

Master Engineer of Rzeszow University of Technology

Faculty of
Mechanical Engineering and Aeronautics



D&F_π
Robert Krzywy

INVEST REM SP Z O O

10.2007 - 02.2008

INVEST-REM in Mogilno

Operator of industry laser , mechanical presses and other industrial machines .

Mechanical press



Riveting machine



Bending machine



Industry laser



Drilling machine



Faculty of Mechanical Engineering and Aeronautics
Department of Aircraft and Aircraft Engines

DIPLOMA THESIS ABSTRACT

Subject: Design of accessory engine to the glider.

Abstract:

This engineering work has created the way how design accessory engine to the ready glider which it will be fixed to part of fuselage.

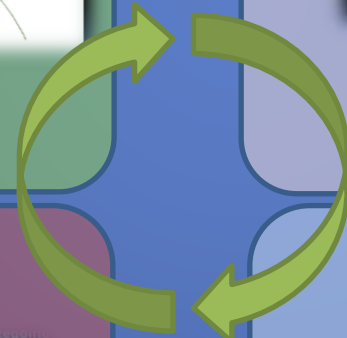


Analysis stage: technical drawings and graphs. The left side shows a technical drawing of a mechanism. The right side shows two graphs: one with a curve rising and then leveling off, and another with a curve falling. The word "Analysis" is written in yellow at the bottom.

Calculation stage: spreadsheets and graphs. The left side shows a spreadsheet with blue headers. The right side shows several graphs with curves. The word "Calculation" is written in yellow at the bottom.

Design stage: 3D models of engine components. The left side shows 3D models of engine parts. The right side shows a 3D model of a complete engine assembly. The word "Design" is written in yellow at the bottom.

Components selection stage: 3D model of an engine. A 3D model of an engine is shown. The word "Components selection" is written in yellow at the bottom.





Faculty of Mechanical Engineering and Aeronautics
 Department of Aircraft and Aircraft Engines

DIPLOMA THESIS ABSTRACT

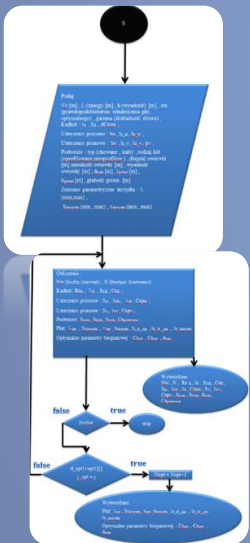
Subject: Optimization and analysis of aerodynamic load of wing.

Abstract:

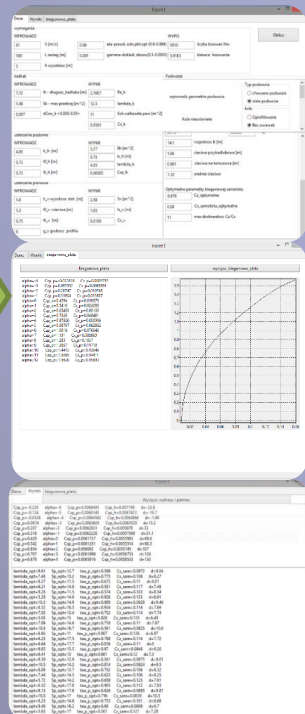
This work is introduction to the final concept of the design of the aircraft wings.

- 1) Program has been created to optimize the wings
- 2) Design has been done in Catia V5
- 3) The aerodynamic analysis have been launched for comparison of some mathematical models in Ansys Fluent & X-FLRa.

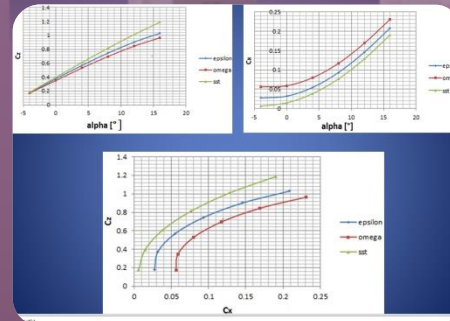
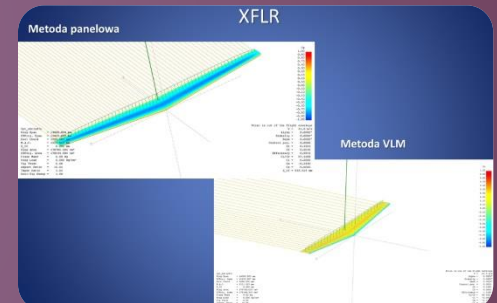
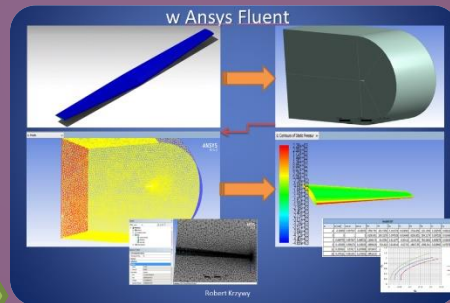
Algorithm



