420	840	1050	1260	
Materialflöde gods	kg/h	500	3550	3550	6000	
Material genom ugnar	kg/h	920	4390	4600	7260	Inkl kedja o fixturer
Gods genom förbeh	kg/h	500	3550	3550	6000	
Antal dysor		84	156	195	228	I ett varmt steg 3 minuter
Tomgångseffekt, värme	kW	116	126	92	136	conveyorn "stoppad"
Värme förbehandling vid drift	kW	84	156	195	228	
Uppvärmn av gods	kW	2	16	16	28	
Värmeffekt förbehandling	kW	86	172	211	256	
Värme torkugn	kW	12	58	61	96	
Värme härdugn	kW	20	93	98	154	
Drifteffekt värme	kW	234	450	462	642	
Motorer:						
Spolpumpar vid drift		31	39	42	45	
Spolpumpar vid aktuell drift		31	39	42	45	Stängs vid nollflöde
Filterpumpar		9	9	9	9	
Cirk. Fläktar torkugn		5	11	11	11	
Slussfläktar torkugn		12	12	0	12	
Cirk. Fläktar härdugn		11	11	11	17	
Slussfläktar härdugn		12	12	0	12	
Frånluftsfläkt		2	2		3	
Sprutbox		30	30	30	30	Stängs vid nollflöde
Summa motoreffekt		111	126	103	139	
Drifteffekt motorer	kW	111	126	103	139	
Drifteffekt totalt	kW	345	576	564	781	
Effekt per producerad mängd kWh/kg		0,69	0,16	0,16	0,13	

The HangOn Green Effect

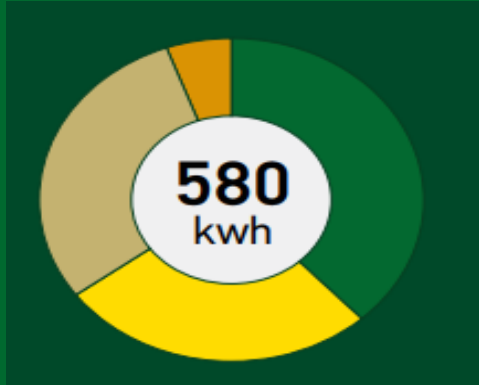
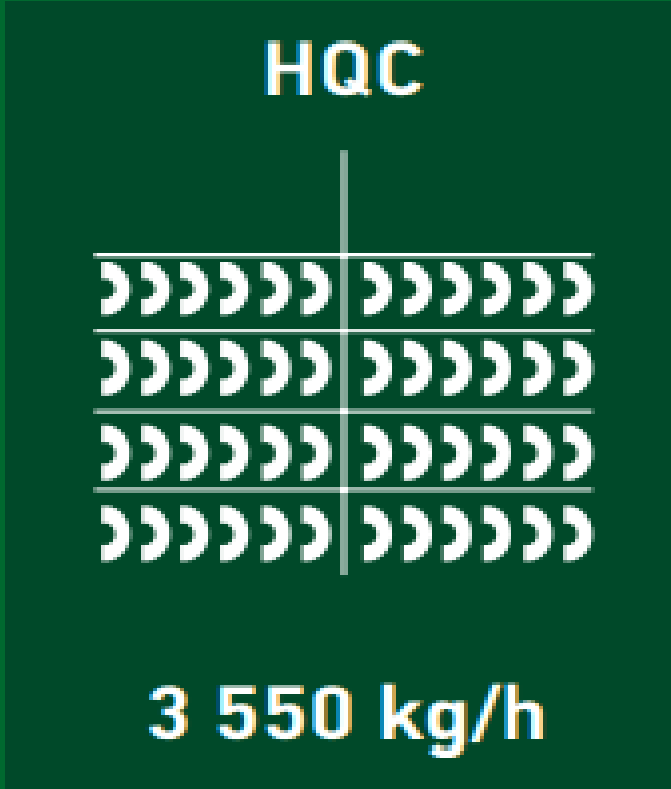
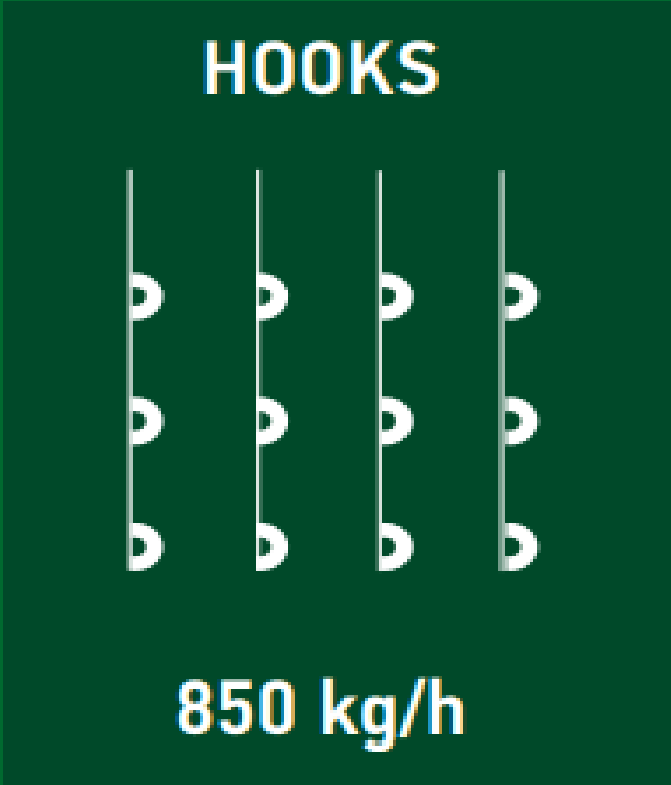
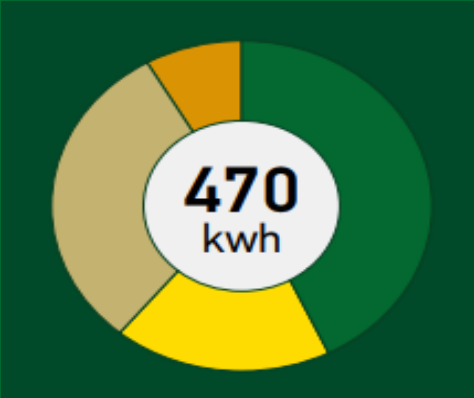
The energy consumption in a coating line is relatively constant

