



PRZETWÓRSTWO TWORZYW - FORMY

COMPANY FORM-PLAST S.A. INTRODUCTION

BYDGOSZCZ, POLAND



Bydgoszcz – Poznań – 130 km
Bydgoszcz – Warszawa – 270 km
Bydgoszcz – Gdańsk - 165 km

FORM-PLAST S.A.

85-831 Bydgoszcz, ul. Torunska 143

tel.: + 48 52 370 33 00, fax: + 48 52 370 33 50

form-plast@form-plast.com.pl

www.form-plast.eu



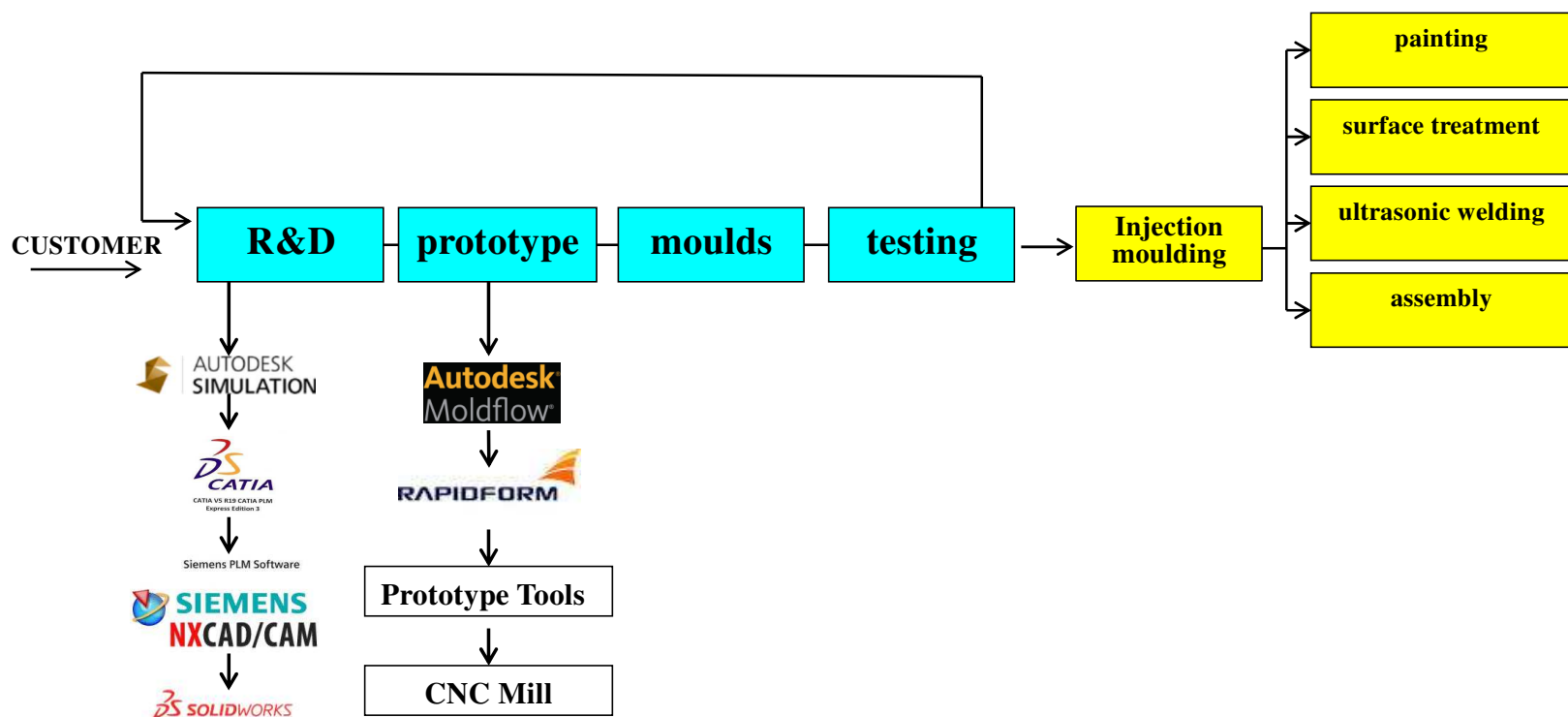


Our factory occupies an area of 30.000 sqm, including production facility area of 20.000 sqm, warehouse with 4.500 pallettes capacity and office space of 1.500 sqm total.





„to integrate different technologies”



LAW STATUS: Joint-Stock Company since 2008

Established in 1978

Employment: 200-300 peoples

MAIN MARKETS:

- *Automotive*
- *TV/LCD/LED*
- *Logistic - Packaging System*

Main customer in plastic products: Faurecia, Toyota Boshoku, Olsa, Delphi, BMW, Volvo Truck, Volvo Car, Magna, TYCO Electronics, Loewe, Sharp, LGE, TPV, 3M.

Main customers in moulds manufacturing: Toyota Boshoku, Faurecia, TRW, Olsa, Shapersgroup, Volvo 3P, Volvo Truck, Thule, Delphi, Magna, Valeo, Loewe, LG, Sharp, Samsung, Electrolux, 3M, Lear



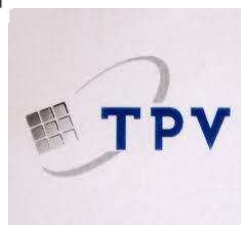
OLSA



DELPHI

LOEWE.

SHARP



3M



INJECTION MOULDING



TECHNOLOGIES:

- *One component parts up to 33 kg*
- *Two-component parts*
- *Gas assisted moulding*
- *RHTC Moulding*
- *Overmoulding with inserts*

72 INJECTION MACHINES:

INJECTION MACHINES REVIEW

LP	Injection machine	Producer	Screw diameter	Screw type	Pillar distance	Injection Pressure	Shot weight [g]	Tool height	Flange diameter [mm]
1	Arburg 220E	Arburg	22	Azot.	220 x 220				
2	Arburg 220E	Arburg	22	Azot.	220 x 220				
3	HRV 30	Huarong	18	Azot.	310x310	2 370	16	100-300	100
4	SM 50	Asian Plastic	25	Azot.	310x310	2 150	59	100-320	125
5	KM 50 E	Kraus Mafei	25	Azot.	340x340	2 500			110
6	HRV 60	Huarong	22	Azot.	320x320	2 777	42	150-360	100
7	VE 70 E	Negri Bossi	28	Bi-m.	360x310	2 000			100
8	WH 80	Metalchem	40	Azot.	340 x 300				
9	HRV 80	Huarong	28	Azot.	370x370	2 330	87	150-400	100
10	KM 80 E	Kraus Mafei	30	Azot.	425x425	2 025			125
11	JSW 110 E	JSW	40	Bimet	404x455	1 880			100
12	VE 90 E	Negri Bossi	35	Bi-m.	400x360	2 000	160	150-450	100
13	SM 90	Asian Plastic	36	Azot.	360x360	1 600	122	125-350	100
14	UT 90	Żywiec	35	Azot.	355x355	1 960	125	125-375	125
15	HRV 100	Huarong	32	Azot.	420x420	2 330	124	170-470	100
16	KM 110 E	Kraus Mafei	40	Azot.	490x490	1 860			125
17	SM 120	Asian Plastic	41	Azot.	410x410	1 590	188	150-400	140
18	SM 120	Asian Plastic	41	Bi-m.	410x410	1 590	188	150-400	100
19	VE 120 E	Negri Bossi	40	Bi-m.	450x400	2 000	210	150-500	100
20	LF 137 H	LienFa	35	Azot.	452x452	1 800	220	200-450	120
21	VE 160 E	Negri Bossi	45	Azot.	510x450	2 000	330	170-550	125
22	UT 175	Żywiec	50	Azot.	480x480	2 000	362	150-500	160
23	SM 210	Asian Plastic	60	Azot.	500x500	1 340	546	200-600	140
24	VE 210 E	Negri Bossi	52	Azot.	570x510	2 000	435	200-630	160
25	KR 250	Krupp		Azot.	505 x 505				