Coding of the program for the wings & optimisation

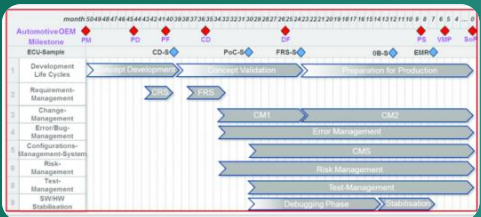


Desing and aerodynamic analysis





Milestone program



Design & Development

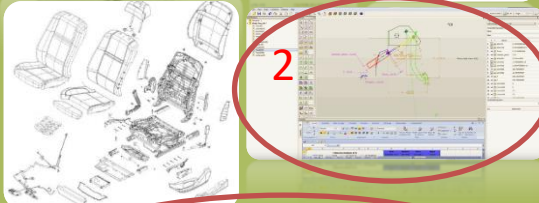
- 1.3D**
All design from single component -> full assembly with variants and kinematic
- 2.Stack-up**
Verification of the chain of tolerance
- 3.Drawings**
GD&T or ASME 14.5 :
All drawings from prototypes variant to final production via single -> sub-assembly-> assembly -> customer drw. -> explode view
- 4.Calculation**
All major calculation related to the whether mechanical or proces steps have been implemented

Validation

1. Prototype
2. Dimension measurement
3. Tests
4. Results

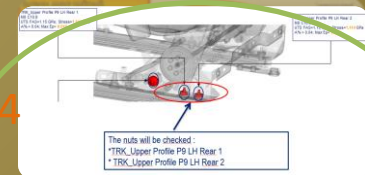
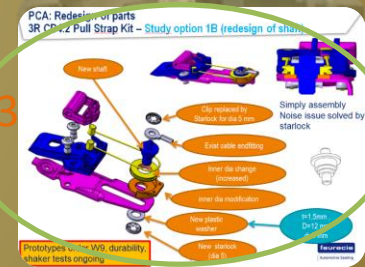
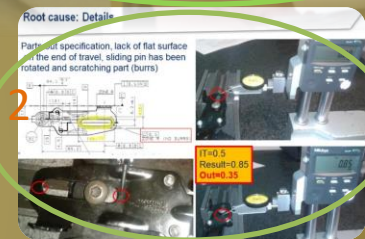
START OF PRODUCTION (SOP)

Design & Development



	Data	
Number of components	...87X (c.10)	...54X(c.8)
pl	3,14	3,14
H_m	7,4	6,5 mm
d	8	8 mm
D1	6,647	6,647 mm
p	1,25	1,25 mm
k_dop	666,66	533,33 N/(mm^2)
F	38000	38000 N
Results		
P	412,6157059	469,74711 N/mm^2
Hm	4,580080136	5,7256787 mm

Validation



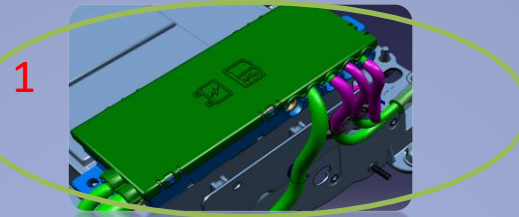
Item	Material	Quantity	Unit	Weight	Volume	Surface	Volume	Surface	Volume	Surface	Volume	Surface
1	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
2	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
3	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
4	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
5	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
6	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
7	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
8	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
9	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
10	Al 6061	1	mm	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1

