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Engenharia de Manufatura – Body Systems

FLEX FIXTURE STRATEGY IMPLEMENTATION

ME QUALITY ASSURANCE



FLEX FIXTURE STRATEGY

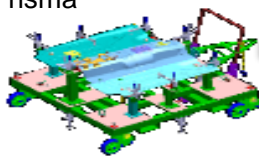
BSO Asm

Past

Onix

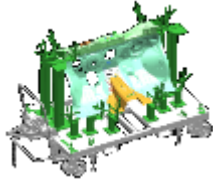


Prisma



Dedicated HF = CMM Measurement / Portable arm

CVER ASM

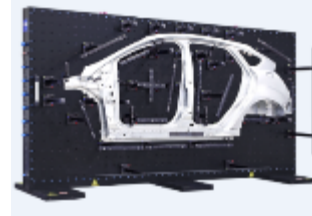


MP (New Scope)

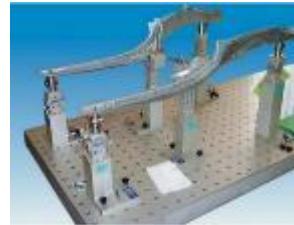


No dedicated HF = Trouble Shooting in free state (Helix system)

Vertical Base Grid



Horizontal Base Grid (2x)



Current

RPS/Datum



Storage

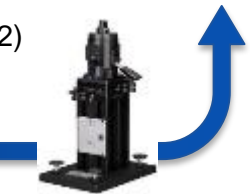


Base Grid Reuse:

All new programs
legacy adaptation
Stamped Parts

RPS Reuse:

All P&A
New Asm/ Parts
Plant space savings (48m2)



RPS/Datum

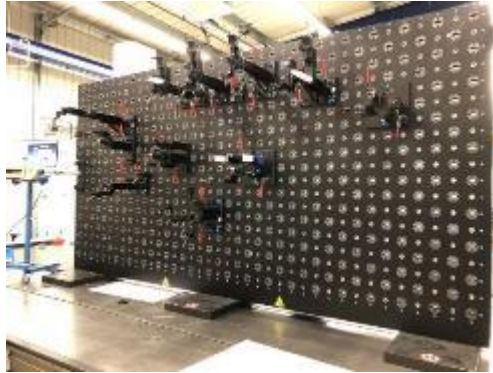
MP "Trouble Shooting"

ScanBox 7260 (Measurement)

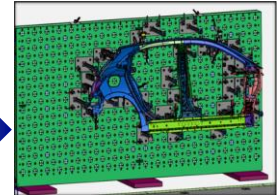
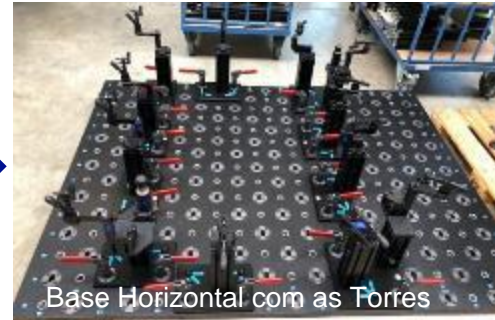
CHECKING FIXTURES EXAMPLES

Supplier: Carl Zeiss Fixtures Systems GMB

Vertical
base

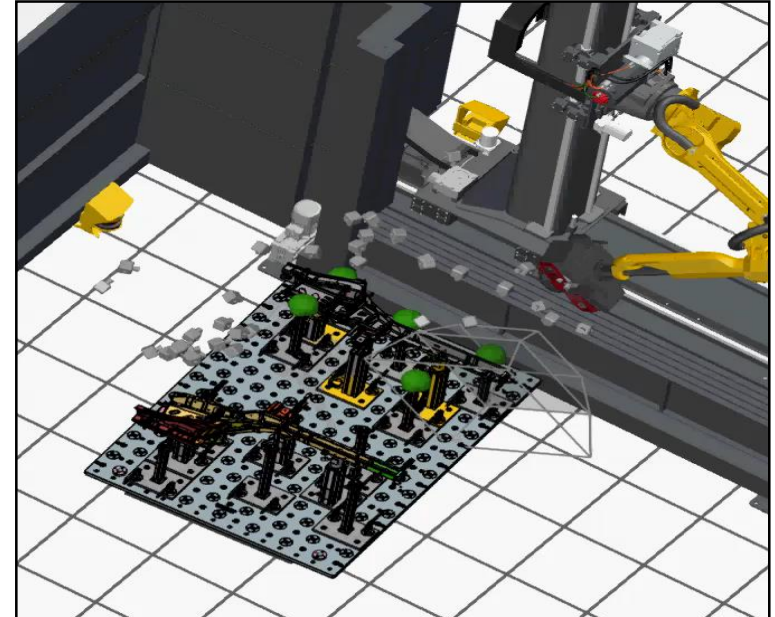
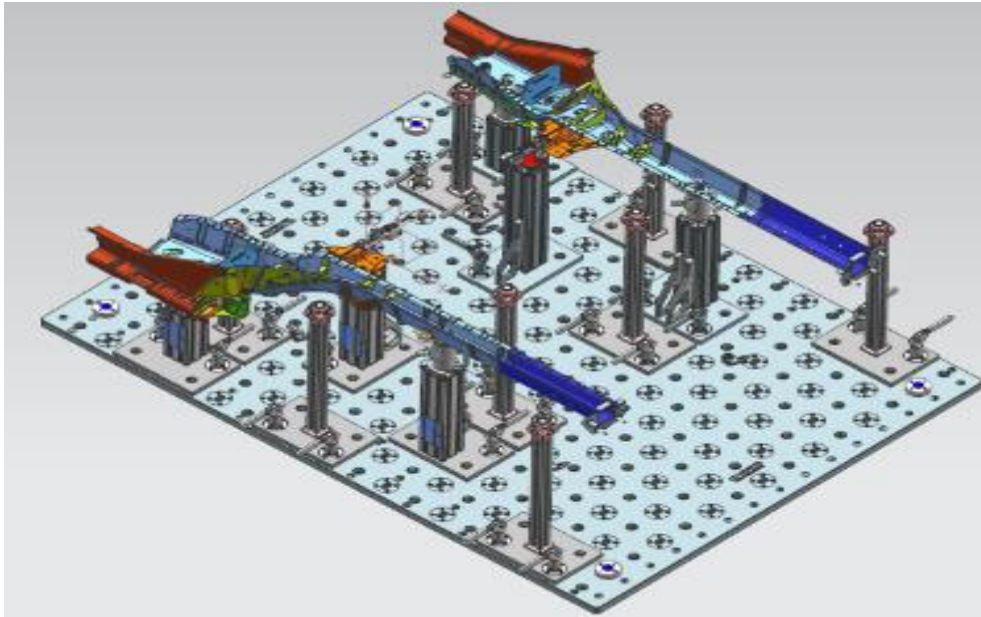


Horizontal
base



GEM FLEXIBLE HOLDING FIXTURE FOR SUBS

Implemented Flexible Holding Fixture for Subs (scan box measurement system equipment) to be stored in small cabinet, reducing storage space at plant floor.