INJECTION MACHINES REVIEW

LP	Injection machine	Producer	Screw diameter	Screw type	Pillar distance	Injection Pressure	Shot weight [g]	Tool height	Flange diameter [mm]
26	SM 250	Asian Plastic	67	Azot.	560x560	1 450	746	200-640	160
27	BSKM 800	Battenfeld	60	Azot.	560 x 560	1 600		262-525	200
28	VE 300 E	Negri Bossi	60	Azot.	630x570	2 000	760	250-700	160
29	LF 320 H	LienFa	55	Bi-m.	610x610	2 170	700	300-900	120
30	LF 320 H	LienFa	65	Bi-m.	610x610	1 550	970	300-900	120
31	UT 340	Żywiec	65	Azot.	692x692	2 310	1 090	250-700	160
32	SM 350	Asian Plastic	75	Azot.	695x695	1 478		260-700	150
33	SM 350 H	Asian Plastic	60	Azot.	720x720	2 100	676	300-720	150
34	SM 350 H	Asian Plastic	60	Azot.	720x720	2 100	676	300-720	150
35	SM 450	Asian Plastic	75	Azot.	780x750	1 500	1 518	300-800	200
36	SM 450 H	Asian Plastic	67	Azot.	820x820	2 100	941	300-880	160
37	SM 450 H	Asian Plastic	67	Azot.	820x820	2 100	941	300-850	160
38	LF 507 H	LienFa	65	Bi-m.	710x710	2 145	1 045	400-700	120
39	LF 507 H	LienFa	70	Bi-m.	710x710	1 850	1 212	400-700	120
40	LF 507 H	LienFa	75	Bi-m.	710x710	1 610	1 390	400-700	120
41	SM 550	Asian Plastic	90	Azot.	845x845	1 805			200
42	BSKM 2000	Battenfeld	80	Azot.	795 x 795	1 600		400-800	250
43	SM 600	Asian Plastic	93	Azot.	860x860	1 736	2 658	350-1100	200
44	LF 707 H	LienFa	75	Bi-m.	860x810	2 550	1 877	450-900	160
45	LF 707 H	LienFa	80	Bi-m.	860x810	2 240	2 135	450-900	160
46	LF 707 H	LienFa	85	Bi-m.	860x810	1 985	2 410		160
47	SM 850	Asian Plastic	100	Azot.	1 080x1020	1 666	3 574	400-1200	200
48	LF 837 H	LienFa	90	Azot.	1005x1005	1 944	2 880	450-1100	200
49	LF 837 H	LienFa	100	Azot.	1005x1005	1 570	3 535	450-1100	200
50	Sandretto 800	Sandretto	90	Azot.	920 x 920				250
51	SM 900	Asian Plastic	110	Azot.	1060x1060	1 690	4 277	500-1200	200

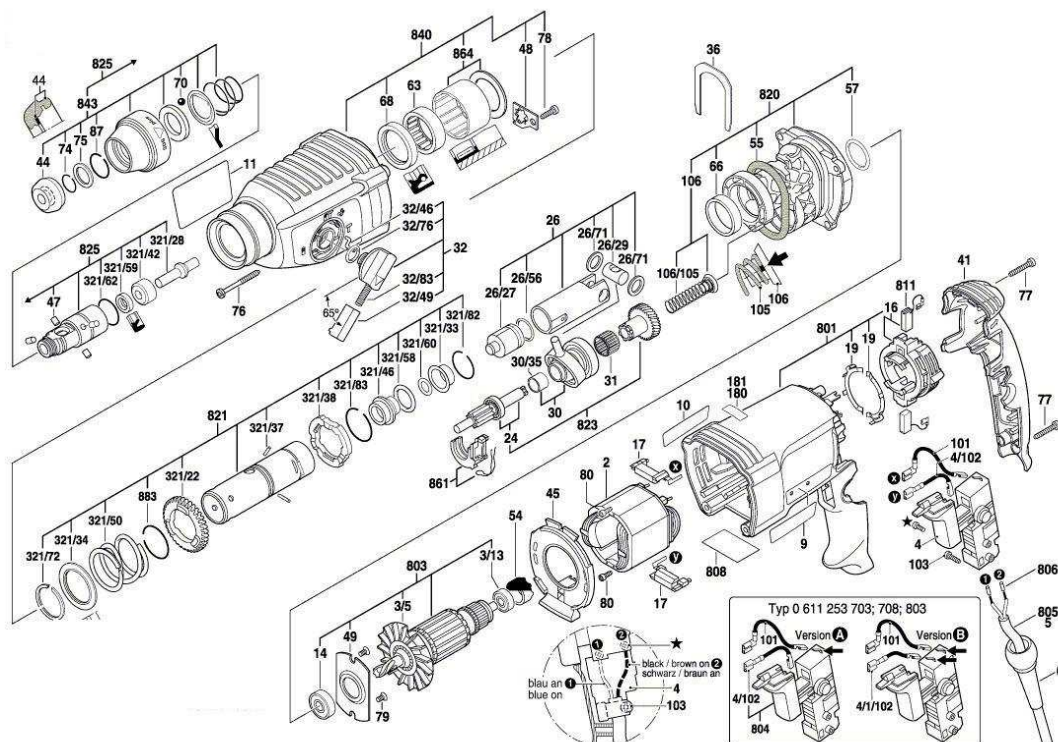
INJECTION MACHINES REVIEW

LP	Injection machine	Producer	Screw diameter	Screw type	Pillar distance	Injection Pressure	Shot weight [g]	Tool height	Flange diameter [mm]
52	SM 1100	Asian Plastic	120	Azot.	1250x1250	1 764	5 763	500-1300	200
53	SM 1200	Asian Plastic	110	Azot.	1220x1220	2 090	5 322	600-1300	200
54	SM 1200	Asian Plastic	130	Azot.	1220x1220	1 500	7 433	600-1300	200
55	LF 1270 H	LienFa	100	Azot.	1210x1210	1 905	3 535	500-1350	200
56	LF 1270 H	LienFa	110	Azot.	1210x1210	1 575	4 274	500-1350	260
57	SM 1500	Asian Plastic	130	Azot.	1520x1420	1 860	6 838	700-1400	260
58	LF 1670 H	LienFa	120	Azot.	1520x1420	1 945	6 100	600-1500	250
59	LF 1670 H	LienFa	150	Azot.	1520x1420	1 646	10 094	600-1500	250
60	SM 1800	Asian Plastic	145	Azot.	1820x1520	1 509	12 154	700-1500	200
61	LF 2070 H	LienFa	180	Azot.	1805x1505	1 463	16 025	650-1500	250
62	SM 2500	Asian Plastic	160	Azot.	2020x2020	1 814	16 648	800-1700	250
63	LF 2570 H	LienFa	180	Azot.	1905x1605	1 463	16 025	650-1700	250
64	LF 3070 H	LienFa	220	Azot.	2005x1805	1 350	26 595	980-2000	250
65	ES80H /25	Engel	18	Azot.					
66	BSKN 700 H	Battenfeld	38	Azot.	fi 1020				
67	F85 Feromat	Klockner	2x 30	Azot.	380 x 380				
68	ES 2F 60/100	Engel	25, 28	Azot.	510 x 360				
69	HDC 160 B	Huarong	2x34	Azot.	640x355	2 140	2x78	110-400	110
70	SM 250	Asian Plastic	36, 46	Azot.	970 x 400				120
71	HDC 300	Huarong	2x44	Azot.	910x505	1 720	2x370	130-520	110
72	HDC 500	Huarong	2x55	Azot.	1100x610	1 940	2x605	200-700	160

Subcomponents assembly into complex modules:

- sealings
- glue tapes
- screwing/riveting
- ultrasonic welding
- decorating
- assembly of purchased parts

ASSEMBLY



INJECTION MACHINES REVIEW



HEAT & COOL

The technology HEAT & COOL enables to achieve high quality of visible surfaces.