Improving hanging efficiency considerably improves energy efficiency

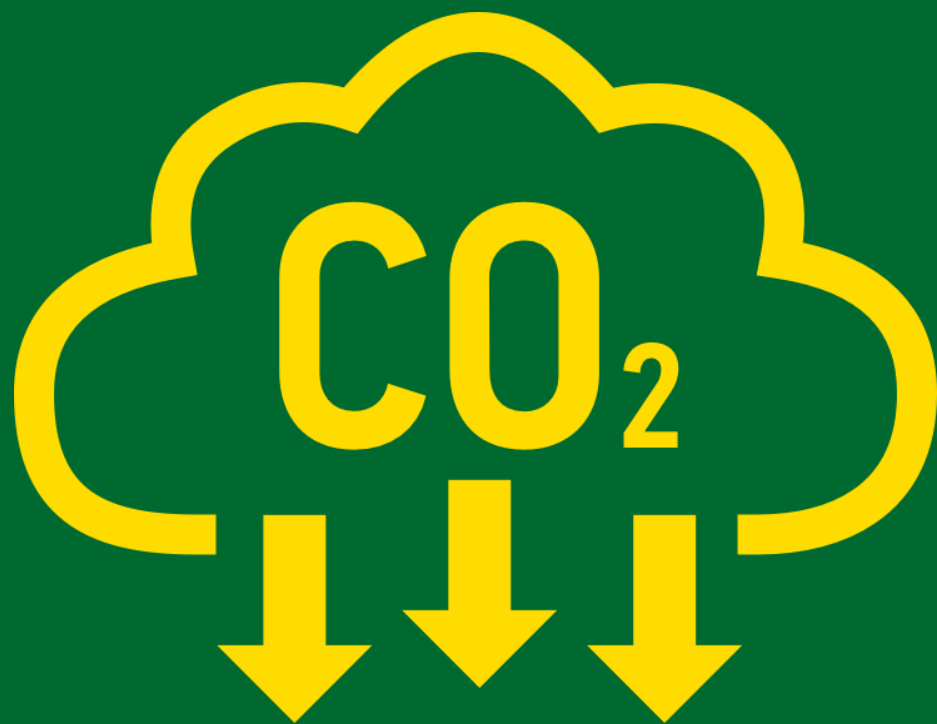
Energy constant - Example



Energy constant - Example



80-90% of the energy consumption is constant!