BENEFITS

- Smaller storage space;
- Easy/fast to position the units;
- Flexibility & Accuracy;
- Horizontal/Vertical base reuse for future programs;

FLEX FIXTURE IMPLEMENTATION EQUIPMENT MEASUREMENT CAPACITY

VIRTUAL ANALYSIS

VIRTUAL SCANBOX, GD&T AND MATH DATA VALIDATION



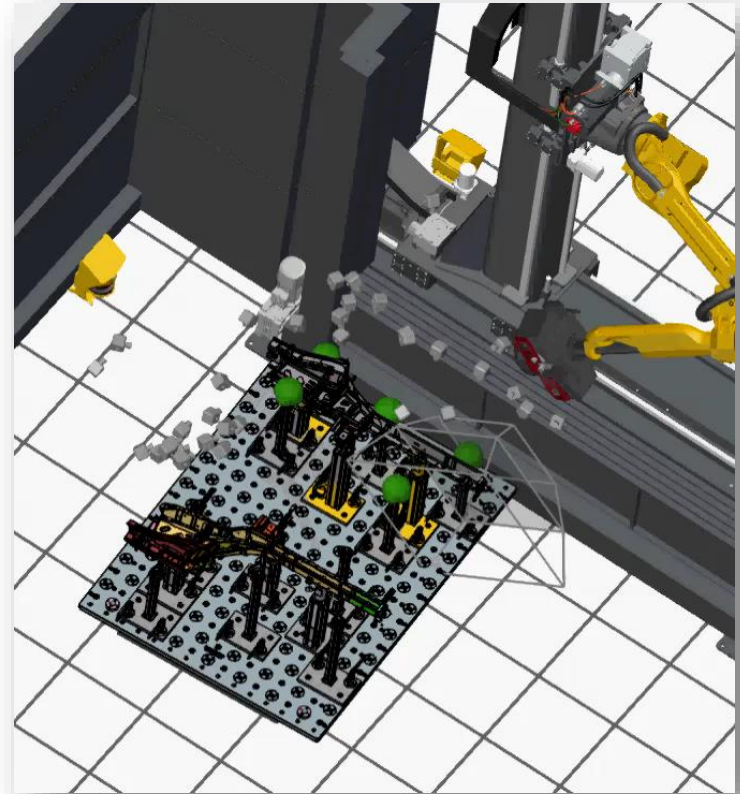
VIRTUAL ANALYSIS

GOM VMR SOFTWARE

The positions for the Scanbox camera(gray squares) are created to capture all the matching areas and important spots in the product.

If there is any problem in this measurement we evaluate what can be done and the best solution for each case.

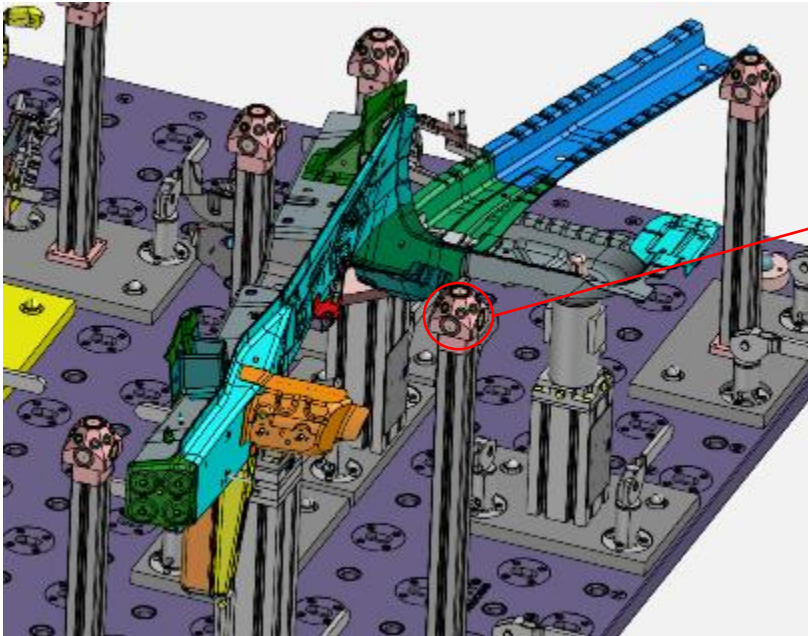
For solution examples, some additional reference towers can be positioned to add some virtual targets, the height of the fixture can be changed or a more deep project change can be needed, in some cases.



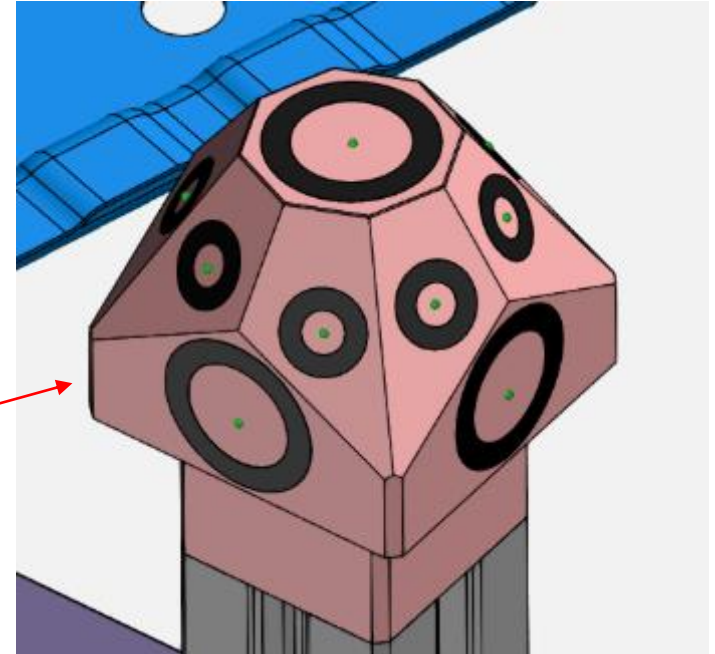
Video 1 – Scanning simulation

VIRTUAL ANALYSIS

After the fixture is pre-projected by supplier, all math data needs to be imported to the Scanbox software where all the analysis is done.