Heat & Cool



without Heat & Cool



PAINTING

***3 FULLY AUTOMATIC PAINTING LINES,
EACH EQUIPPED WITH:***

- *preparation stands*
- *6-axis painting robots (FANUC)*
- *IR or hot drying tunnels*
- *cleaning/reworks stands*
- *quality inspection*
- *tampo printing*
- *silk screen paint*

Maximum part size:

- *Maximum size of part: 1 500 x 800mm*
- *Maximum height: 280 mm*



PAINTING

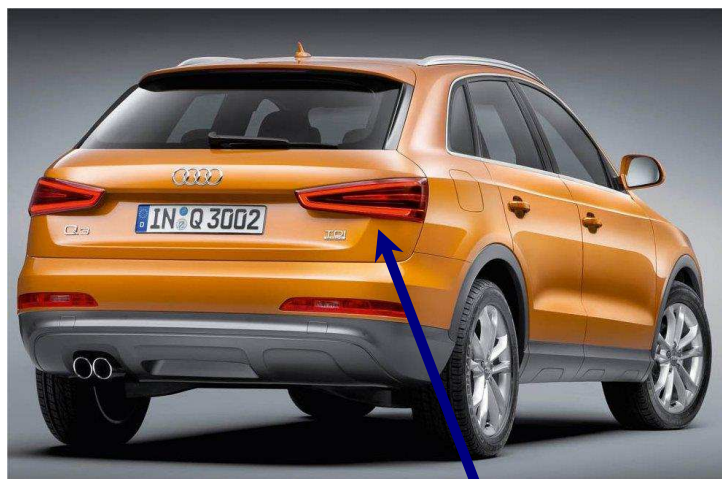


PAINTING

Our painting technology is fully automatic – the further works will be effected on next montage stages.



Housing



Sealing Box



Canister



Control Panel

Cable Channel





Clamp Heater



Clamp (Thule)



Air conditioning lever





Front door cover



Cover wheels



PRZETWÓRSTWO TWORZYW - FORMY

Foot step lower

Grill DV & MV



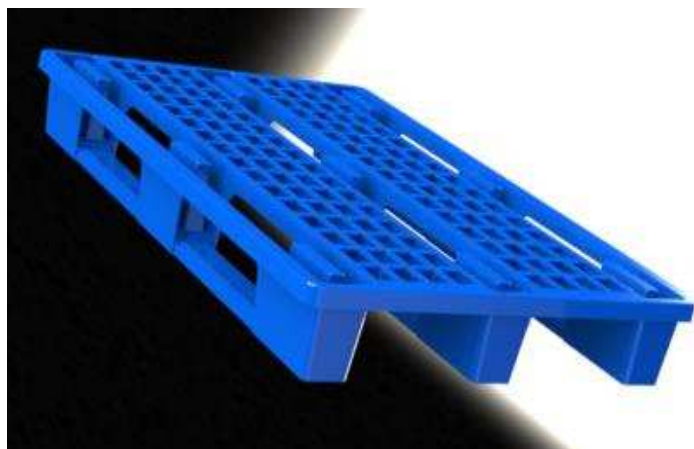
Sealing Collar





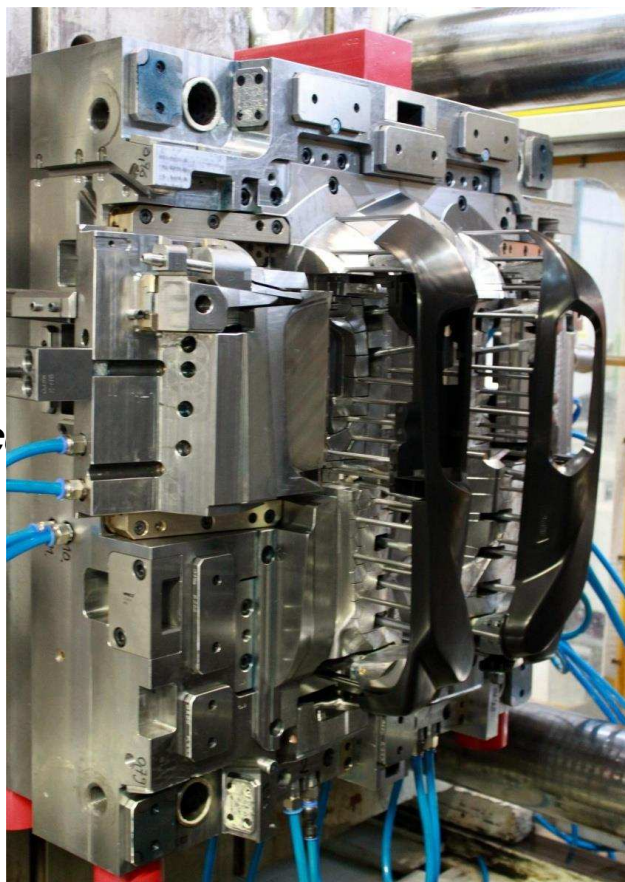


SPACEBOX
SYSTEMY OPAKOWAŃ W LOGISTYCE



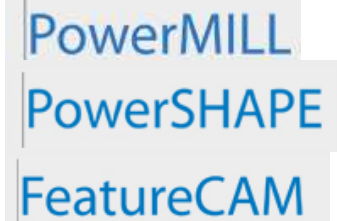
DEPARTMENTS:

-  **Design and Developement Office**
-  **Planning and management team**
-  **Plastic flow simulation unit**
-  **Technologists and programmists offic**
-  **Spark erosion unit**
-  **Toolsmith unit**
-  **Quality unit**
-  **Injection mould warehouse**



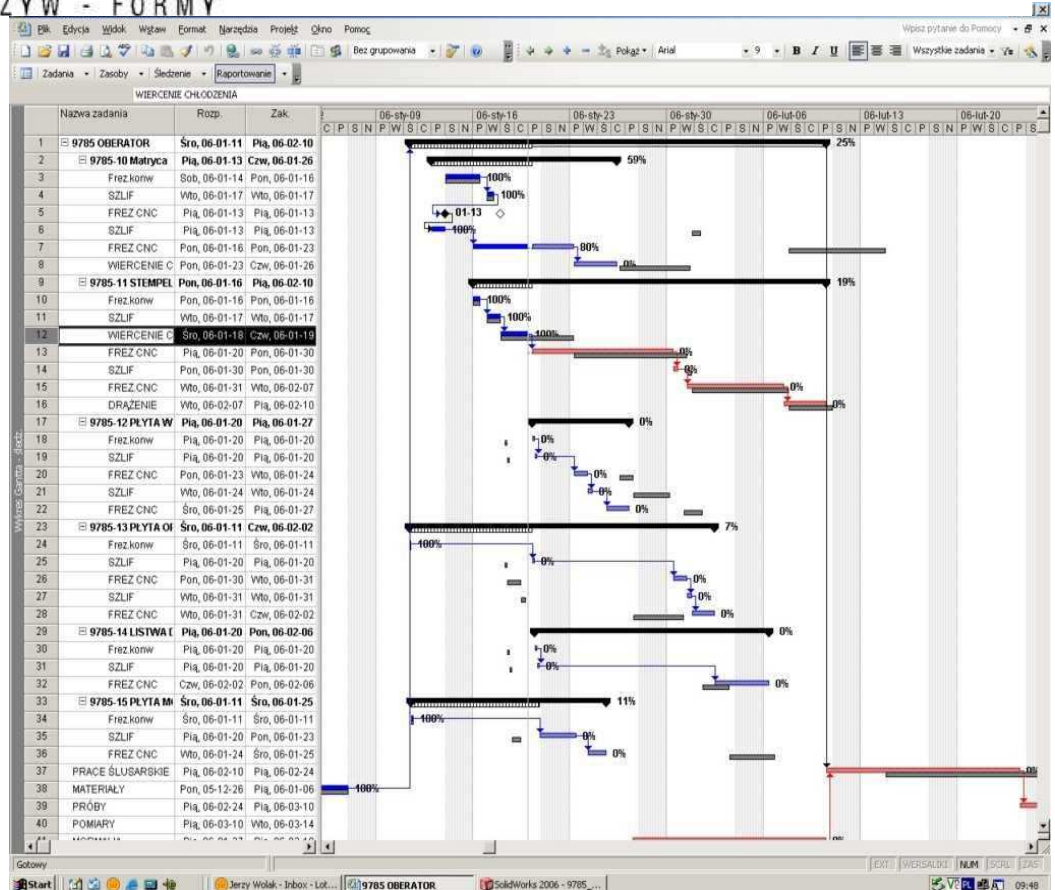


Siemens PLM Software



PROJECT MANAGEMENT

- Each project is managed by one project leader
- Planning in Microsoft Project System