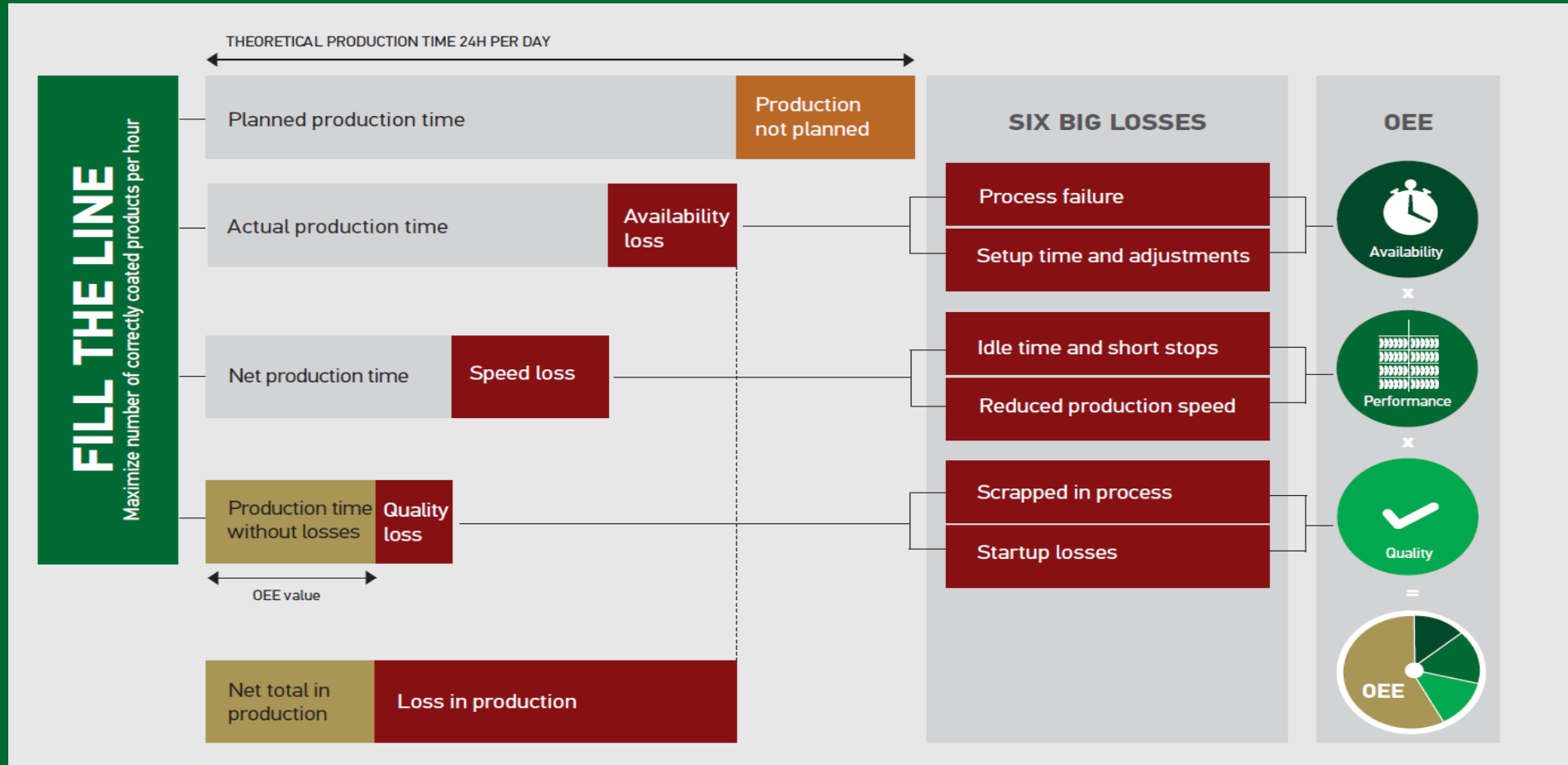




HangOn

Coating Cost Calculation

OEE – a realistic calculation of coating costs



OEE

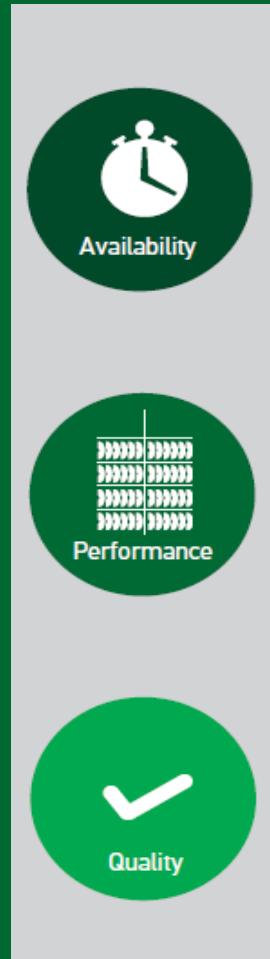
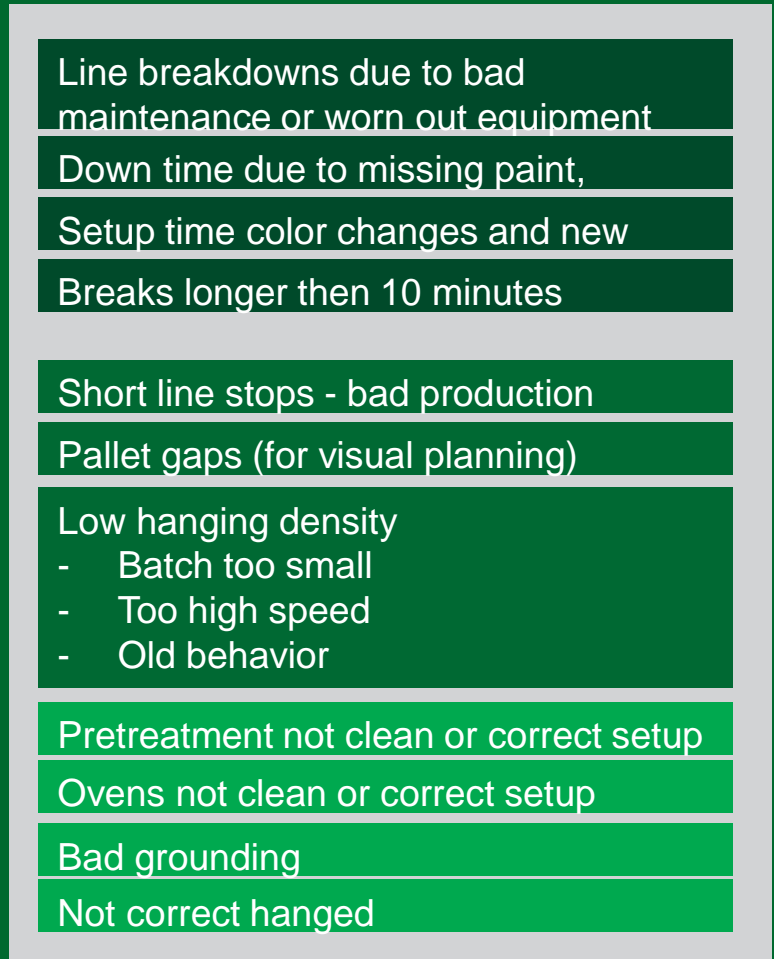
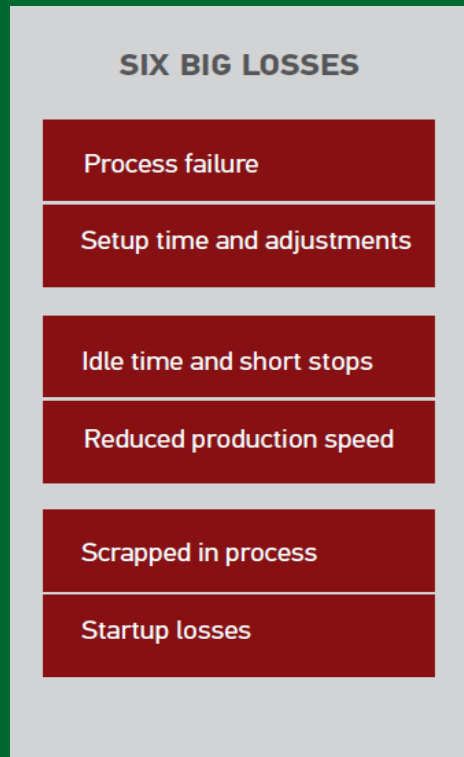
70%