SUV Front rails example



Reference towers with targets (green)

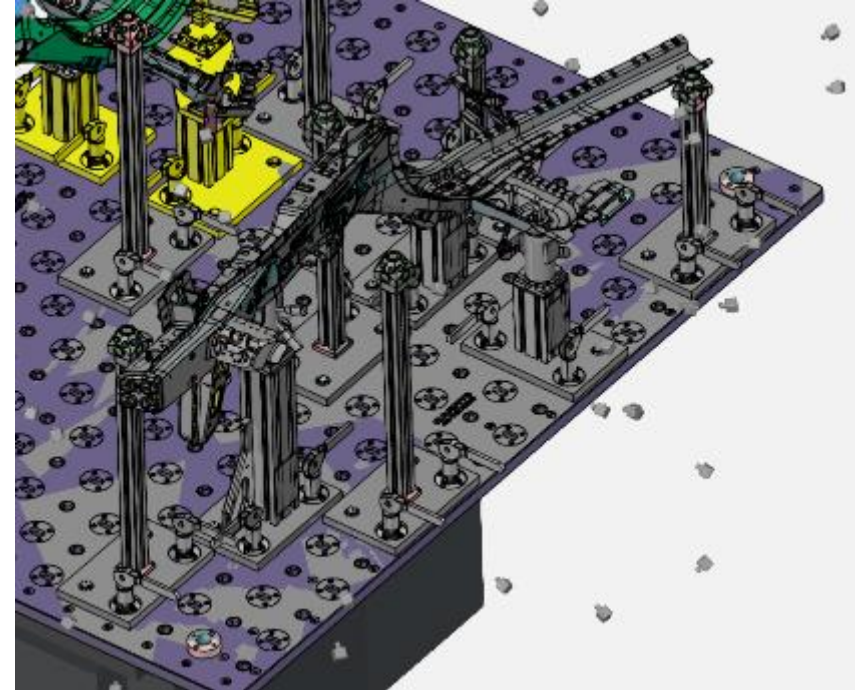
- The virtual targets(Reference adhesive points) are created and set to be considered as the reference by the scan (green points).

VIRTUAL ANALYSIS

OUT COMES TO SUPPLIER

If no change is needed, supplier can go ahead with the construction. If some kind of improvement is needed, then the Scanbox analysis is done with the new math model of the fixture, to validate it.

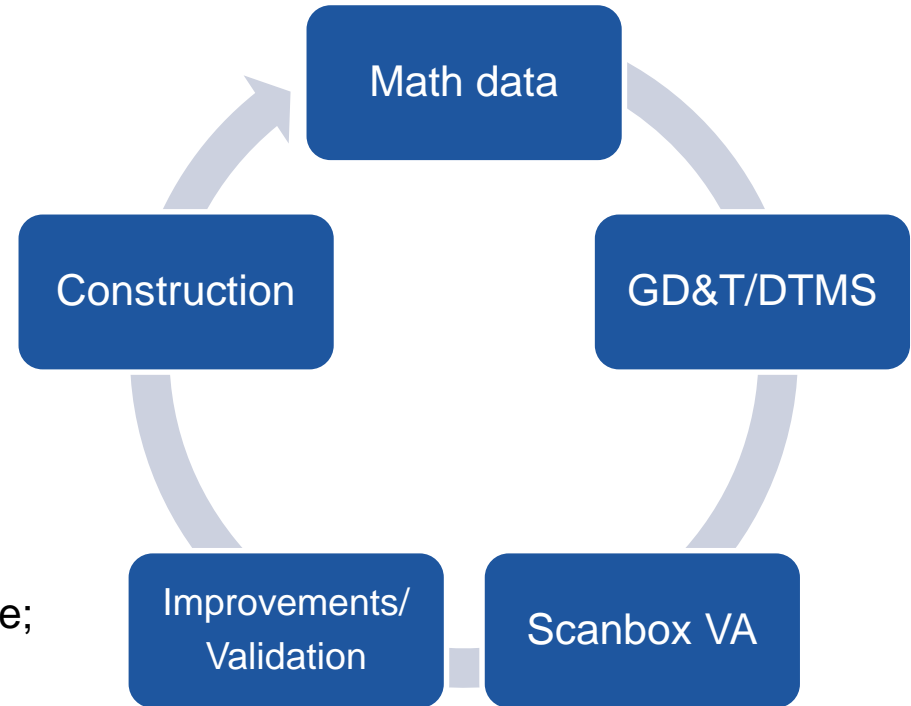
In the final math model, Datums and GD&T are also evaluated and if some kind of issue is found, the corrections are maiden.

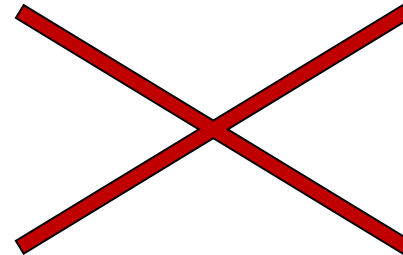
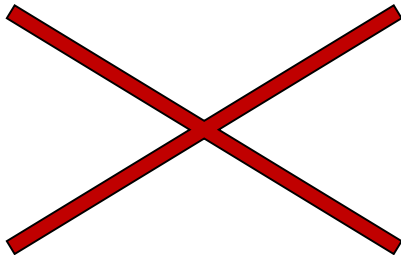
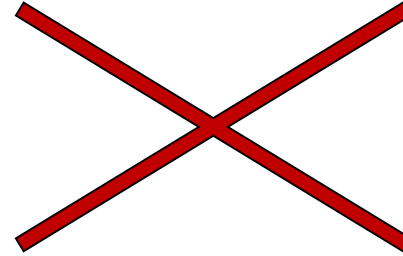
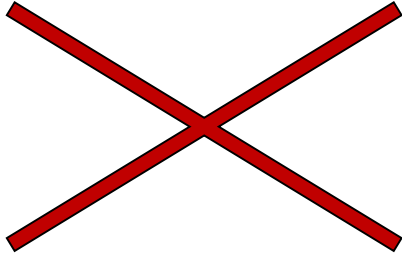


Picture 5 – Scanned area example (gray)

BENEFITS:

- Robust fixture from the beginning;
- Validation of Scanbox measurement;
- All the important surfaces/points in each product captured, to evaluate its quality;
- Capture all fixtures interference in advance;
- No reworks, no additional cost.