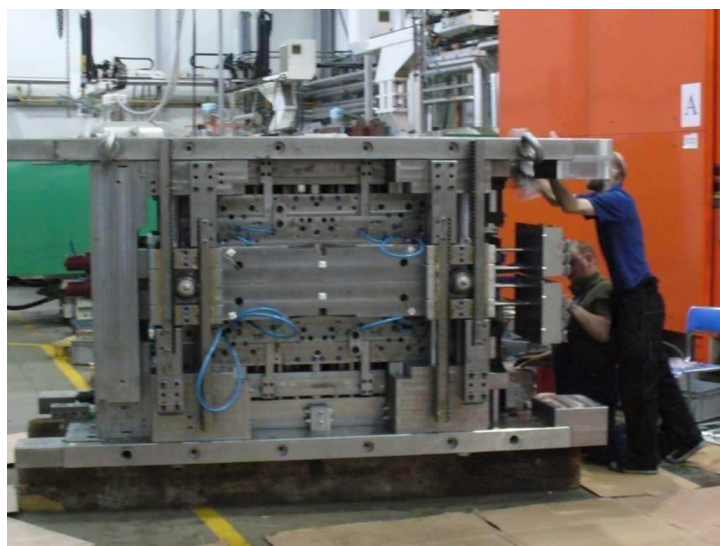
**MOULD
MANUFACTURING**

*Manufacturing of the moulds with
maximum weight up to 30 Tons*



Machines in toolshop:

- *3-Axis CNC Milling machines*
- *5-Axis CNC High precision milling machines*
- *Turning machines*
- *Grinding machines*
- *EDM + Electrods making (11 pcs.)*



3-AXIS MILLING MACHINES

1.	HARTFORD HEP-3150 SG	3250x1500x1040 mm
2.	HARTFORD HV-70	1500x780x500 mm
3.	FADAL VMC 6030	1500x750x650 mm
4.	FADAL VMC 4020	1015x500x500 mm
5.	HASS VM-3	1016x660x635 mm
6.	DECKEL MAHO 103V	1000x600x600 mm
7.	HARTFORD VMC 850	850x510x510 mm
8.	MAZAK FJV-20	560x980x500 mm
9.	HASS/MIKRON VCE 500	500x300x250 mm



5-AXIS MILLING MACHINES:

1.	MAHO DECKEL DMU 70 EVOLUTION	790x600x520 mm
2.	MAHO DECKEL DUO BLOCK 100P 125T	1000x1000x1000 mm
3.	FIDIA K214	2850x1250x1400 mm

4-AXIS MILLING MACHINES:

1.	CME FS2	2000x1000x1000 mm
2.	MAHO DECKEL DMU 125T	1250x880x800 mm
3.	MAZAK VTC-20B	1120x510x510 mm

INTEGRATED MILLING CENTER:

1.	Mazak Integrex 200 IV S	fi 660x1045
----	-------------------------	-------------

LONG CHANNELS DRILLING MACHINE:

IXION TLF 1004 4-AXIS	(2000 x 2000 x 800 mm)
-----------------------	------------------------

DEPTH EROSION MACHINES (EDM):

1.	SURE FIRST 1080EDM	970x800x505 mm
2.	CHARMILLES ROBOFORM	900x600x450 mm
3.	SODICK AQ 75L	700x500x350 mm
4.	SURE FIRST CNC420	600x300x300 mm
5.	CHARMILLES D420	400x250x150 mm
6.	EDEC 40 EROMEX	400x250x150 mm
7.	EDE 40	400x250x150 mm
8.	SODICK AM 3L	300x200x250 mm

WIRE EROSION MACHINES:

1.	JAPAX LDM 150	1500x600x300 mm
2.	JAPAX LDM 100	1000x600x300 mm
3.	FANUC ROBOCUT OC-1C	500x500x395 mm
4.	SURE FIRST DW432	400x300x200 mm

Milling Electrodes:

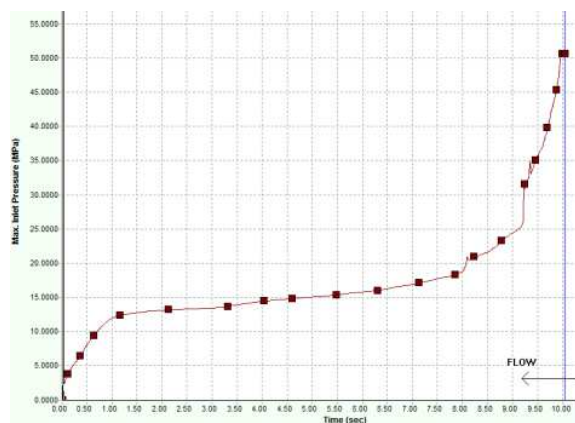
1.	HAAS MINI MILL	400x300x250 mm
2.	SURE FIRST MG860	1000x400x600mm
3.	MAZAK IMPULS	300x200x250 mm



PRZETWÓRSTWO TWORZYW - FORMY

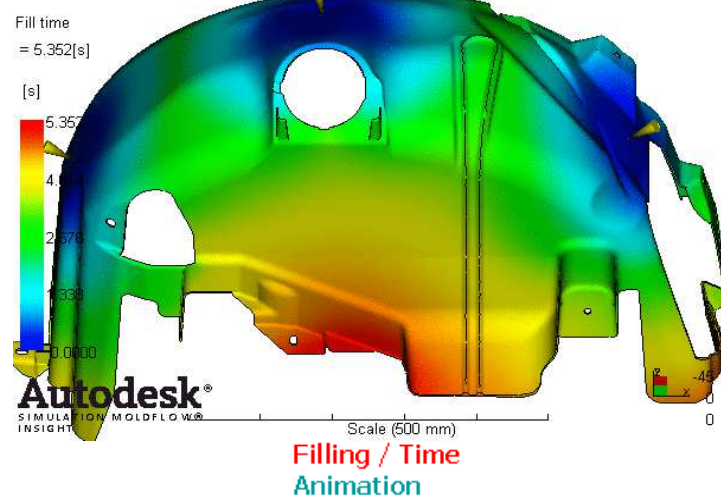
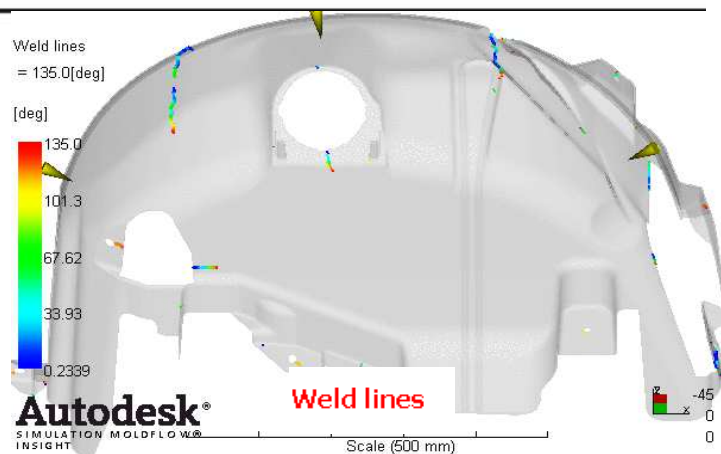