60%

98%

Typical OEE!
41%

OEE – practical losses & variety



OEE
60-85%

15-95%

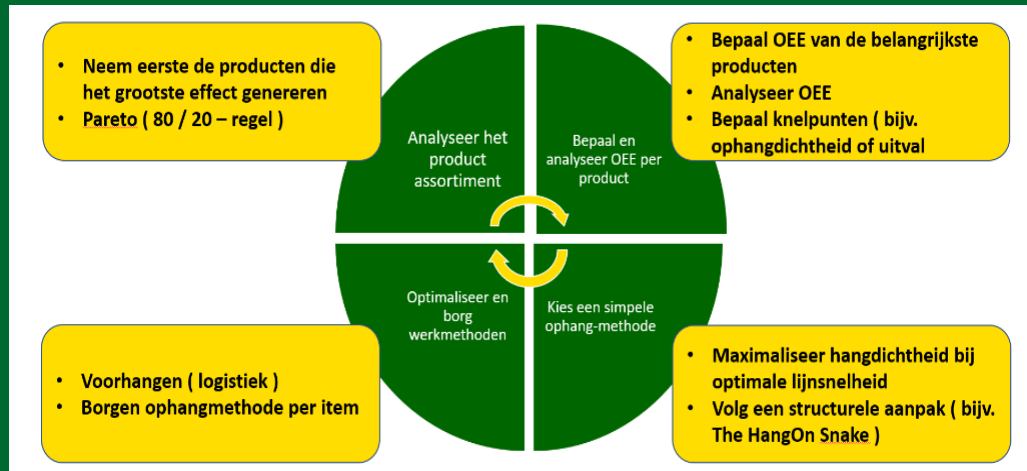
95-99%

OEE – some remarks

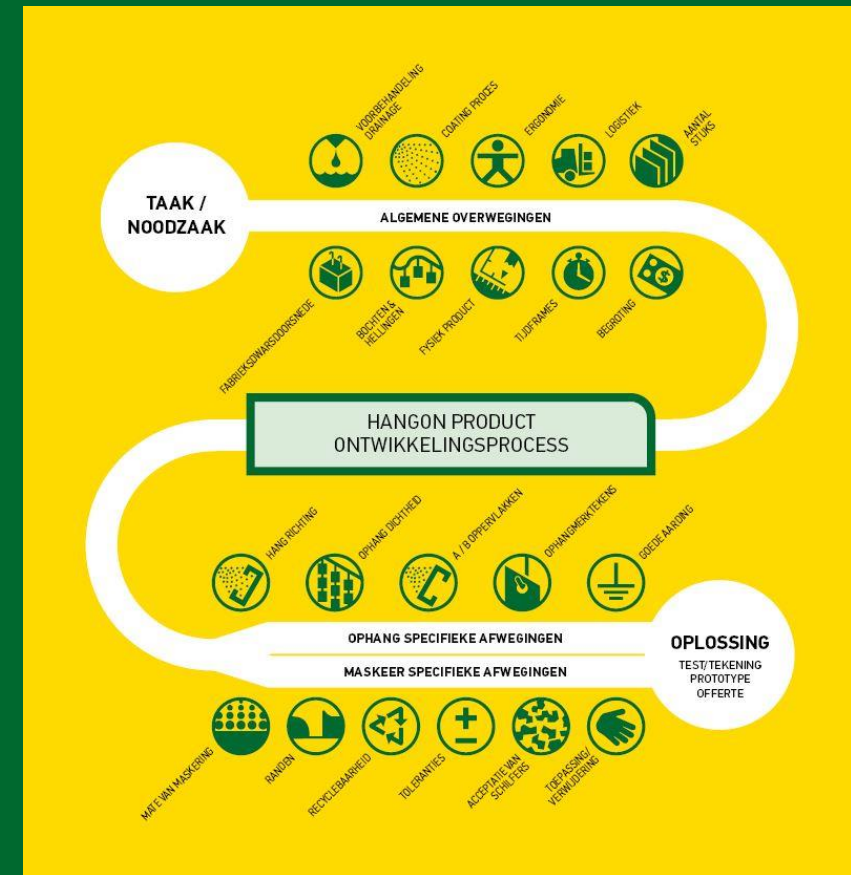
- OEE Goal – Minimize the losses in a coating line → Maximize the number of correct coated products per hour
- There is no *norm* for OEE, first focus on 'low hanging fruit' (80/20 rule). Don't focus on small deviations from reality
- Establishing the theoretical maximum is a challenge. We consider an OEE of 40% as an industry average
- The goal of OEE in CCC is to compare 2 scenarios in a realistic way (include losses) and to see how results are affected when the scenarios are changed

Improving OEE – hanging & masking

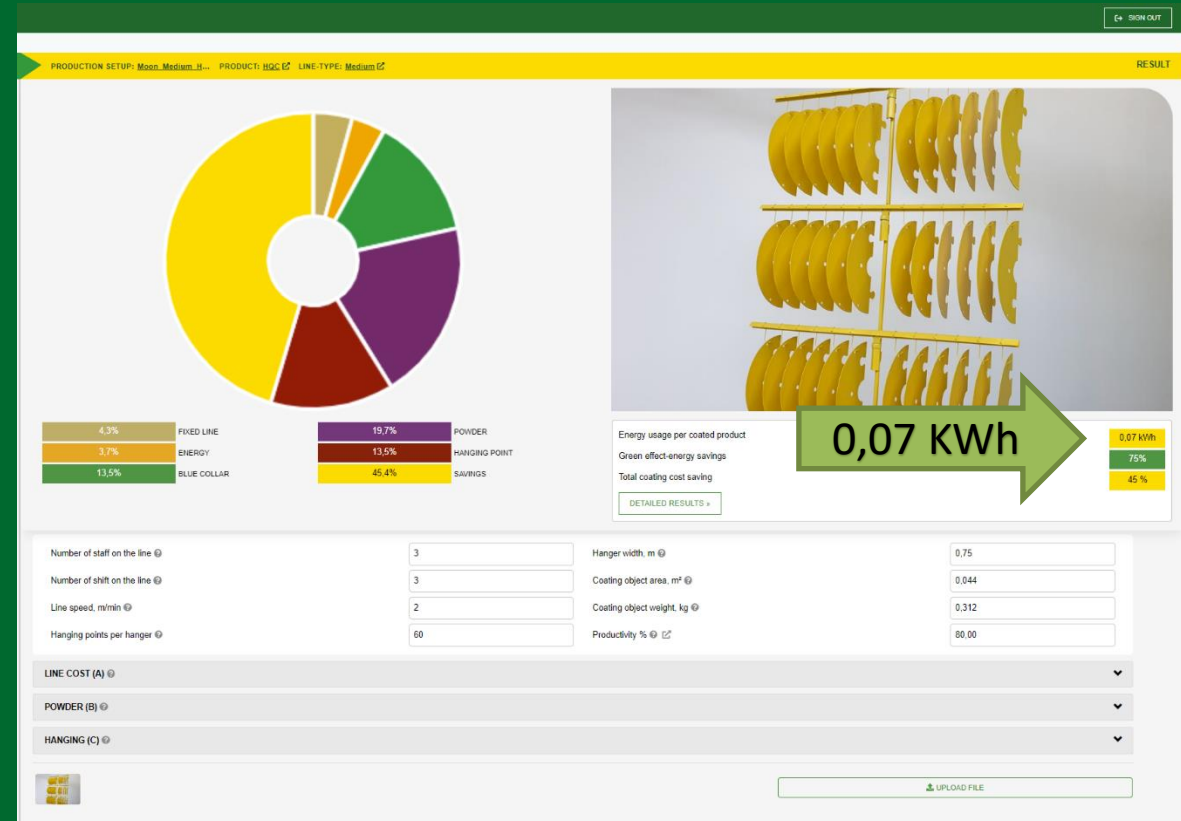
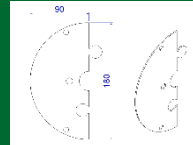
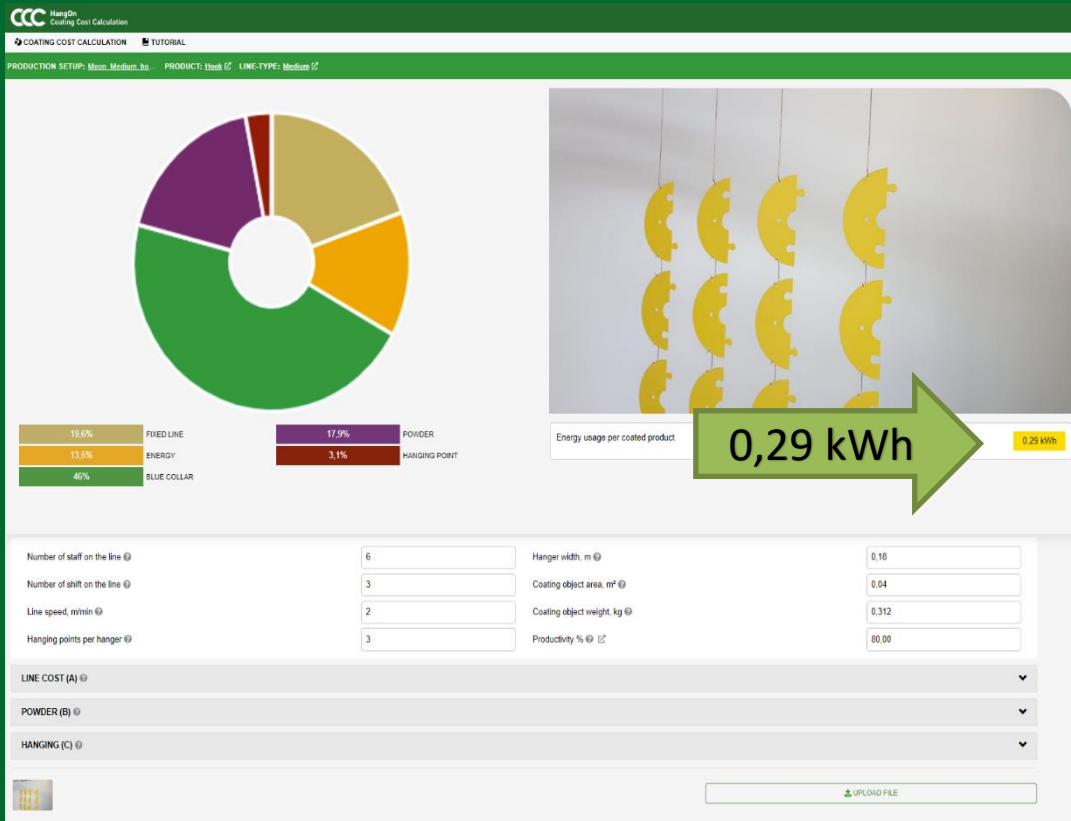
Fill The Line !