FLEX FIXTURE IMPLEMENTATION

SCAN BOX INITIATIVES

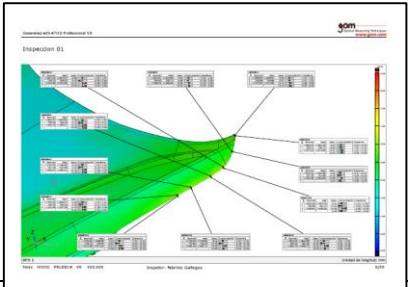
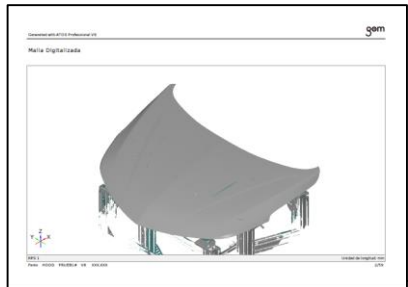
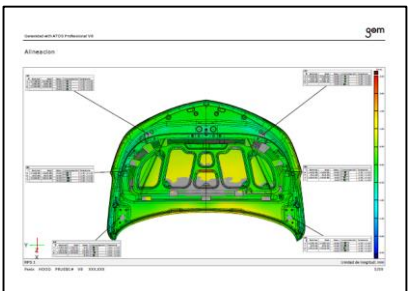
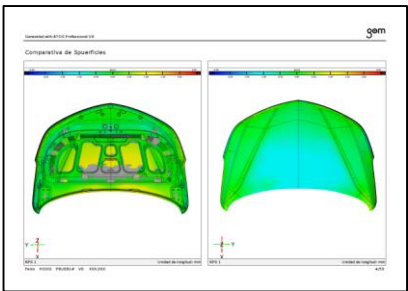
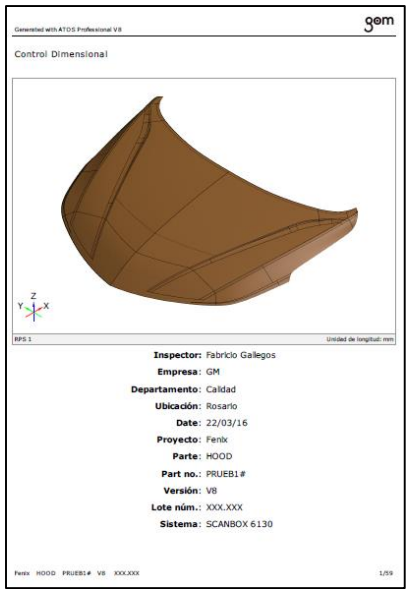


Measurement Report Customization

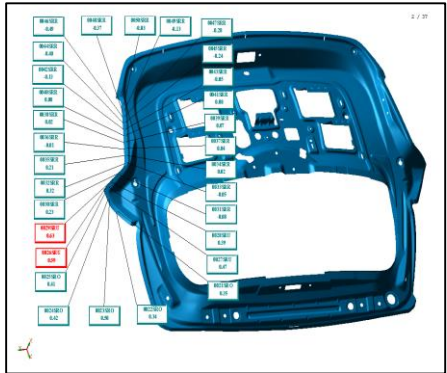
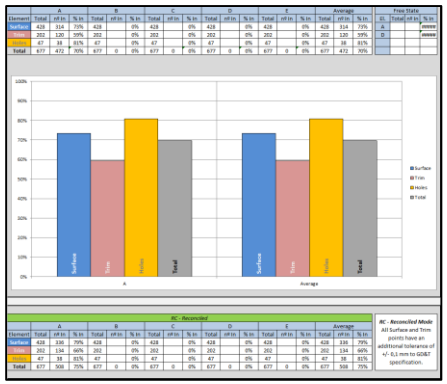
Scope: Customize Measurement Report customization to replace current CMM Measurement Reports of Stamped and Injected Parts

From

To



2253TLD									
	NOMINAL	MEAS	+TOL	-TOL	DEV				
AX	3329.85	3330.21	0.5	0.5	0.36				
X	-494.78	-494.81	0.5	0.5	-0.03				
Y	-490.89	-491.56	0.5	0.5	-0.67				
Z	359.89	359.68	0.5	0.5	-0.29				
T	0	0.37	0.5	0.5	0.37			pass	
2254TLD									
	NOMINAL	MEAS	+TOL	-TOL	DEV				
AX	3330.77	3331.03	0.5	0.5	0.26				
X	-490.89	-491.56	0.5	0.5	-0.67				
Y	-490.89	-491.56	0.5	0.5	-0.67				
Z	356.2	356.18	0.5	0.5	-0.02				
T	0	0.67	0.5	0.5	0.67			fail	
000LKR									
	NOMINAL	MEAS	+TOL	-TOL	DEV	In-Plane			
AX	3120.63	3120.77	0.75	0.75	0.13			pass	
X	351.75	351.73	0.75	0.75	-0.02				
Y	1173.51	1173.87	0.75	0.75	0.36				
Z	14	14.1	0.1	0.1	0.1			Diam pass	
D	0	0.2	0.75	0.75	0.2	6.327		LOC pass-B	
T	0	0.14	0.75	0.75	0.14	0.578		BONUS	0.05
000LKR									
	NOMINAL	MEAS	+TOL	-TOL	DEV	In-Plane			
AX	3121.22	3121.39	0.75	0.75	0.17			pass	
X	384.5	383.93	0.75	0.75	-0.57				
Y	1265.35	1265.33	0.75	0.75	-0.02				
Z	13.2	13.2	0.1	0.1	0			Diam pass	
D	0	0.14	0.75	0.75	0.14	0.578		LOC pass	
T	0	0.14	0.75	0.75	0.14	0.578		BONUS	0



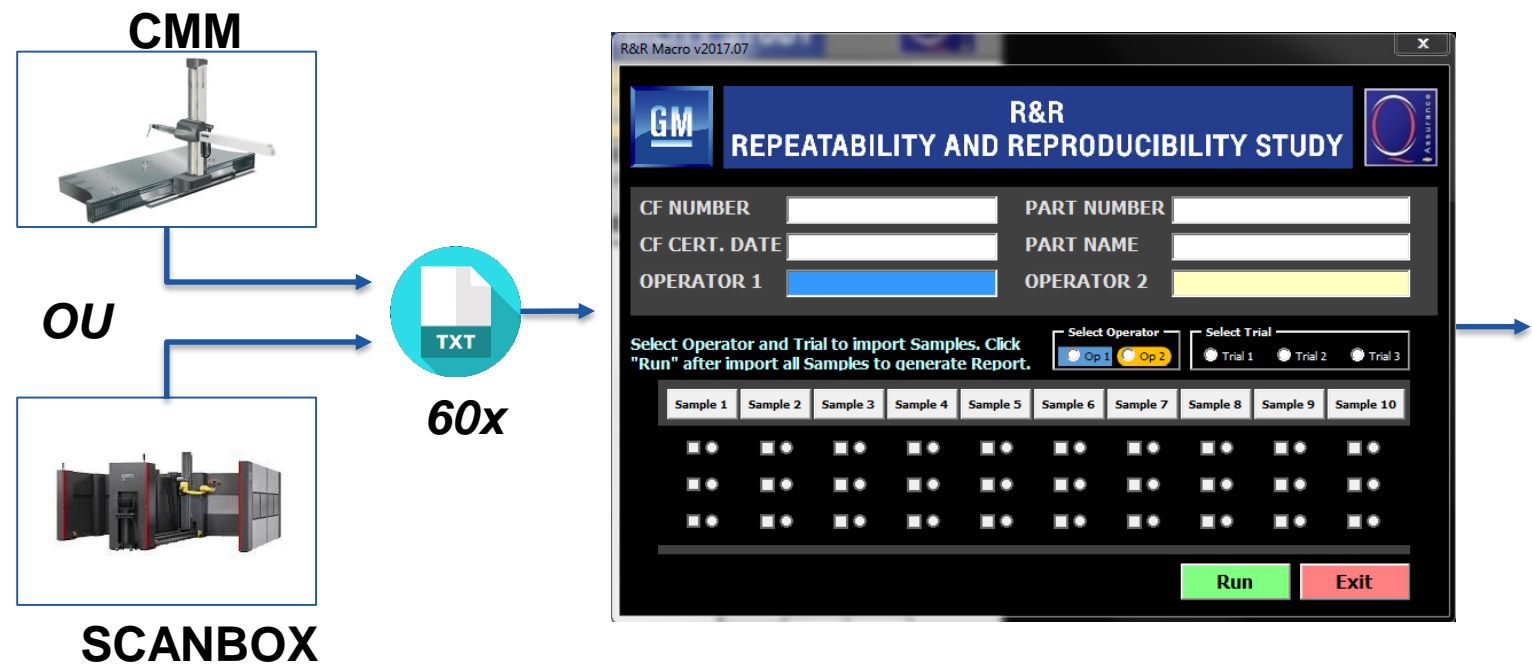
Automatic R&R and Capabilities Measurement