NOK Validation

Design & Development

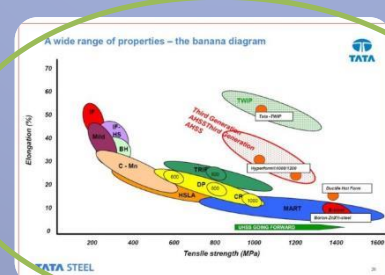
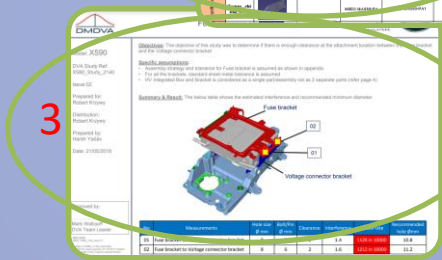


- ### Design & Development
- 3D
 - Bill Of Material (BOM)
 - Stack-up
- Verification of the tolerances chain
- Material selection
 - Design Failure Mode Effect Analysis (DFMEA)
 - Drawings
 - Finite Element Analysis (FEA)
 - Package review

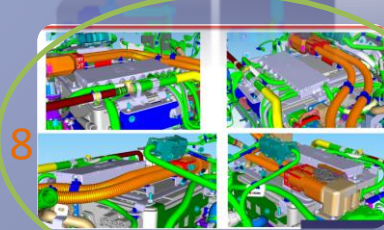
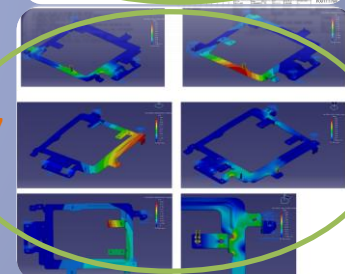
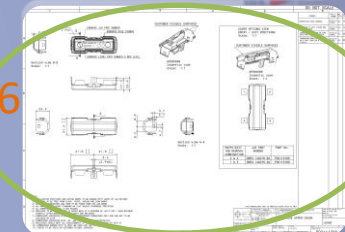