Clamping force curve



Pressure curve during the filling stage

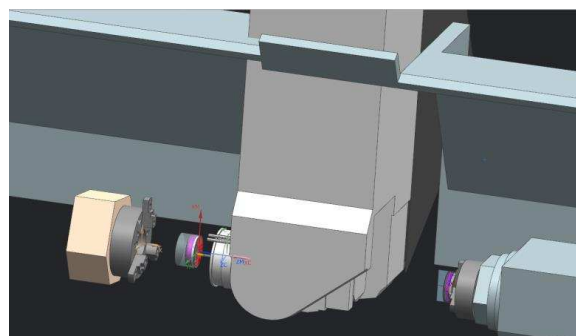
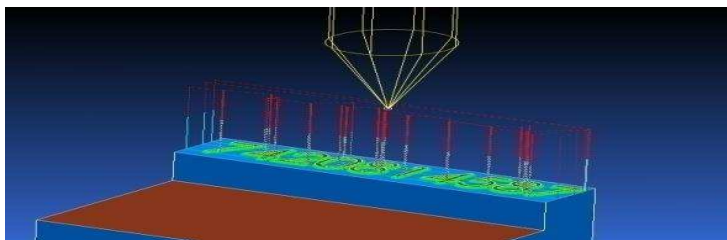
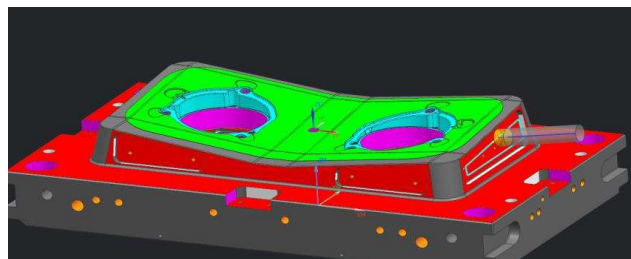
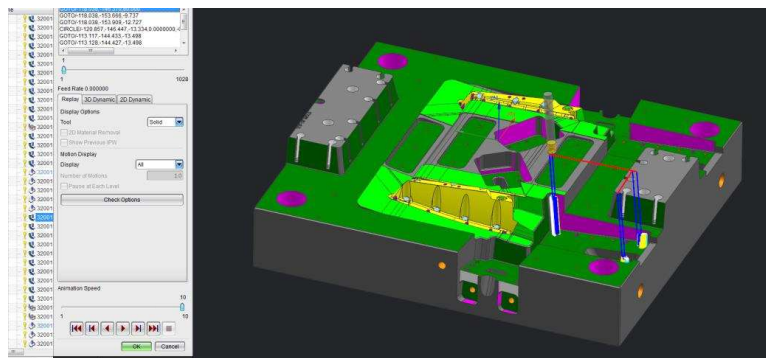
Max = 50 MPa



PRZETWÓRSTWO TWORZYW - FORMY

Making of programs for milling in CNC machines

(3 - Axis, 4 - Axis, 5 - Axis)



Simulation programs for Multi-Tasking Machines

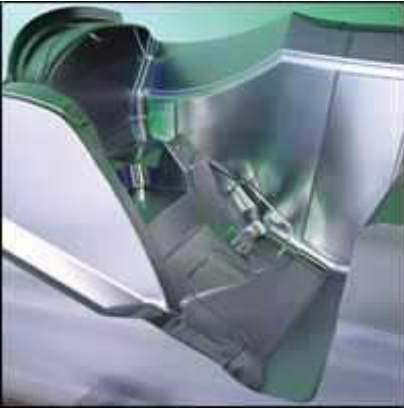
FP Making of program for engraving in CNC milling machine

 *Design and making of electrode for spark erosion*

 *Making of program for wire erosion*

 *Design of device for milling machine for serial production.*





3-Axis



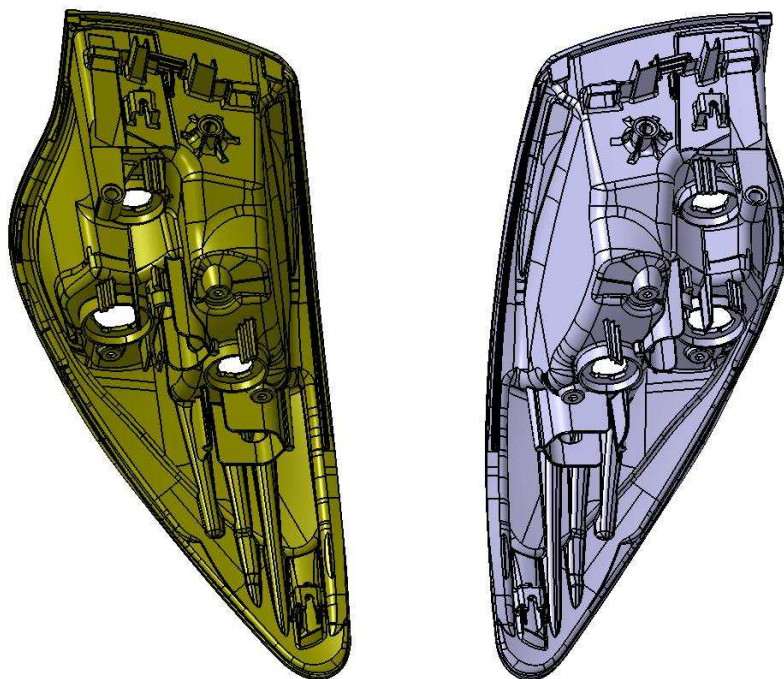
5- Axis



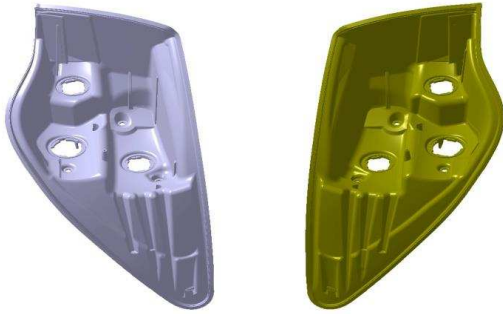
**Multi-Tasking
Machines**

FROM CONCEPT TO REALISATION – Project Car lamp

- 1) *Technical design concept*
- 2) *3D file of the injected part*
- 3) *Plastic flow simulation*
- 4) *3D file of injection mould*
- 5) *Timing schedule*
- 6) *Injection mould book*
- 7) *Manufacturing of the mould*
- 8) *Measuring of the mould*
- 9) *Testing*



3D files of the parts



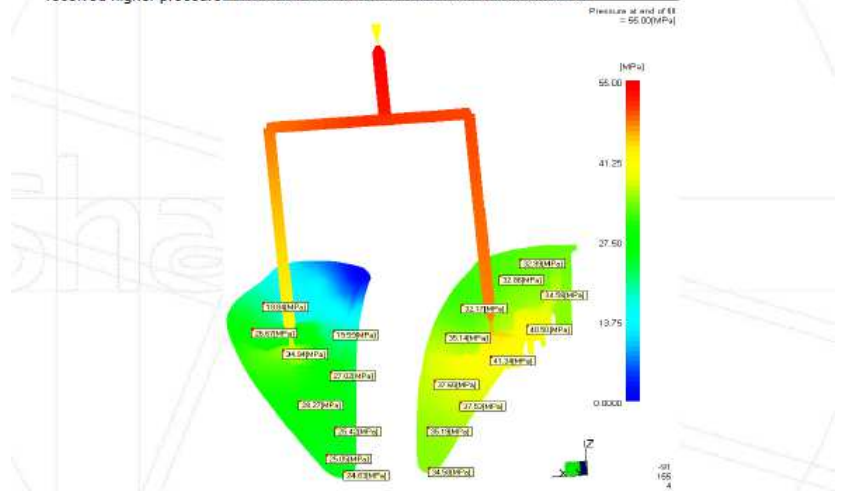
3D of injection mould



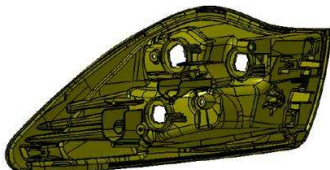
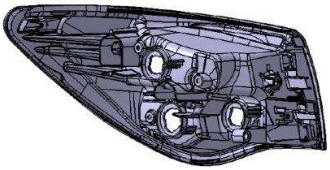
Plastic flow simulation