Scope: Create special routines to automatically perform R&R and Capabilities Measurements (including Cp and Cpk tendencies)

Current / CMM

FABRICAÇÃO DE COMPONENTES PLÁSTICOS		Índices de Performance do Processo: Pp e Ppk		Capabilidade do Processo: Cp e Cpk																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Item	PQC	Descrição	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P29	P30	P31	P32	P33	P34	P35	P36	P37	P38	P39	P40	P41	P42	P43	P44	P45	P46	P47	P48	P49	P50	P51	P52	P53	P54	P55	P56	P57	P58	P59	P60	P61	P62	P63	P64	P65	P66	P67	P68	P69	P70	P71	P72	P73	P74	P75	P76	P77	P78	P79	P80	P81	P82	P83	P84	P85	P86	P87	P88	P89	P90	P91	P92	P93	P94	P95	P96	P97	P98	P99	P100	P101	P102	P103	P104	P105	P106	P107	P108	P109	P110	P111	P112	P113	P114	P115	P116	P117	P118	P119	P120	P121	P122	P123	P124	P125	P126	P127	P128	P129	P130	P131	P132	P133	P134	P135	P136	P137	P138	P139	P140	P141	P142	P143	P144	P145	P146	P147	P148	P149	P150	P151	P152	P153	P154	P155	P156	P157	P158	P159	P160	P161	P162	P163	P164	P165	P166	P167	P168	P169	P170	P171	P172	P173	P174	P175	P176	P177	P178	P179	P180	P181	P182	P183	P184	P185	P186	P187	P188	P189	P190	P191	P192	P193	P194	P195	P196	P197	P198	P199	P200	P201	P202	P203	P204	P205	P206	P207	P208	P209	P210	P211	P212	P213	P214	P215	P216	P217	P218	P219	P220	P221	P222	P223	P224	P225	P226	P227	P228	P229	P230	P231	P232	P233	P234	P235	P236	P237	P238	P239	P240	P241	P242	P243	P244	P245	P246	P247	P248	P249	P250	P251	P252	P253	P254	P255	P256	P257	P258	P259	P260	P261	P262	P263	P264	P265	P266	P267	P268	P269	P270	P271	P272	P273	P274	P275	P276	P277	P278	P279	P280	P281	P282	P283	P284	P285	P286	P287	P288	P289	P290	P291	P292	P293	P294	P295	P296	P297	P298	P299	P300	P301	P302	P303	P304	P305	P306	P307	P308	P309	P310	P311	P312	P313	P314	P315	P316	P317	P318	P319	P320	P321	P322	P323	P324	P325	P326	P327	P328	P329	P330	P331	P332	P333	P334	P335	P336	P337	P338	P339	P340	P341	P342	P343	P344	P345	P346	P347	P348	P349	P350	P351	P352	P353	P354	P355	P356	P357	P358	P359	P360	P361	P362	P363	P364	P365	P366	P367	P368	P369	P370	P371	P372	P373	P374	P375	P376	P377	P378	P379	P380	P381	P382	P383	P384	P385	P386	P387	P388	P389	P390	P391	P392	P393	P394	P395	P396	P397	P398	P399	P400	P401	P402	P403	P404	P405	P406	P407	P408	P409	P410	P411	P412	P413	P414	P415	P416	P417	P418	P419	P420	P421	P422	P423	P424	P425	P426	P427	P428	P429	P430	P431	P432	P433	P434	P435	P436	P437	P438	P439	P440	P441	P442	P443	P444	P445	P446	P447	P448	P449	P450	P451	P452	P453	P454	P455	P456	P457	P458	P459	P460	P461	P462	P463	P464	P465	P466	P467	P468	P469	P470	P471	P472	P473	P474	P475	P476	P477	P478	P479	P480	P481	P482	P483	P484	P485	P486	P487	P488	P489	P490	P491	P492	P493	P494	P495	P496	P497	P498	P499	P500	P501	P502	P503	P504	P505	P506	P507	P508	P509	P510	P511	P512	P513	P514	P515	P516	P517	P518	P519	P520	P521	P522	P523	P524	P525	P526	P527	P528	P529	P530	P531	P532	P533	P534	P535	P536	P537	P538	P539	P540	P541	P542	P543	P544	P545	P546	P547	P548	P549	P550	P551	P552	P553	P554	P555	P556	P557	P558	P559	P560	P561	P562	P563	P564	P565	P566	P567	P568	P569	P570	P571	P572	P573	P574	P575	P576	P577	P578	P579	P580	P581	P582	P583	P584	P585	P586	P587	P588	P589	P590	P591	P592	P593	P594	P595	P596	P597	P598	P599	P600	P601	P602	P603	P604	P605	P606	P607	P608	P609	P610	P611	P612	P613	P614	P615	P616	P617	P618	P619	P620	P621	P622	P623	P624	P625	P626	P627	P628	P629	P630	P631	P632	P633	P634	P635	P636	P637	P638	P639	P640	P641	P642	P643	P644	P645	P646	P647	P648	P649	P650	P651	P652	P653	P654	P655	P656	P657	P658	P659	P660	P661	P662	P663	P664	P665	P666	P667	P668	P669	P670	P671	P672	P673	P674	P675	P676	P677	P678	P679	P680	P681	P682	P683	P684	P685	P686	P687	P688	P689	P690	P691	P692	P693	P694	P695	P696	P697	P698	P699	P700	P701	P702	P703	P704	P705	P706	P707	P708	P709	P710	P711	P712	P713	P714	P715	P716	P717	P718	P719	P720	P721	P722	P723	P724	P725	P726	P727	P728	P729	P730	P731	P732	P733	P734	P735	P736	P737	P738	P739	P740	P741	P742	P743	P744	P745	P746	P747	P748	P749	P750	P751	P752	P753	P754	P755	P756	P757	P758	P759	P760	P761	P762	