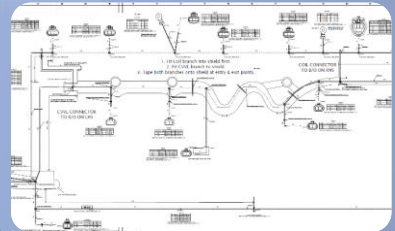
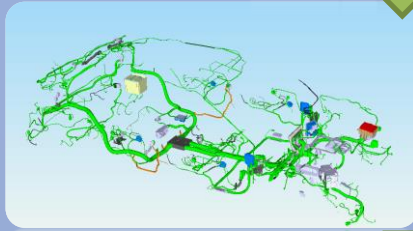
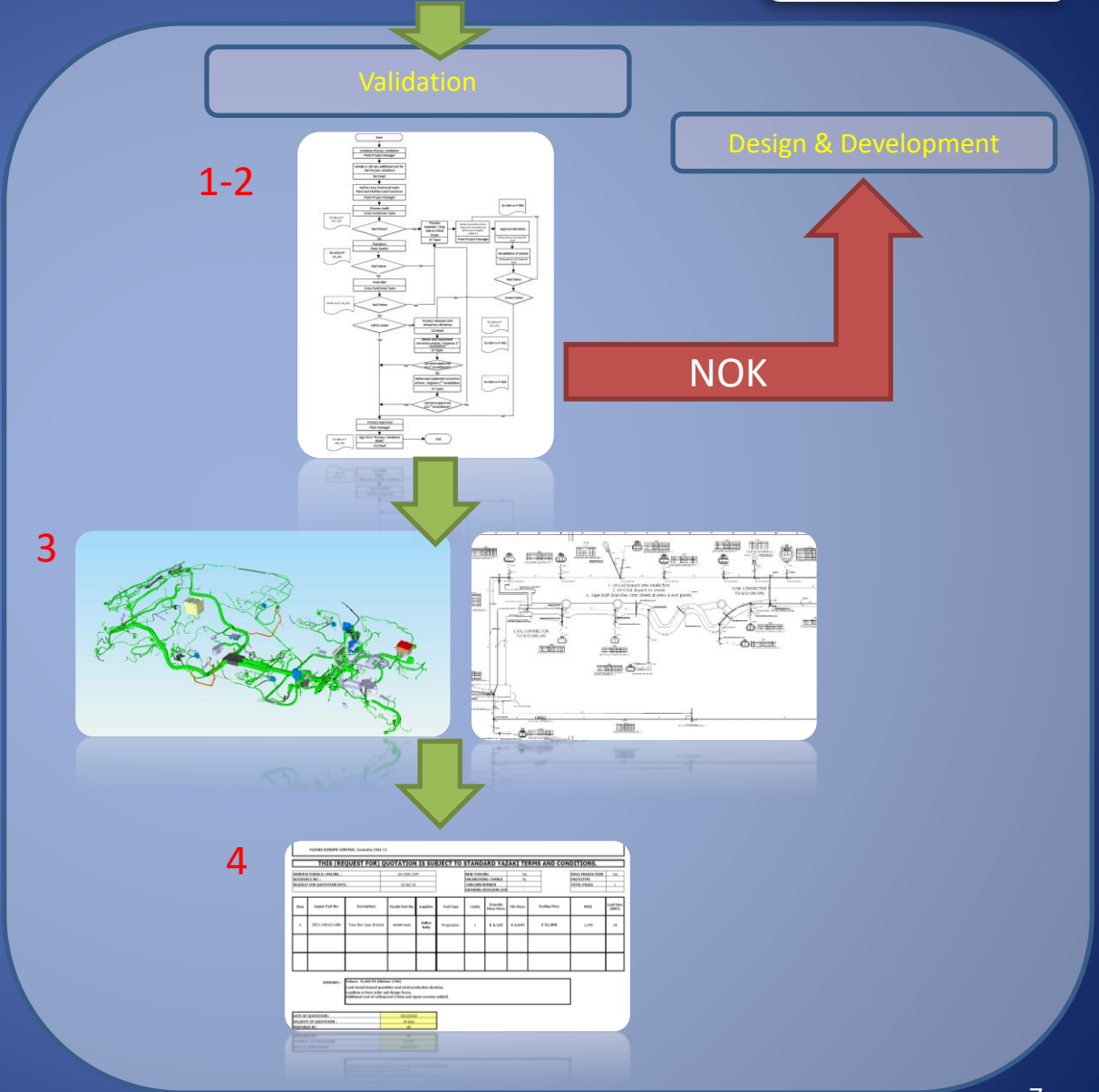
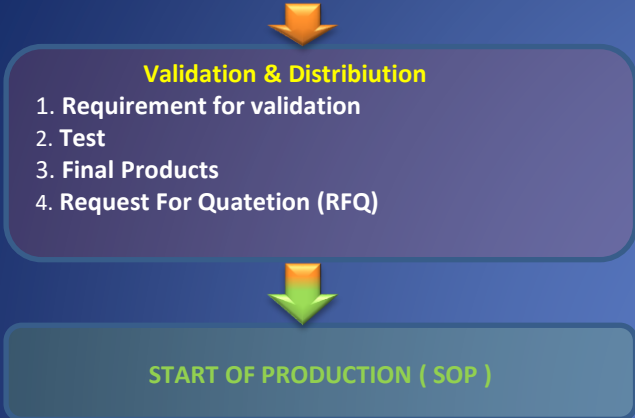
2

Part Name	Qty	Material	Part Number	Unit Price	Total Price
Terminal	1000	ME80-1000-001	ME80-1000-001	0.10	100.00
Terminal	1000	ME80-1000-002	ME80-1000-002	0.10	100.00
Terminal	1000	ME80-1000-003	ME80-1000-003	0.10	100.00
Terminal	1000	ME80-1000-004	ME80-1000-004	0.10	100.00
Terminal	1000	ME80-1000-005	ME80-1000-005	0.10	100.00
Terminal	1000	ME80-1000-006	ME80-1000-006	0.10	100.00
Terminal	1000	ME80-1000-007	ME80-1000-007	0.10	100.00
Terminal	1000	ME80-1000-008	ME80-1000-008	0.10	100.00
Terminal	1000	ME80-1000-009	ME80-1000-009	0.10	100.00
Terminal	1000	ME80-1000-010	ME80-1000-010	0.10	100.00



- 5
- Optimise vertical hinge
 - Optimise the rear surface to avoid contact with battery during cover / uncovers terminal process
 - Create as much as functional / under stress design for clipping process





YAZAKI EUROPE LIMITED, COVENTRY, ENGLAND

THIS REQUEST FOR QUOTATION IS SUBJECT TO STANDARD YAZAKI TERMS AND CONDITIONS.