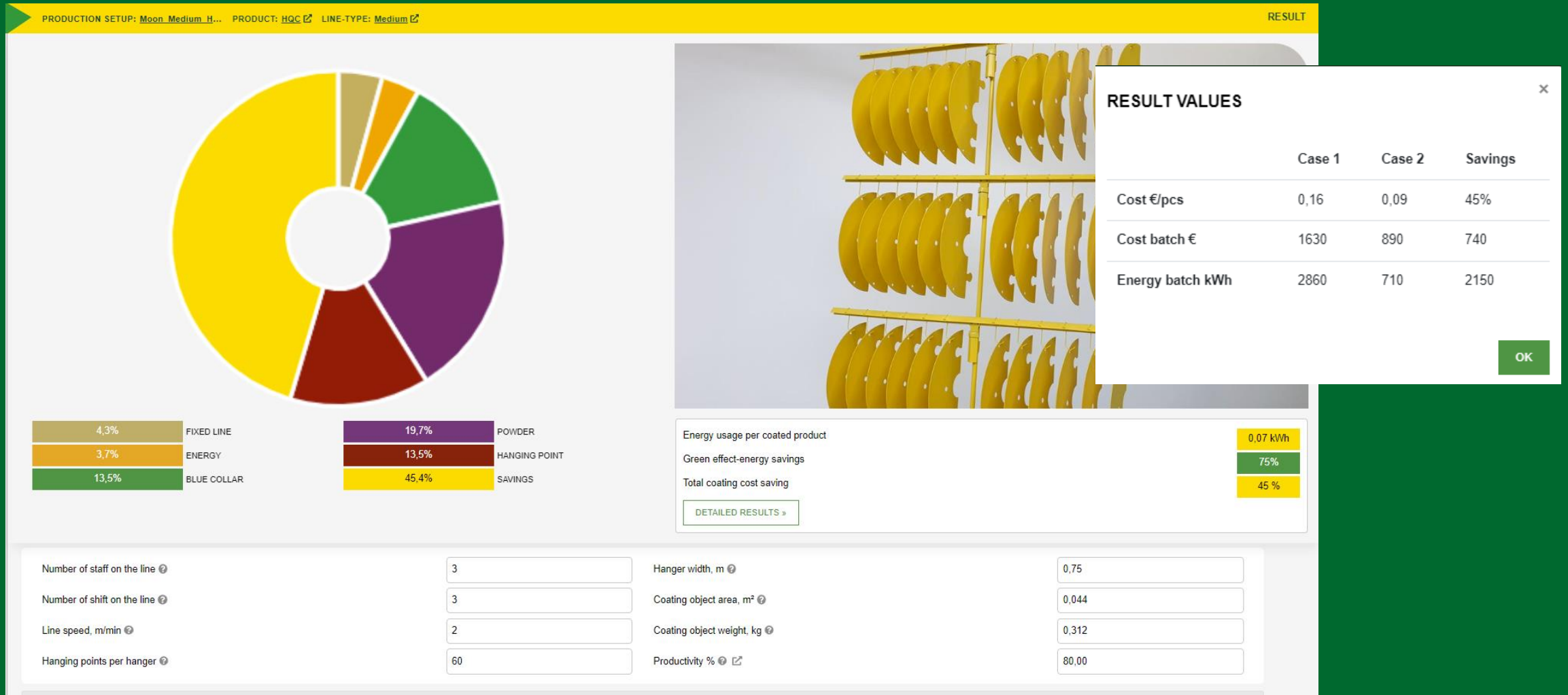
Maximaliseer het aantal correct gecoat producten per uur