P763	P764	P765	P766	P767	P768	P769	P770	P771	P772	P773	P774	P775	P776	P777	P778	P779	P780	P781	P782	P783	P784	P785	P786	P787	P788	P789	P790	P791	P792	P793	P794	P795	P796	P797	P798	P799	P800	P801	P802	P803	P804	P805	P806	P807	P808	P809	P810	P811	P812	P813	P814	P815	P816	P817	P818	P819	P820	P821	P822	P823	P824	P825	P826	P827	P828	P829	P830	P831	P832	P833	P834	P835	P836	P837	P838	P839	P840	P841	P842	P843	P844	P845	P846	P847	P848	P849	P850	P851	P852	P853	P854	P855	P856	P857	P858	P859	P860	P861	P862	P863	P864	P865	P866	P867	P868	P869	P870	P871	P872	P873	P874	P875	P876	P877	P878	P879	P880	P881	P882	P883	P884	P885	P886	P887	P888	P889	P890	P891	P892	P893	P894	P895	P896	P897	P898	P899	P900	P901	P902	P903	P904	P905	P906	P907	P908	P909	P910	P911	P912	P913	P914	P915	P916	P917	P918	P919	P920	P921	P922	P923	P924	P925	P926	P927	P928	P929	P930	P931	P932	P933	P934	P935	P936	P937	P938	P939	P940	P941	P942	P943	P944	P945	P946	P947	P948	P949	P950	P951	P952	P953	P954	P955	P956	P957	P958	P959	P960	P961	P962	P963	P964	P965	P966	P967	P968	P969	P970	P971	P972	P973	P974	P975	P976	P977	P978	P979	P980	P981	P982	P983	P984	P985	P986	P987	P988	P989	P990	P991	P992	P993	P994	P995	P996	P997	P998	P999	P1000	P1001	P1002	P1003	P1004	P1005	P1006	P1007	P1008	P1009	P1010	P1011	P1012	P1013	P1014	P1015	P1016	P1017	P1018	P1019	P1020	P1021	P1022	P1023	P1024	P1025	P1026	P1027	P1028	P1029	P1030	P1031	P1032	P1033	P1034	P1035	P1036	P1037	P1038	P1039	P1040	P1041	P1042	P1043	P1044	P1045	P1046	P1047	P1048	P1049	P1050	P1051	P1052	P1053	P1054	P1055	P1056	P1057	P1058	P1059	P1060	P1061	P1062	P1063	P1064	P1065	P1066	P1067	P1068	P1069	P1070	P1071	P1072	P1073	P1074	P1075	P1076	P1077	P1078	P1079	P1080	P1081	P1082	P1083	P1084	P1085	P1086	P1087	P1088	P1089	P1090	P1091	P1092	P1093	P1094	P1095	P1096	P1097	P1098	P1099	P1100	P1101	P1102	P1103	P1104	P1105	P1106	P1107	P1108	P1109	P1110	P1111	P1112	P1113	P1114	P1115	P1116	P1117	P1118	P1119	P1120	P1121	P1122	P1123	P1124	P1125	P1126	P1127	P1128	P1129	P1130	P1131	P1132	P1133	P1134	P1135	P1136	P1137	P1138	P1139	P1140	P1141	P1142	P1143	P1144	P1145	P1146	P1147	P1148	P1149	P1150	P1151	P1152	P1153	P1154	P1155	P1156	P1157	P1158	P1159	P1160	P1161	P1162	P1163	P1164	P1165	P1166	P1167	P1168	P1169	P1170	P1171	P1172	P1173	P1174	P1175	P1176	P1177	P1178	P1179	P1180	P1181	P1182	P1183	P1184	P1185	P1186	P1187	P1188	P1189	P1190	P1191	P1192	P1193	P1194	P1195	P1196	P1197	P1198	P1199	P1200	P1201	P1202	P1203	P1204	P1205	P1206	P1207	P1208	P1209	P1210	P1211	P1212	P1213	P1214	P1215	P1216	P1217	P1218	P1219	P1220	P1221	P1222	P1223	P1224	P1225	P1226	P1227	P1228	P1229	P1230	P1231	P1232	P1233	P1234	P1235	P1236	P1237	P1238	P1239	P1240	P1241	P1242	P1243	P1244	P1245	P1246	P1247	P1248	P1249	P1250	P1251	P1252	P1253	P1254	P1255	P1256	P1257	P1258	P1259	P1260	P1261	P1262	P1263	P1264	P1265	P1266	P1267	P1268	P1269	P1270	P1271	P1272	P1273	P1274	P1275	P1276	P1277	P1278	P1279	P1280	P1281	P1282	P1283	P1284	P1285	P1286	P1287	P1288	P1289	P1290	P1291	P1292	P1293	P1294	P1295	P1296	P1297	P1298	P1299	P1300	P1301	P1302	P1303	P1304	P1305	P1306	P1307	P1308	P1309	P1310	P1311	P1312	P1313	P1314	P1315	P1316	P1317	P1318	P1319	P1320	P1321	P1322	P1323	P1324	P1325	P1326	P1327	P1328	P1329	P1330	P1331	P1332	P1333	P1334	P1335	P1336	P1337	P1338	P1339	P1340	P1341	P1342	P1343	P1344	P1345	P1346	P1347	P1348	P1349	P1350	P1351	P1352	P1353	P1354	P1355	P1356	P1357	P1358	P1359	P1360	P1361	P1362	P1363	P1364	P1365	P1366	P1367	P1368	P1369	P1370	P1371	P1372	P1373	P1374	P1375	P1376	P1377	P1378	P1379	P1380	P1381	P1382	P1383	P1384	P1385	P1386	P1387	P1388	P1389	P1390	P1391	P1392	P1393	P1394	P1395	P1396	P1397	P1398	P1399	P1400	P1401	P1402	P1403	P1404	P1405	P1406	P1407	P1408	P1409	P1410	P1411	P1412	P1413	P1414	P1415	P1416	P1417	P1418	P1419	P1420	P1421	P1422	P1423	P1424	P1425	P1426	P1427	P1428	P1429	P1430	P1431	P1432	P1433	P1434	P1435	P1436	P1437	P1438	P1439	P1440	P1441	P1442	P1443	P1444	P1445	P1446	P1447	P1448	P1449	P1450	P1451	P1452	P1453	P1454	P1455	P1456	P1457	P1458	P1459	P1460	P1461	P1462	P1463	P1464	P1465	P1466	P146

