Process optimization in injection moulding

< Management summary >

ettwig interim management February 25th, 2019

Product description

Product design:



Bill of materials:

Item #	Item description	No. of parts used	
41 4646 0000	Body	2	
41 4648 0000	Tread Lock	1	
41 4650 0000	Flange	1	Components made
41 4649 0000	Plunger	1	inhouse
41 4651 0000	Bottom Slider	1	
41 4647 0000	Top Slider	1	
Buy in	Insertion Tube	1	Procured part

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Situation – key figures at project start

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- Volume:
- Scrap rate moulding:
- Disposal rate moulding: 5.0%
- Process lead time: 229 days

3.7 Mio. pcs/year

2.6%

Quality of Bottom Slider – Measurement of bending (mm)



• Control chart – batch M318280:







Bottom slider - Analysis & Test (One-way ANOVA)

Selecting the right test:

- continuos Y and discrete X,
- 🗸 Data are normal
- Equal variances
- One-way ANOVA

Boxplot:

- \succ H₀: $\mu_1 = \mu_2 = \mu_3$
- H₀ rejected! Compared to the standard of boxes containing 4'000 pcs, the reduced filling with 200 or 500 pcs significantly reduces bending.



Bottom Slider storage – Solution								
	As is – big boxes		To be – small boxes					
	pc./box	Big box		pc./box	Small box			
		600x400x300			600x400x150			
	Body	1'200		Body	500			
	Top Slider	4'000		Top Slider	1'500			
	Bottom Slider	4'000		Bottom Slider	1'500			

- **Concept:** Reduce pressure of upper parts on lower parts in box
- Solution: Implement small boxes for storage of body, top and bottom slider
- Savings: Reduce feeding problems/stoppages of assembly line due to bended bodies, top and bottom sliders







- **Concept:** Ensure proper placement of parts into box
- Solution: Implement handling systems and grippers for picking demoulded parts and placing them into a box
- **Savings:** Reduce feeding problems/stoppages of assembly line due to bended bodies, top and bottom sliders



- **Concept:** Improve process design (add final inspection as last step to supplier's process, transfer batch release to Logistics)
- Solution: Transfer sample analysis from external lab to resin supplier
- Savings: 7 days process lead time

Results

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The most significant improvements so far have been realized in moulding (i. e. the upstream processes). Little more time will be needed to benefit from these effects also in assembly.

Quality

- Flange: DPPM of flange overmoulded has been improved from 811 down to 583 (-28%).
- Scrap rate moulding: from 2.6% down to 0.64% (-75%)
- **Disposal rate moulding**: from 5% down to 4% (-20%)

Process lead time

• PLT: from 229 down to 207 days (-10%)