The Green Effect – Example 1

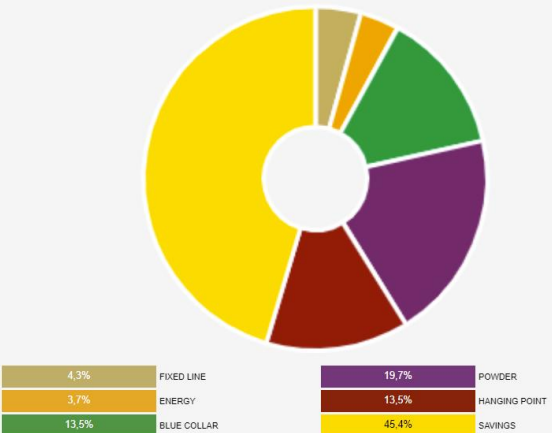


CCC – General calculation

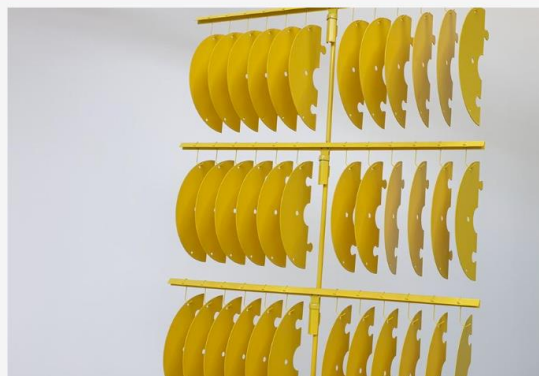


CCC – General calculation + Line costs

PRODUCTION SETUP: Moon_Medium_H... PRODUCT: HQC LINE-TYPE: Medium RESULT



Category	Percentage
FIXED LINE	4,3%
ENERGY	3,7%
BLUE COLLAR	13,5%
POWDER	19,7%
HANGING POINT	13,5%
SAVINGS	45,4%



Energy usage per coated product
Green effect-energy savings
Total coating cost saving

[DETAILED RESULTS >](#)

LINE COST (A)

Number of staff on the line:	3	Cost premises, €/year:	60000
Hanging points:	80	Repair & Maintenance, €/year:	30000
Annual volume(pcs):	10000	Fixed line cost, €/h:	51
Prehanging time per staff (s/pcs):	2,5	Energy usage empty line, KW:	437
Hours per shift and year:	1750	Temperature C, pre treatment:	55
Number of shifts:	3	Temperature drying oven, C:	120
Total staff cost (vacation, social, pension), €/h:	20	Temperature curing oven, C:	180
Blue collar cost, €/h:	60	Material steel/aluminium, factor:	Steel
Investment (automatic line) €:	1400000	Coating objects flow incl hanger, kg/h:	2844
Interest rate %:	6,00	Energy usage coating objects, KW:	111
Depreciation rate (years):	10	Cost energy, €/kWh:	0,08
Capital cost (depreciation + interest), €/year:	182000	Energy cost, €/h:	43
Space (line+ handling area) m2:	1200	Total line cost, €/h:	154
Cost premises incl light, €/m²:	50	Productivity (line utilization, OEE), %:	80,00
		Total line cost OEE, €/h:	192

RESULT VALUES 6 vs 6 Staff

	Case 1	Case 2	Savings
Cost €/pcs	0,16	0,1	40%
Cost batch €	1630	970	660
Energy batch kWh	2860	710	2150