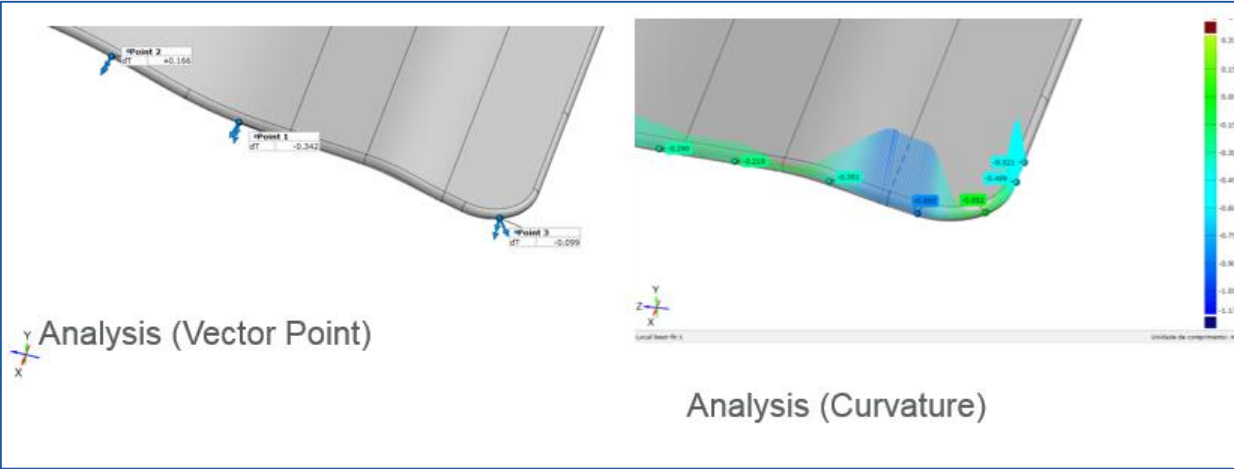
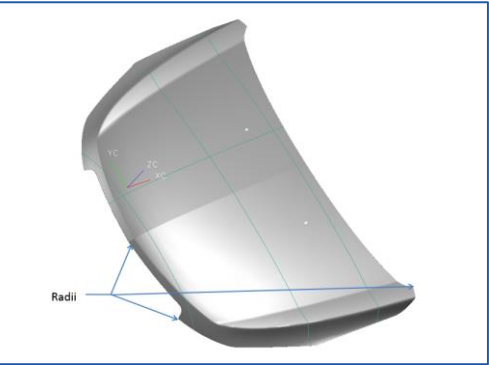
R&R – MACRO (MSA)



Part Average	-0.68	-0.68	-0.67	-0.67	-0.64	-0.61	-0.80	-0.77	-0.79	-0.79	Rp	0.20
Equipment Variation:	0.05						%EV-Tol	5.5%	%EV-TV	14.5%	R-Dbl-Bar	0.02
Appraiser Variation:	0.00						%AV-Tol	0.0%	%AV-TV	0.0%	X-bar Diff	0.00
R & R:	0.05						%RR-Tol	5.5%	%RR-TV	14.5%	UCL R chart	0.04
Part Variation:	0.37								%PV-TV	98.9%	LCL R Chart	0.00
Total Variation:	0.38										Max Range	0.08
											Range Stable?	No

Jewell Radii Measurement

Scope: Create Jewell Radii Measurement Routine and Reports to report at program gates



GOM Inspect Professional Curves

GOM's approach

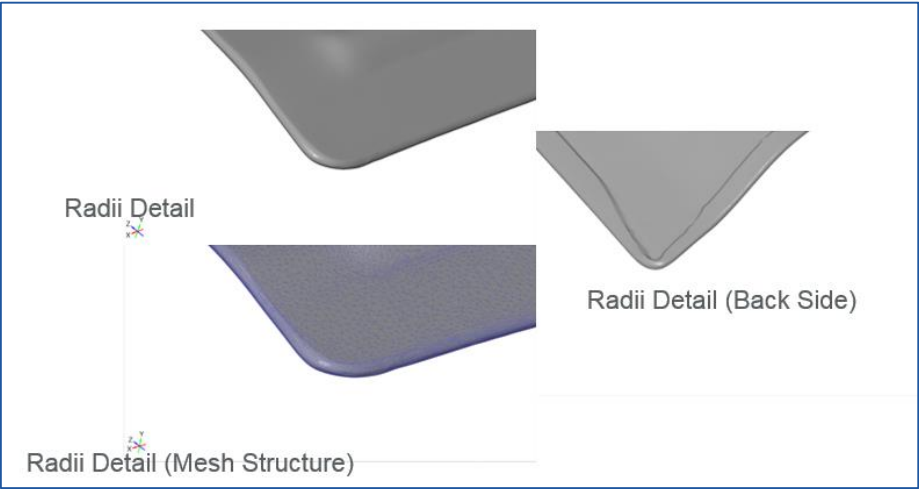
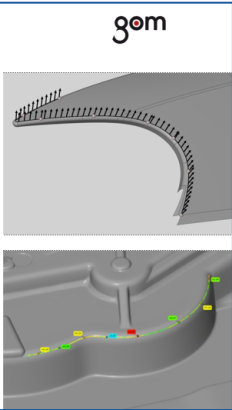
Curvature, radii, flush, gap, etc. should provide the same advantages as full-field surfaces.

Merging the full-field inspection world with the single point inspection world.

Provide a maximum of information for all inspection elements

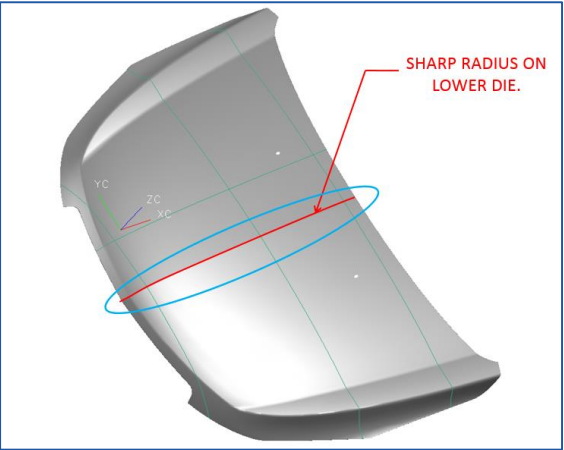
Let the user decide at any later point where he wants detailed information, i.e. where he wants to pick single points for in depth analysis

The "Curves" concept provides this high information density



Feature lines Measurement

Scope: Create Feature Lines Measurement Routine and Reports to report at program gates