Item	Quantity	Description	Unit	Material	Lead Time	Price	Volume	Notes
1	1000	Yazaki Logo Bracket	mm	Aluminum	2 weeks	€ 1.50	€ 1,500.00	Low

YAZAKI REQUEST QUOTATION FORM

Yazaki Europe Limited, Coventry, England

Request for quotation and production details

Yazaki Europe Limited, Coventry, England

Yazaki Europe Limited, Coventry, England

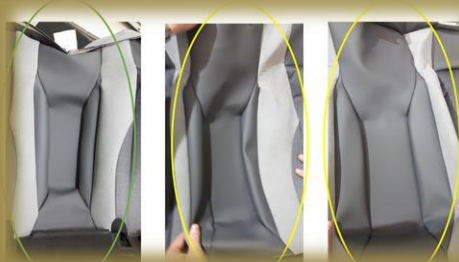
Quality of the product On-Site of the customer

1. Inspection of the delivery according to the risk of failures
2. Quality inspection all of the products and rework when products were out of standards
3. Creating the catalog of production failures and reporting them
4. Create a control plan , quality specifications , participate in product modification

1. Delivery note

Order no.:	DN 8425	Auto:	SB-91-EXS	Deliv. date:	
Deliv. date:	28.11.2020	Sofer:	Lung Raul	30.11.2020	
VLT ID no.:	RD1559111				
Referinta	P.N. VL	Denumire	Description	Quantity	U.M.
1	10A 881 405 P VWA	2778542X01	F3C-Basis	105	pcs
2	10A 881 405 Q VXH	2778563X01	F3C-Design	500	pcs
3	10A 885 805 F VWA	257824X03	RSB 60% Basis	48	pcs
4	10A 885 805 G VXH	257824X03	RSB 60% Comfort-design	320	pcs
5	10A 885 806 G VWA	257825X03	RSB 60% Basis	240	pcs
6	10A 885 806 H VXH	257827X03	RSB 60% Comfort-design	228	pcs
7	10A 885 806 K VXH	272106X02	RSB 60% Comfort-Design - 4-Strip	132	pcs
8	10A 881 805 CD VWA	278154X04	FSB Passenger Arm. Basis RHD	79	pcs
9	10A 881 805 CE VXH	278143X03	FSB Drive/Design LHD	238	pcs

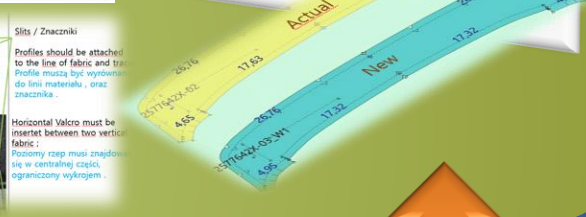
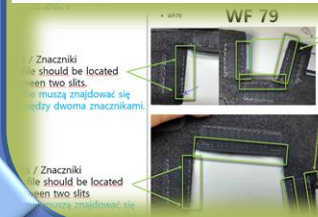
2. Quality Inspection



4. Control plan , specification , product modification

REFERENCE	DATE	REVISION	CONTROL PLAN / PLAN DE CONTROL
10A 881 805 P VWA	28.11.2020	01	Control Plan for F3C-Basis
10A 881 805 Q VXH	28.11.2020	01	Control Plan for F3C-Design
10A 885 805 F VWA	28.11.2020	01	Control Plan for RSB 60% Basis
10A 885 805 G VXH	28.11.2020	01	Control Plan for RSB 60% Comfort-design
10A 885 806 G VWA	28.11.2020	01	Control Plan for RSB 60% Basis
10A 885 806 H VXH	28.11.2020	01	Control Plan for RSB 60% Comfort-design
10A 885 806 K VXH	28.11.2020	01	Control Plan for RSB 60% Comfort-Design - 4-Strip
10A 881 805 CD VWA	28.11.2020	01	Control Plan for FSB Passenger Arm. Basis RHD
10A 881 805 CE VXH	28.11.2020	01	Control Plan for FSB Drive/Design LHD

Item	Specification	Measurement method	Max. Smpg	Control	Test	Design	Control	Spec.	Control	Spec.	Control	Spec.
1	Check the conformity and regularity of the general appearance of the exterior side of the cover	Visual										
2	Check the presence and the position of the 4 Lateral plastic profiles	Visual										
3	Check the presence and the position of the 4 Tie down	Visual										
4	Check the presence and the position of the 4 lateral profile/Tie down	Visual										
5	Check the notch deviation = 1.5 mm Edge to Edge = 3 mm	Caliper										