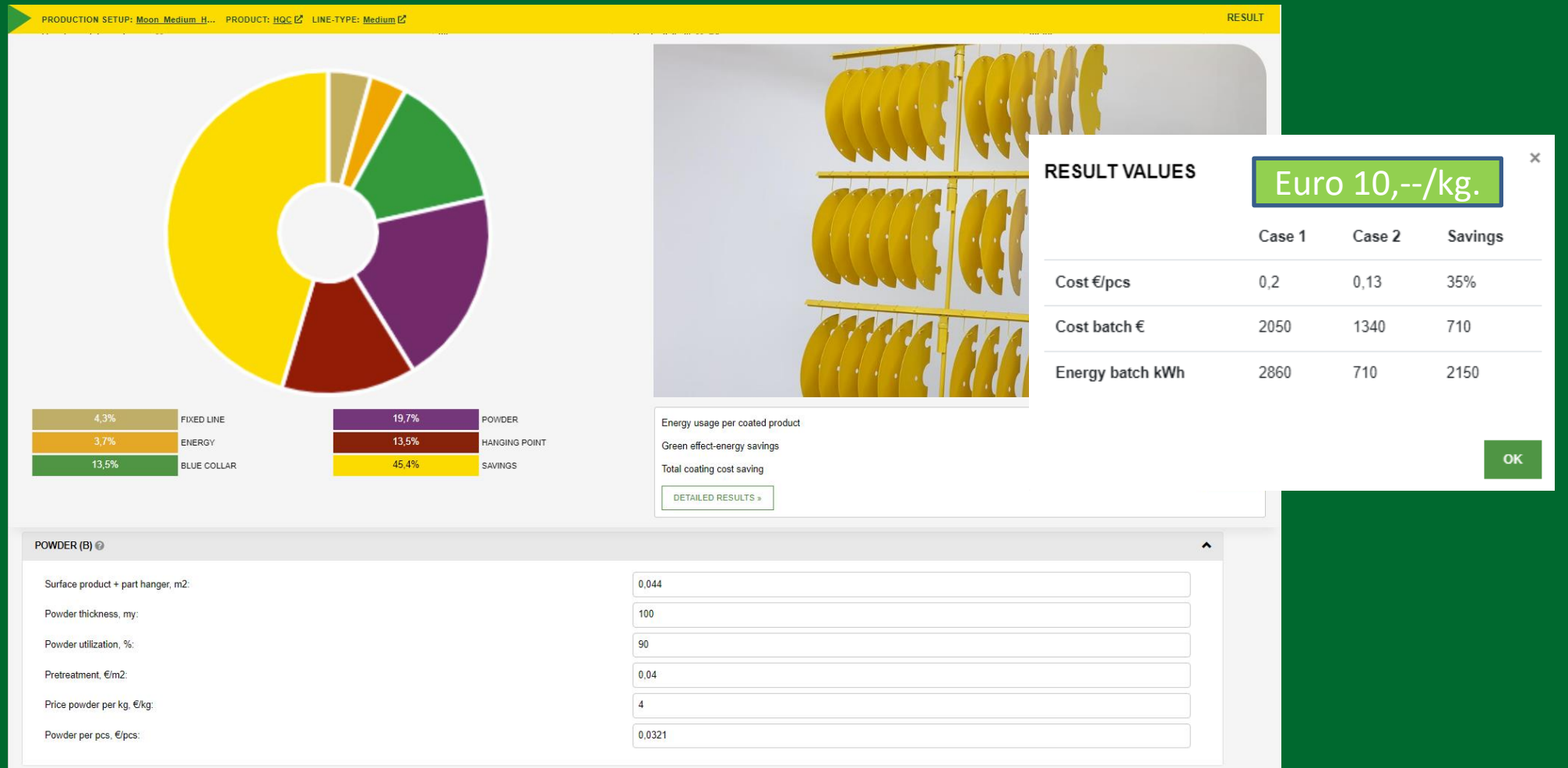
OK

RESULT VALUES 0,3 kWh

	Case 1	Case 2	Savings
Cost €/pcs	0,23	0,1	54%
Cost batch €	2270	1040	1230
Energy batch kWh	2860	710	2150

OK

CCC – General calculation + Powder



CCC – General calculation + Hanging

PRODUCTION SETUP: Moon_Medium_H... PRODUCT: HQC LINE-TYPE: Medium RESULT

	FIXED LINE	ENERGY	BLUE COLLAR	POWDER	HANGING POINT	SAVINGS
Percentage	4.3%	3.7%	13.5%	19.7%	13.5%	45.4%

Energy usage per coated product
Green effect-energy savings
Total coating cost saving
[DETAILED RESULTS >](#)

RESULT VALUES

Hanger 20kg.

	Case 1	Case 2	Savings
Cost €/pcs	0,16	0,09	45%
Cost batch €	1630	900	730
Energy batch kWh	2860	820	2040

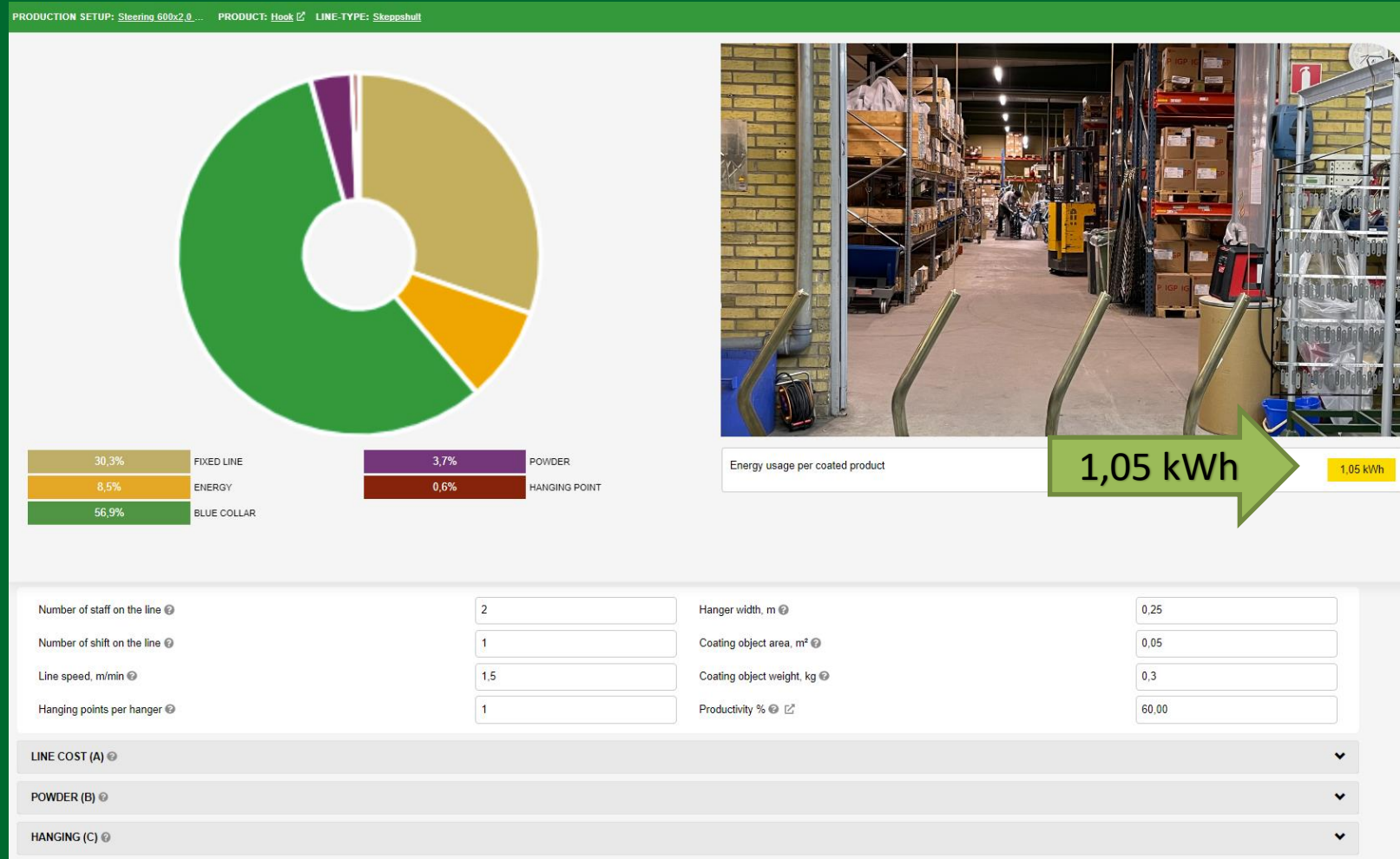
OK

HANGING (C) ©

Item #	Net weight/hanger	Purchase price (€/pcs)	Qty per hanging unit	Life time cleaning / disposal (# of laps)	Cleaning cost (€/pcs)	Number of cleaning	Total cost (€/pcs)
Shaft	2	7,5	1	120	0	0	0,0625
HQC	0,3	1	5	4	0	0	1,25

[ADD +](#)