D- FILLING ANALYSIS-pressure

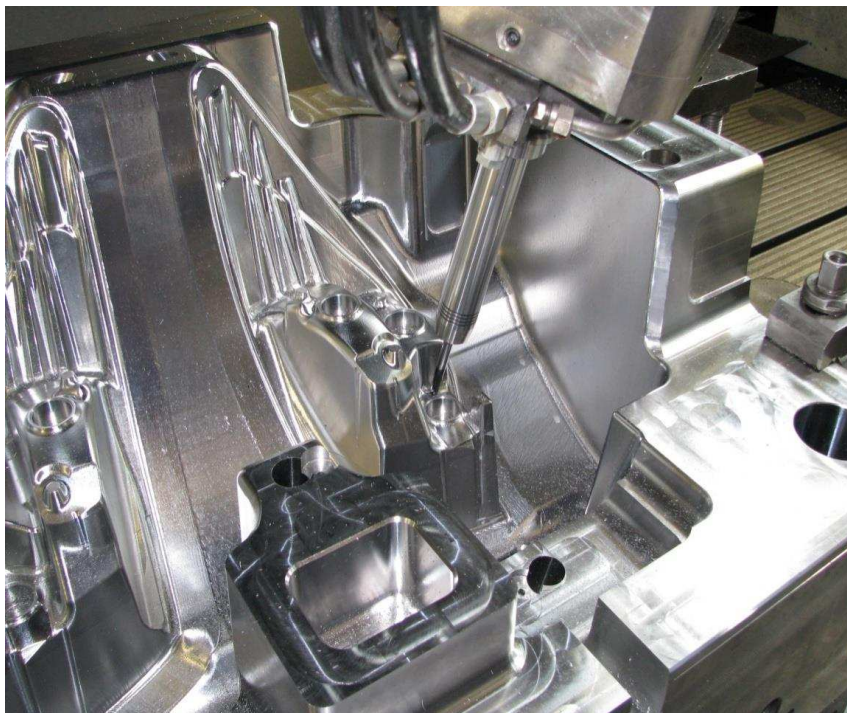
On below picture you can see results of pressure. Pressure for part like that is normal. On the right part was received higher pressure. To solve this problem we can close nozzles earlier



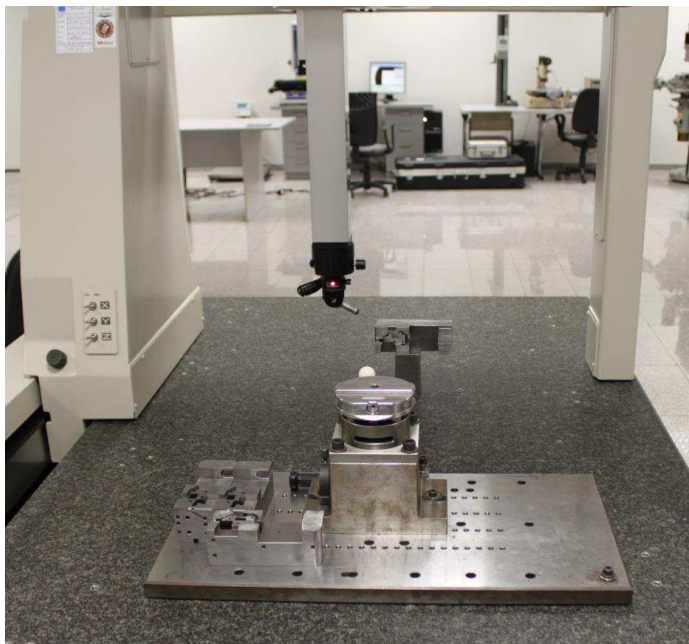
Injection mould book

		TECHNICAL DATA		N° 8527	
Customer		Customer's ref. number: xxxxxxx			
LB1A-3716040/041 Right/Left					
					
					
Approved					
Created			A	07-05-2011	
NAME :	SIGNATURE :	ISSUE :	DATE :		

Manufacturing of the mould

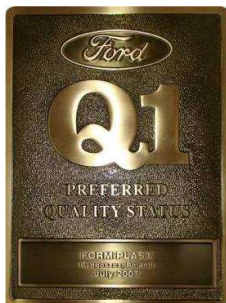


Measurements



Samples





- *Q1 AWARD since 2007*



- *ISO/TS 16949:2009*



- *ISO 14001:2004*
- *PN-N-18001:2004*

KEY PERFORMANCE INDICATORS for 2014:

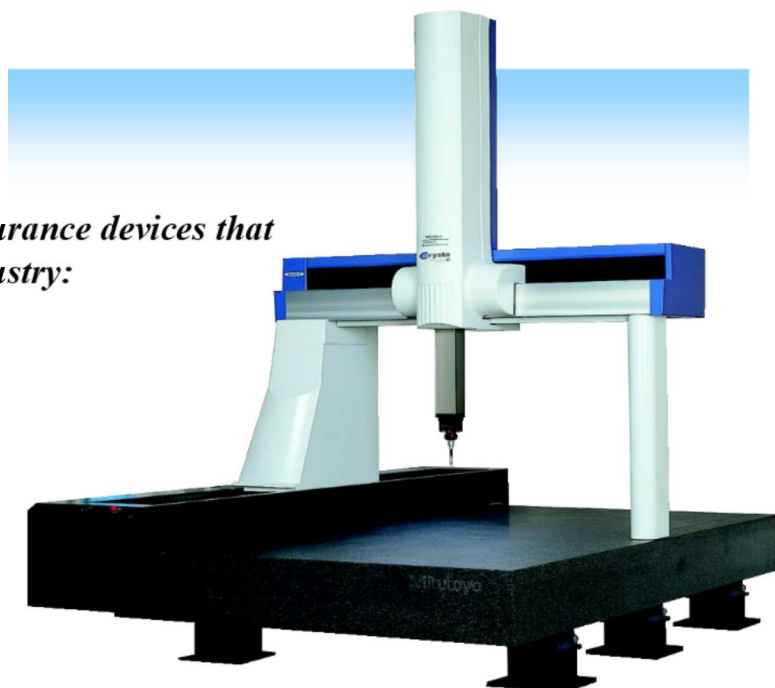
quality performance PPM = 19

delivery performance 99,92%

EQUIPMENT:

FORM-PLAST S.A. is equipped with 250 quality assurance devices that guarantee effective measurements for automotive industry:

- 3D-Measuring machine Mitutoyo
- Slide caliper
- Micrometer
- Microscope
- Highmeter
- Glossmeter
- Dynamometer
- Digital weight
- Special tools for securing special factors or part functioning areas
- other devices used in injection, painting, assembly and toolshop departments

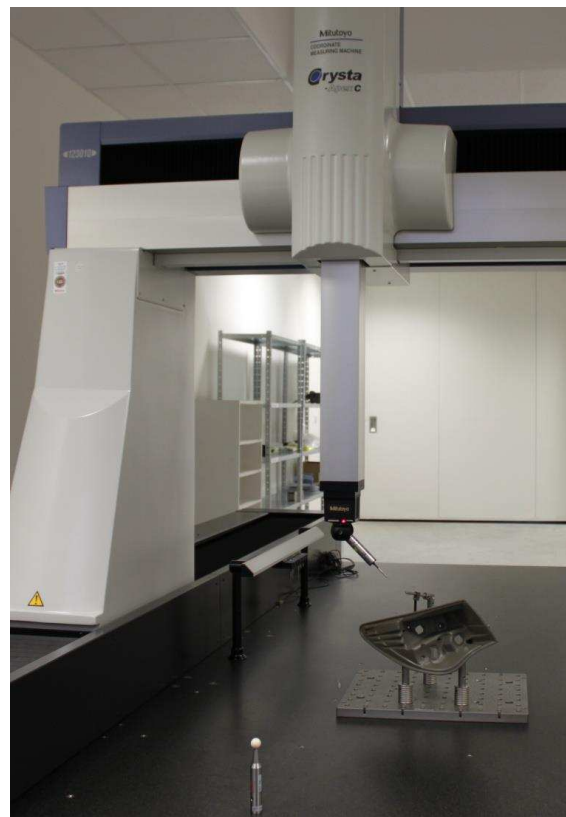


Mitutoyo

New CNC CMM with laser scanning

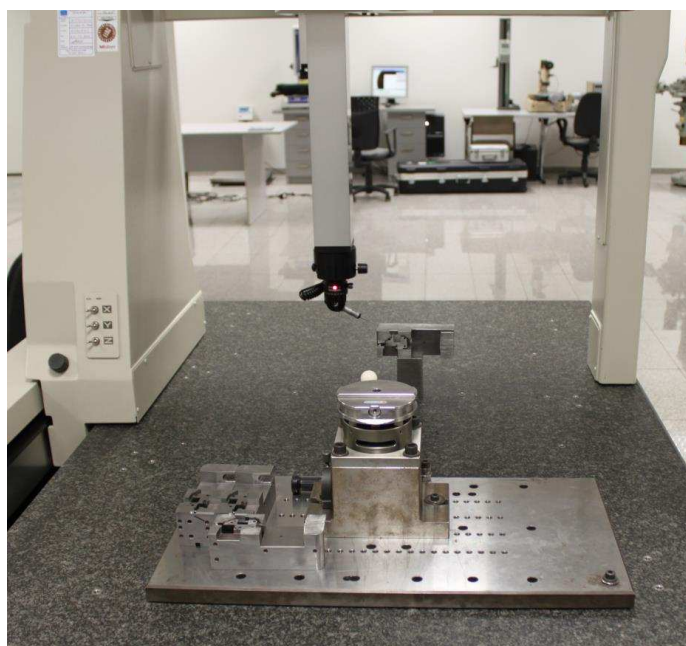
Ranges in axis:

*X1200*Y3000*Z1000mm*



Mitutoyo

Manual CMM Mitutoyo M7106



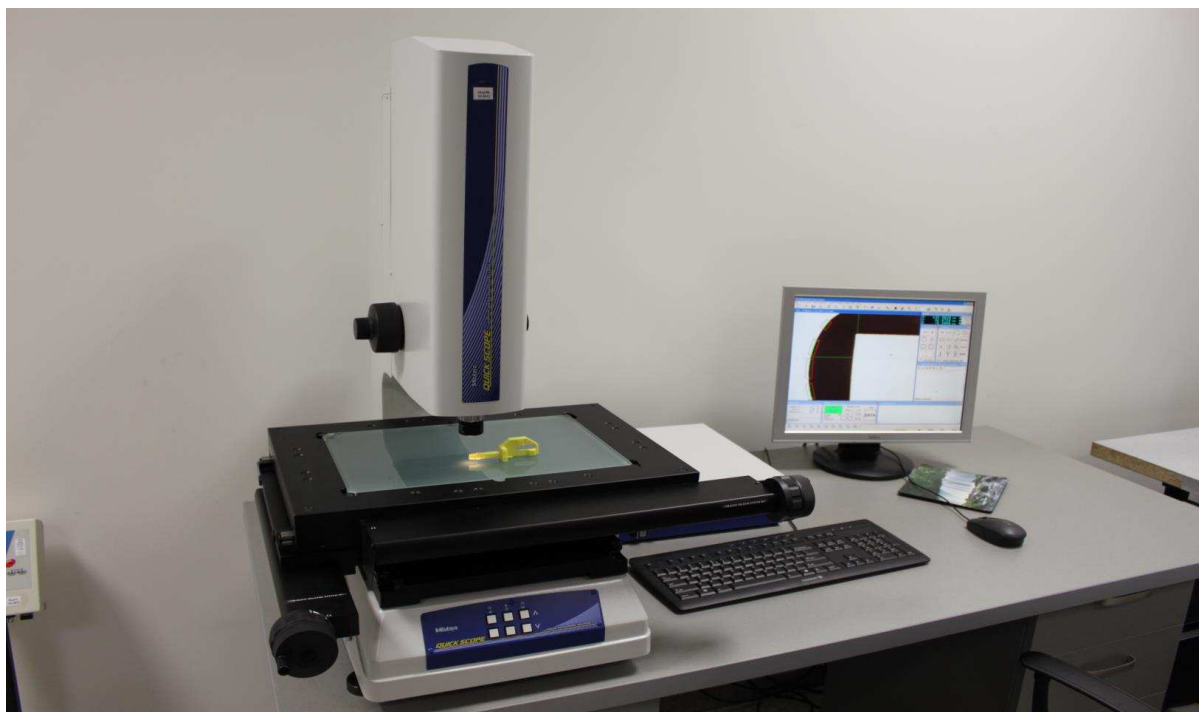


Measurement arm with digital handheld laser scanners



Mitutoyo

Microscope – dimension and angle measurement





Roughness measurement



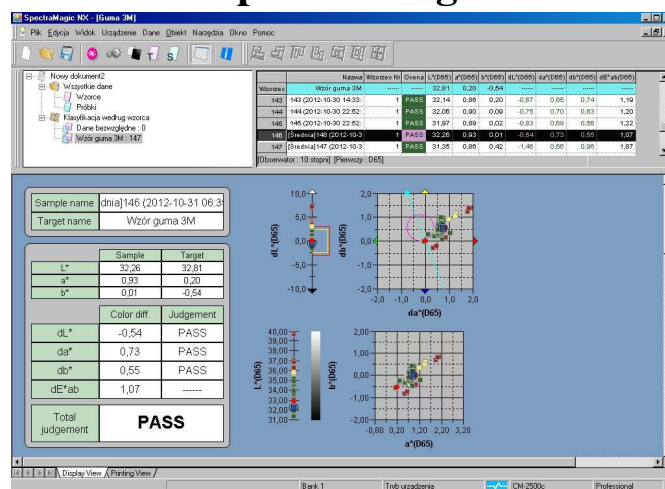
Colour inspection



Spectrophotometr 2500c with 45/0° geometry, is a portable, hand-held equipment designed to measure, match and control the colour of small, irregular surfaces as well as substrates with grain and texture.

Conformity with Volkswagen standards.

Software – Spectra Magic Pro



Gloss inspection Microgloss Elcometer

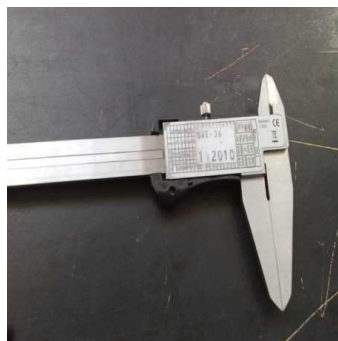


Dynamometer Push – pull test



We have computer system for monitoring of measuring devices as follows:

- tracking of control dates of standard measuring devices
- identification of measuring devices with internal register
- the program includes all measuring devices used in FORM-PLAST.



Nazwa przyrządu	Nr ewidencyjny	Nr fabryczny	Zakres pomiarowy	Dokładność
Blok testowy twardości				
Blok testowy twardości	Ppk/09	EP982771260		1
Cyfrowy miernik siły nacisku i rozciągania				
Cyfrowy miernik siły nacisku i rozciągania	Ppk/102	232606	0-500	+/-0.2
Cyfrowy miernik wilg. i temp.				
Cyfrowy miernik wilg. i temp.	Ppk/39	26	nie dotyczy	1
Czujnik diatest				
Czujnik diatest	Cdz/56	117366	0-0,08	0,01
Czujnik diatest	Cdz/59	b/n	0-0,8	0,01
Czujnik diatest	Cdz/57	XC418249	0-0,8	0,01
Czujnik diatest	Cdz/60	70062144	0-0,8	0,01
Czujnik diatest	Cdz/58	70042086	0-0,8	0,01
Czujnik diatest	Cdz/71	90206134	0-0,8	0,01
Czujnik diatest	Cdz/72	90504908	0-0,8	0,01
Czujnik dźwigniowo-zębaty				
Czujnik dźwigniowo-zębaty	Cdz/03	9K0301	0-0,8	0,01
Czujnik dźwigniowo-zębaty	Cdz/21	99G794	0-0,8	0,01
Czujnik dźwigniowy				
Czujnik dźwigniowy	Cdz/06	b/n	0-10	0,01
Czujnik dźwigniowy	Cdz/12	951 0104	0-10	0,01