3. Catalog of defects

Defect	Image	Tolerances
Alignment		max.2
Damaged fabric		
Irregular sewing		max.3
Irregular sewing tie down		max.3
Irregular pattern		FSB Tolerance: max.6mm, 6SC Tolerance: max.8mm

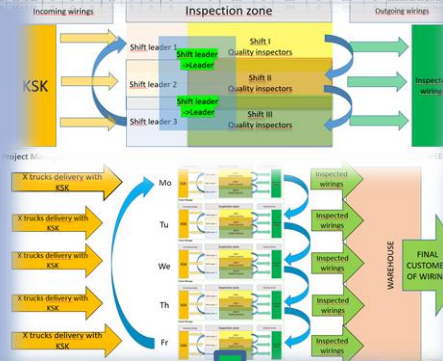
03.2021 – 08.2021

Quality Project Manager at Exact Systems GmbH delegated to Leoni Wiring Systems

Role :

1. Participation in contract assignment .
2. Monitoring the flow between manufacturer and final customer (Quality Wall implementation) .
3. Controlling and implementing the number of Quality Inspectors , Leaders and Controllers based on Ramp up plan in the weekly basis (the number of QI were between 10-45). Employing, schedule , monitor , assess and fill all working hours of Quality Inspectors .
4. Providing the control station and all necessary tools for the Quality Inspection .

Week	Incoming inspection										Commission trolley & SAS										Remark	Update
	Exact Systems		Tromax MA		Basista MA		Sital network		Sital network components		L&E/IN		IK EXT		IN		EXT					
7	1	0	0	1	5	2	12	8	0	5	5	0	0	0	4	0	4	0	4			
10	10	0	0	3	5	7	8	12	0	0	0	0	0	0	4	0	4	0	4	plus 1 coordinator	Reduced 7 Pr...	
11	9	10	0	9	0	0	0	10	8	0	0	0	0	11	2	1	8	2	1	starting 3rd shift/ 2nd coordinator from Exact	compared with plan from QI...	
12	13	13	0	0	0	0	0	9	9	0	0	0	0	215	0	285	0	282	0	Target, remove or replace operators from external companies		
13	0	12	12	0	0	0	0	0	0	0	0	0	0	282	0	215+15AS	0	215+15AS	0	customers to create possible		
14	7	7	7	0	0	0	0	10	10	0	0	0	0	215+15AS	0	215+15AS	0	215+15AS	0	1st leader		
15	7	7	7	0	0	0	11	9	0	0	0	0	0	215 + 15AS	0	215 + 15AS	0	215 + 15AS	0	2nd QI leader EN		
16	7	7	7	0	0	0	11	9	0	0	0	0	0	215 + 15AS	1	215 + 15AS	1	215 + 15AS	1			
17	13AS	13AS	0	13AS	0	0	0	0	0	0	0	0	0	285	0	285	0	285	0	Additional 15minutes		




03.2021 – 08.2021

Quality Project Manager at Exact Systems GmbH delegated to Leoni Wiring Systems

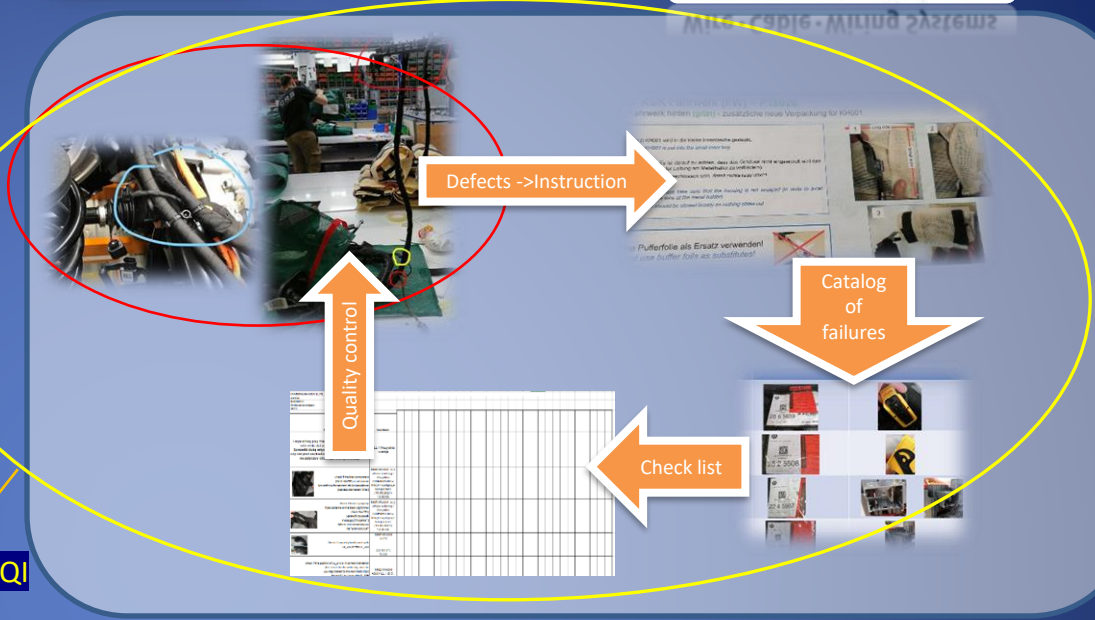
Role :