The Green Effect - Example 2



The Green Effect - Example 2

PRODUCTION SETUP: Special_wire_shaft... PRODUCT: Hook LINE-TYPE: Skepps... RESULT

Category	Percentage
FIXED LINE	7,6%
ENERGY	2,1%
BLUE COLLAR	24,5%
POWDER	3,7%
HANGING POINT	0,8%
SAVINGS	61,3%

Energy usage per coated product: 0,26 kWh

Green effect-energy savings: 75%

Total coating cost saving: 61%

[DETAILED RESULTS »](#)

Number of staff on the line	<input type="text" value="2"/>	Hanger width, m	<input type="text" value="1,5"/>
Number of shift on the line	<input type="text" value="1"/>	Coating object area, m²	<input type="text" value="0,05"/>
Line speed, m/min	<input type="text" value="1,5"/>	Coating object weight, kg	<input type="text" value="0,3"/>
Hanging points per hanger	<input type="text" value="24"/>	Productivity %	<input type="text" value="60,00"/>

LINE COST (A)

POWDER (B)

HANGING (C)

RESULT VALUES

	Case 1	Case 2	Savings
Cost €/pcs	0,98	0,38	61%
Cost batch €	11724	4536	7188
Energy batch kWh	12552	3180	9372

RESULT VALUES

Afstand 12,5cm

	Case 1	Case 2	Savings
Cost €/pcs	0,51	0,38	26%
Cost batch €	6120	4536	1584
Energy batch kWh	6300	3180	3120



**Advice how to work
smart, profitable &
sustainable!**

1

Understand the energy
consumption and the cost
structure in your coating
line

– use our CCC!



**Advice how to work
smart, profitable &
sustainable!**

2

Make hanging a
strategic question, since it
influences both line usage
and work methods
– **it's a management
question!**





**Advice how to work
smart, profitable &
sustainable!**

3

Keep things simple and
focus on the highrunners
to increase the hanging
density (pareto rule
80/20)!





**Advice how to work
smart, profitable &
sustainable!**

4

Evaluate working methods to increase the hanging density like pre-hanging. Saved time can make it possible to closing of shifts, a production free day for maintenance etc.
This saves energy!





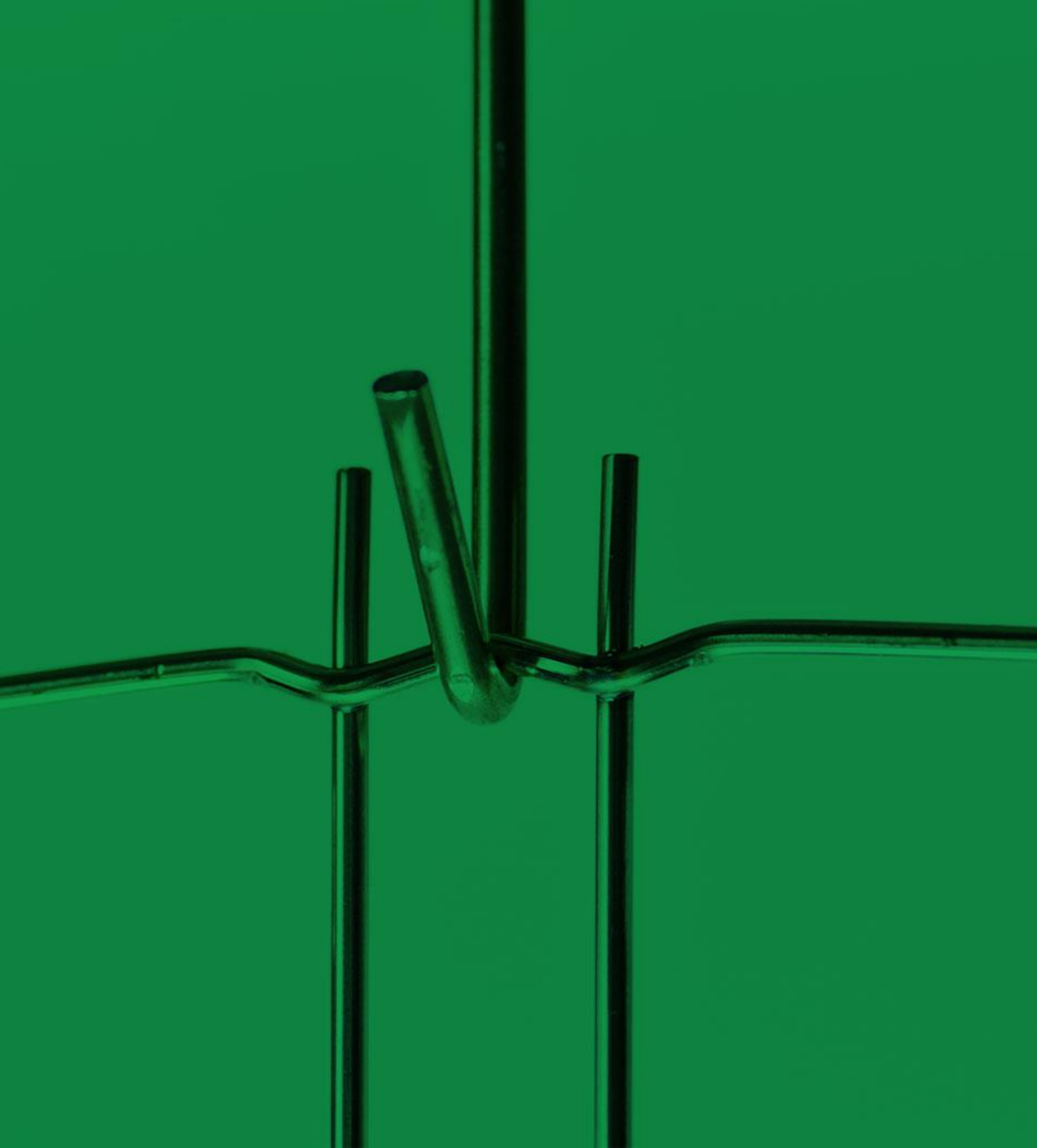
**Advice how to work
smart, profitable &
sustainable!**

5

Don't forget that you can
shorten the hanging time
with smart hanging
solutions.

**This saves a lot of your
costs!**





**Advice how to work
smart, profitable &
sustainable!**

6

**Contact HangOn for
help and counseling
with smart solutions!**



End + Questions?