GOM Inspect Professional Curves

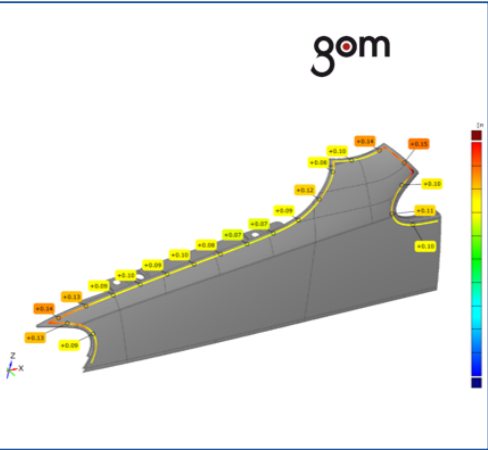
Advantages of curve-based inspection

- Condensed visualization
- Focus on functional properties

Bridge the gap between point-based and surface-based inspection

Inspection applications

- Curve deviations



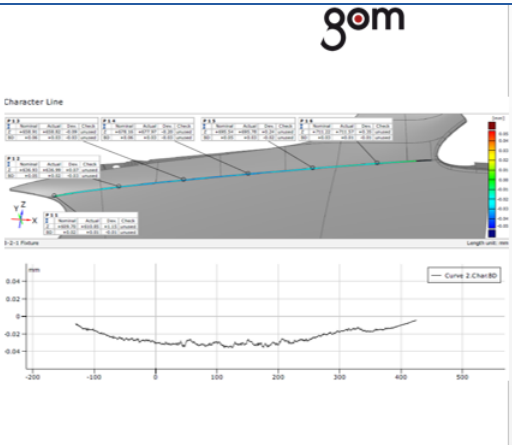
GOM Inspect Professional Curves

Advantages of curve-based inspection

- Condensed visualization
- Focus on functional properties
- Bridge the gap between point-based and surface-based inspection

Inspection applications

- Curve deviations
- Character lines



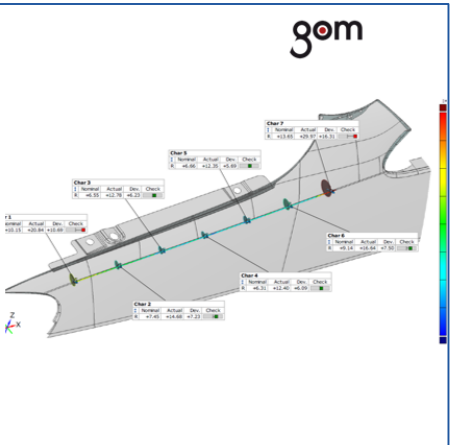
GOM Inspect Professional Curves

Advantages of curve-based inspection

- Condensed visualization
- Focus on functional properties
- Bridge the gap between point-based and surface-based inspection

Inspection applications

- Curve deviations
- Character lines
- Radius inspection



Dimensional Alarm Notification

Scope: Understand ScanBox capability to release dimensional alarm notification similar to GDIS for Stamped and Injected Parts with Variation Trends

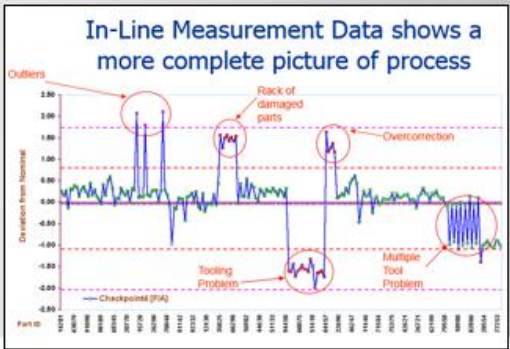
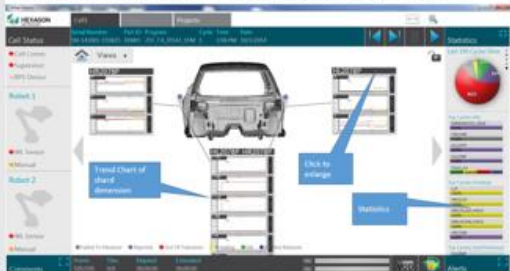
GDIS from CMM

PROGRAM	DEVICE	PART	ROUTINE	JOB	EVENT_TIME	FEATURE	ATT	RLL	RUL	ABS_DIFF	LAST_BUILD	LAST-1_BUILD	ALARMS	TOTAL_MEASURED	TOTAL_SETUP	PLANT
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	2971NRD	Z_DEV	-0.70	0.70	1.42	2.12	1.36	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	2971NRD	Z_DEV	-0.70	0.70	0.89	1.59	1.62	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	2971NRD	Z_DEV	-0.70	0.70	0.59	1.29	1.29	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8735NRD	X_DEV	-1.00	1.00	0.46	-1.46	-1.84	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-1.00	1.00	0.46	-1.46	-1.84	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-1.00	1.00	0.40	-1.40	-1.84	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-1.00	1.00	0.36	-1.36	-1.84	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-0.80	0.80	0.30	-1.10	-1.20	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-0.80	0.80	0.29	-1.09	-0.77	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-0.80	0.80	0.23	-1.03	-0.85	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-0.70	0.70	0.23	-0.93	-0.66	12	74	74	Rosario Asm
DISC_B	CMM	Trimmer 2	ANSA7787	120912_NR	11-26-2019 02:24	8802NRD	DEV	-0.80	0.80	0.14	-0.94	-1.17	12	74	74	Rosario Asm

RLL	RUL	ABS DIFF	LAST_BUILD	LAST-1_BUILD	ALARMS	TOTAL_MEASURED	TOTAL_SETUP	PLANT
-0.70	0.70	1.42	2.12	1.36	12	74	74	Rosario Asm
-0.70	0.70	0.89	1.59	1.62	12	74	74	Rosario Asm
-0.70	0.70	0.59	1.29	1.29	12	74	74	Rosario Asm
-1.00	1.00	0.46	-1.46	-1.84	12	74	74	Rosario Asm
-1.00	1.00	0.46	1.46	1.46	12	74	74	Rosario Asm
-1.00	1.00	0.40	1.40	0.91	12	74	74	Rosario Asm
-1.00	1.00	0.36	1.36	1.92	12	74	74	Rosario Asm
-0.80	0.80	0.30	1.10	1.20	12	74	74	Rosario Asm
-0.80	0.80	0.29	-1.09	-0.77	12	74	74	Rosario Asm
-0.80	0.80	0.23	-1.03	-0.85	12	74	74	Rosario Asm
-0.70	0.70	0.23	-0.93	-0.66	12	74	74	Rosario Asm
-0.80	0.80	0.14	0.94	1.17	12	74	74	Rosario Asm

ISA / Rule Manager

ISA Runtime – Trend Chart View



Top 5 points (OK)	
MRWAW2101_ODLE	100%
HR2156P	100%
HL2157P	100%
HL2156P	100%
Trim1_m1	NaN% NaN% NaN% NaN%

Top 5 points (Trending)	
x_R	100%
HR1511P	100%
MRLVS1203_HDCA	100%
MRLVS1204_HDCA	100%
HR1739P	100%

Top 5 points (OutOfTolerance)	
HL1004P	



THANK YOU