- 5. Creating a control plan .
- 6. Creating a catalog of defects .
- 7. Creating and up to dating the check list for Quality Inspection .
- 8. Creating the evidence for inspected product to avoid any claims from customer .

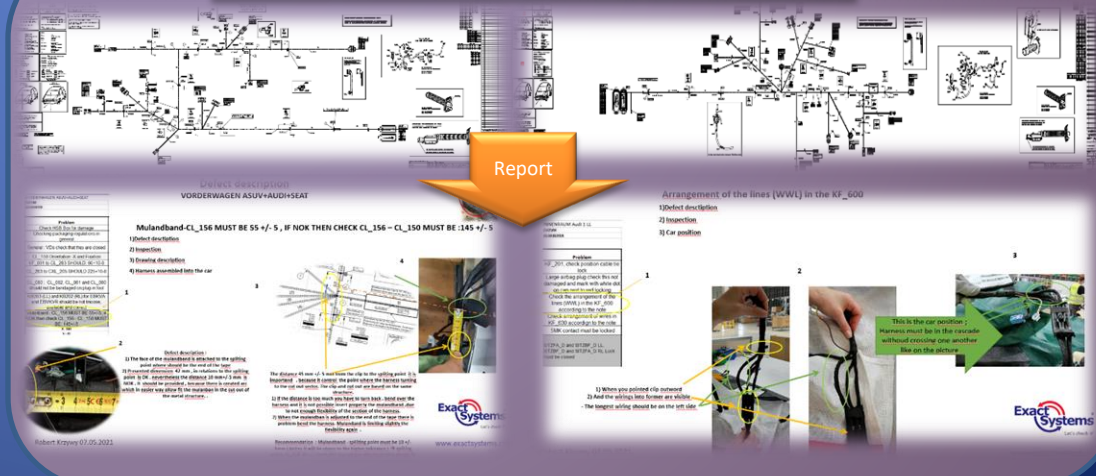
Evidence of QI

Role :

- 9. Cooperating with Design Department and modified the drawing definition .
- 10 . Reporting to the supplier the failures by presentation of the design documents and quality of the current product .



Drawings verification and change implementation



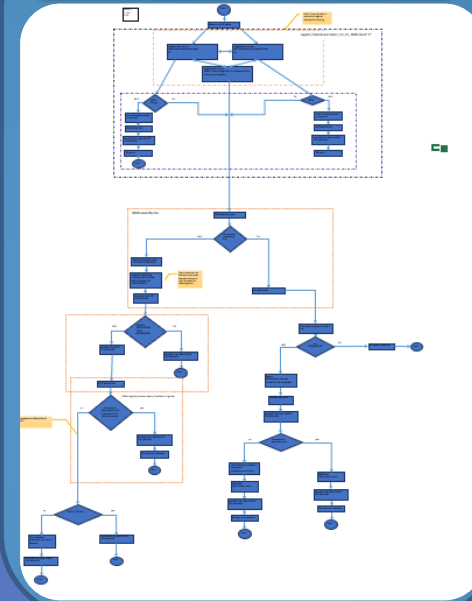
09.2021 – 10.2021

Novares Resident Engineer at at Exact Systems GmbH delegated to BMW Dingolfing

Role :