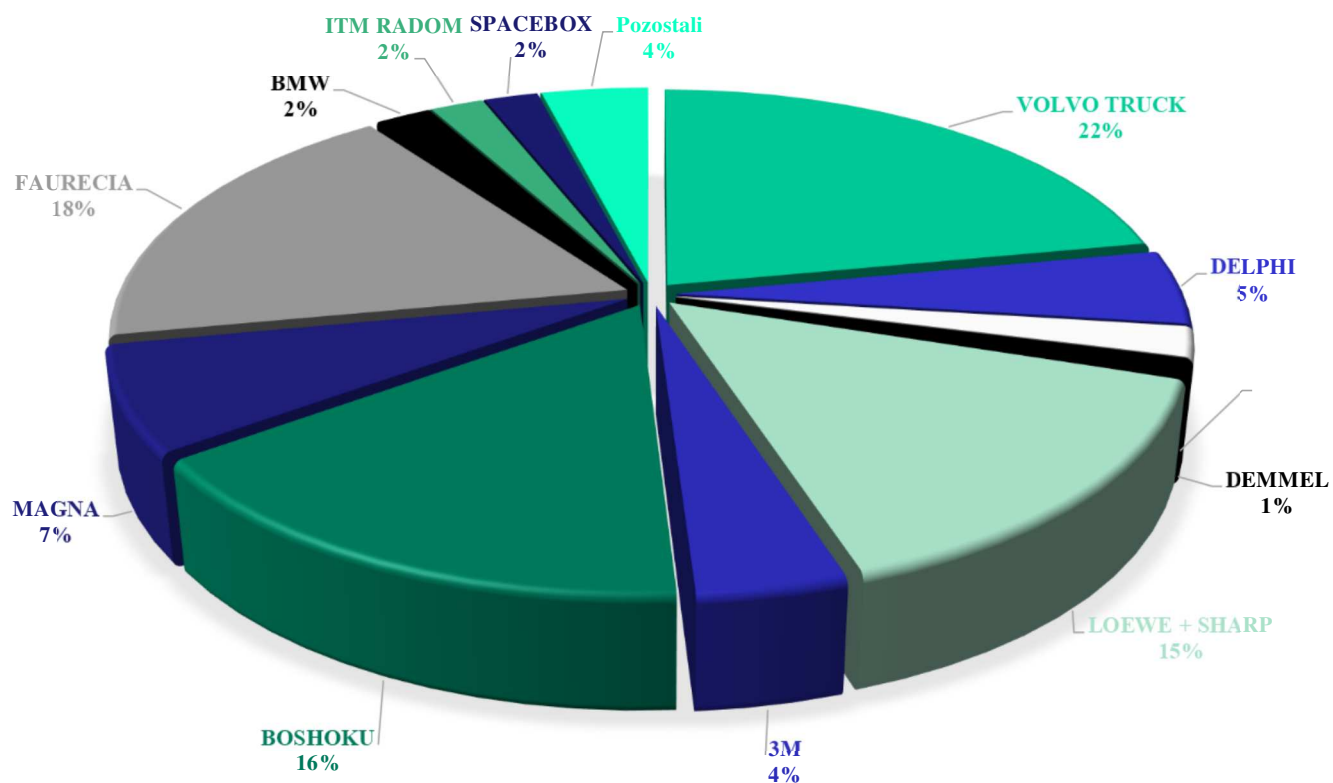
Quality audits in 2008-2010:

Date	Company	Audit scope	Result
27-05-2008	Johnson Controls	Quality System Audit	Green
07-11-2008	Volvo 3P	Process Audit	Positive
18-12-2008	Skoda / VW	Audit VDA 6.1	93% (class A)
30-04-2009	PZL Mielec	Quality System Audit	Positive
17-09-2009	Scania	Quality System Audit	Positive
02-12-2009	Tensho Poland Corp.	Process Audit	86% (Green)
15-12-2009	FIAT	Quality System Audit	89% (Green)
09-02-2010	Johnson Controls	Quality System Audit	88%
01-09-2010	Tyco Electronics	Quality System Audit	84% (class B)
24-11-2010	LG Electronics	Process Audit	85,3% (class A)
08-12-2010	PAS	Process Audit	92% (class A)

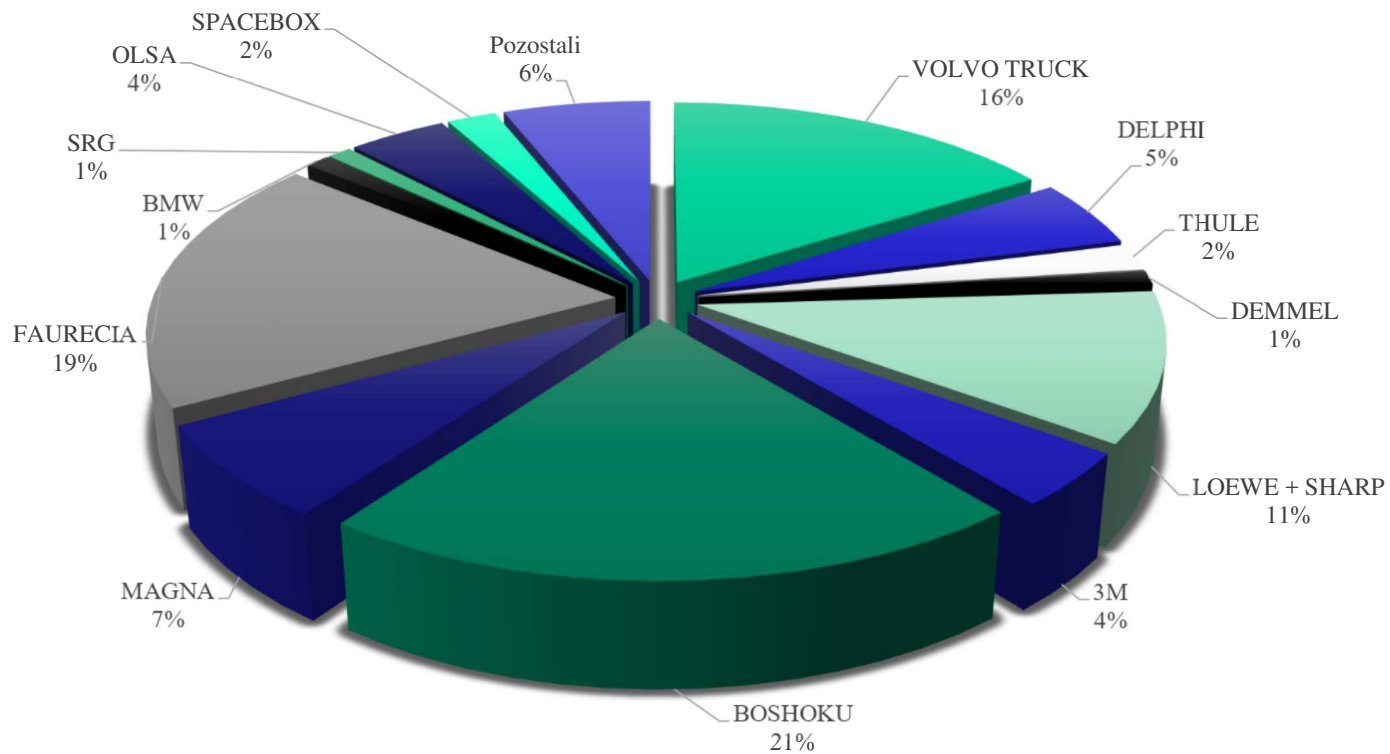
Quality audits in 2011-2015:

Date	Company	Audit scope	Result
07-02-2011	Delphi Thermal	Process Audit	94,7% (Green)
17-03-2011	Scania	Quality System Audit	Positive
12-03-2011	Magna	Quality System Audit	91% (Green)
29-04-2011	Husqvarna	Quality System Audit	98% (class A)
23-08-2011	Peguform	Quality System Audit	Positive
31-08-2011	LG Electronics	Quality System Audit	80% (class B)
07-11-2011	LG Electronics	Technical Audit	85% (class B)
08-02-2012	BMW	Quality System Audit	Positive
01-03-2012	3M	OHSAS audit	97,6% (class A)
27-03-2012	Faurecia	Quality System Audit	80% (class B)
15-05-2012	Boshoku	Quality System Audit	90% (class A)
16-05-2012	3M	Quality System Audit	Positive
04-10-2012	SRG Global	Quality System Audit	95% (class A)
28-11-2012	Boshoku	Process Audit	95% (class A)
31-01-2013	Loewe	Process Audit	80,5% (class A)
19-03-2013	Diehl Controls	Proces and System Audit	91% (class A)
20-05-2013	3M Argentina	Proces Audit	Positive
12-11-2013	Delta Tech	Proces audit	80% (class AB)
17-12-2013	Delphi	Audit MCA	93% (Green)
28-04-2014	OLSA	Audit procesu	97% (class B)
09-05-2014	FIAT	Audit procesu	81% (Green)
22-04-2015	Volkswagen	Audit procesu	90% (A)
18-09-2015	3M	Audit systemu	positive

Główni odbiorcy w 2012-2013r.



Główni odbiorcy w 2014 r.



*We hope that this presentation will
encourage you to enter into
cooperation with Form-Plast S.A.*

form-plast@form-plast.com.pl



Tel: +48 052 3703300