1. Creating the process scheme of cooperation between Novares and BMW on BMW site
2. React on BMW claims :
 - 2.1 Analysing current defects
 - 2.2 Doing accurate measurement
 - 2.3 Doing a rework if possible
3. Approving new component after tool modification by testing statically and dynamically (driving test)

1. Process scheme of cooperation



2. BMW claim

BMW AG

BMW AG - POSTFACH 1102 - D- 84122 DINGOLFING

NOVARES CZ JANOVICE S.R.O.
ROZVOJKA ZONA 555
340 21 JANOVICE NAD UHEAVOU
CZECH REPUBLIC

COMPLAINT REPORT
247348223

Date: 06.09.2021 Our Reference: SCHWEIGER Department: MS-623 Telephone: 0151//60232750 Telex: Page: 1

BATCH REJECTION Supplier no: 188968 10

Part number	Part Name	Clc. Ref. No.	Your Delivery No.	Clc. Order No.	Your Delivery No.	Delivered Quantity	defect Quantity
7911247/13	Usporeznenka	23187545 31082021	F3MDJH	86451301			
EB624A	TE-MIN: 220			86451301			
DEFECT : QSP Costs							
ERROR DATE : 02.09.2021							
DECISION : Handling expenditure							
CATEGORY : OTHER ERROR PASTTRACK : N STATEMENT : N							
SCRAP-ID : 1889681024 79112471379789094924860579							
7911247/13	Usporeznenka	23187545 31082021	F3MDJH	86451301			
EB624A	TE-MIN: 35			86451301			
DEFECT: 1x Noise Flaw							
ORDER 3160144 - TELEFAM							
pf*ifen Ger*usch im Frischluftgitter = AS-ID 00025184575							
ERROR DATE : 02.09.2021							

2.1 - 2.3 Reacting when the failures are appeared on-site of the customer



3. Static & Dynamic Validation inside the car during the driving test for design change approval.



09.2021 – 10.2021

Novares Resident Engineer at at Exact Systems GmbH
delegated to BMW Dingolfing

Role :

- 4. Creating the presentations to provide clear status of issues and all measurements .
- 5. Cooperating with Design department to solve the problem which have appeared by design modification and description .
- 6. Negotiation and agreement related to the defects with BMW . Creating approved catalog of the defects .
- 6. Up to dating the control plan .
- 7. Creating the regular follow up to track continuously the work .

6. Customer agreed defect catalog

Defects on the central vent console for delivery DL 86487800 & 8648774L -> 112X part number 9490661 Inspected at

Defect	Defect description	Defect category	Defect status	Defect location	Defect quantity	Defect date	Defect time	Defect person	Defect photo
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

7. Control plan actualization

4. Presentation to the supplier

Result of measurements

Left side - bent component Right side Method of measurement

Number of measurement	Value left side of the vent	Value right side of the vent
1	0,26	0,26
2	0,26	0,26
3	0,26	0,26
4	0,26	0,26
5	0,26	0,26
6	0,26	0,26
7	0,26	0,26
8	0,26	0,26
9	0,26	0,26
10	0,26	0,26
11	0,26	0,26
12	0,26	0,26

Legend:
 Measurement on the first step of assembly
 Measurement on the second step of assembly - final assembly

In this case: 0,25 / 0,25 mean that in first step we had 0,25 mm and after assembly too component the gap has enlarged to 0,25.

Rear control vent failures 1.

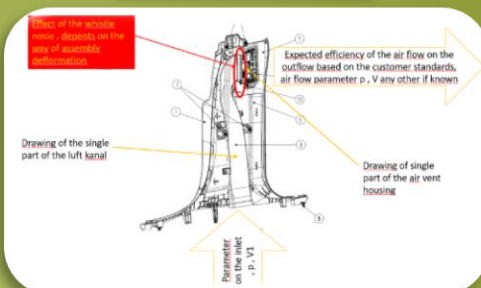
1. There were 3 samples with difficulties of closing the vent - [video](#) [photo](#) [photo](#) [photo](#)

Rear control vent failures 2.

2. There was one sample with missing component -> sorting action by Zettl

Not possible change the gNB location

5. Design modification



8. Follow up

D&F Robert Krzywy

Thank you for your attention !

I am flexible and open for cooperation World wide

email : mail@robertkrzywy.com

Telephon number : +48 786 816 215