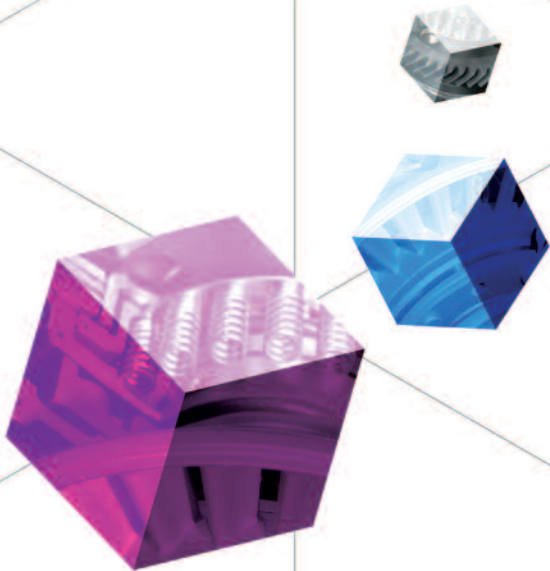




## INNOvative Testing and Engineering Solution Services

Innotess is growing with a global leading person who has a dream and has a valued knowledge



## Introduction

Innotess was established in 2009 to contribute to the development of domestic and foreign components industry.

Excellent analytical skills and advanced test equipment and ensure reliability based on the expertise, proven service life and a variety of R&D is an engineering services specialized in supplying the best service in the support area.

We support the environment, vibration, reliability & NVH, safety, electronics for the automotive and mechanical properties testing and analysis, product development and production of electronic component

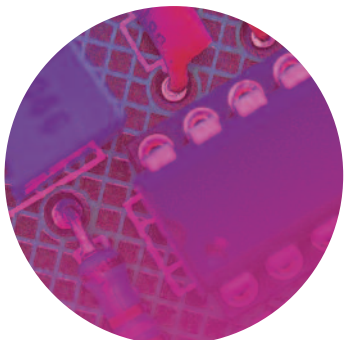
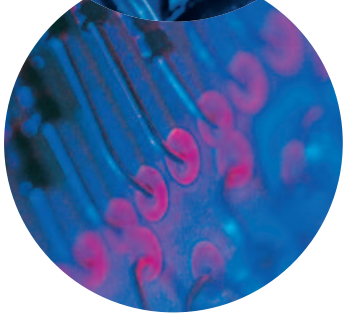
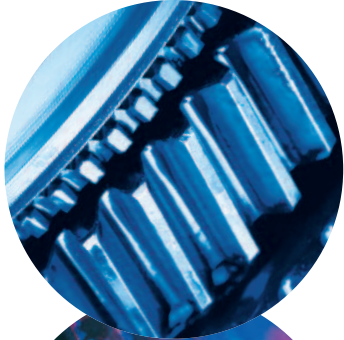
Inntess has greatly contributed to our know - how and the technology only for testing and analysis in conjunction with a variety of possible problems in product development and production, based on deriving the exact cause and speedy resolution to reduce development costs and the cost of quality customers. Promises to test and analyze technical support engineers are working with us to bring a greater development and inspiration to make your product containing the sweat and passion can emerge as a product with the best performance and the best quality.

Constant innovation and challenge offer to you differentiated testing and analysis services. We look forward to your support.

Thank you.

CEO

Kim Duck Whan (Andrew, Kim)



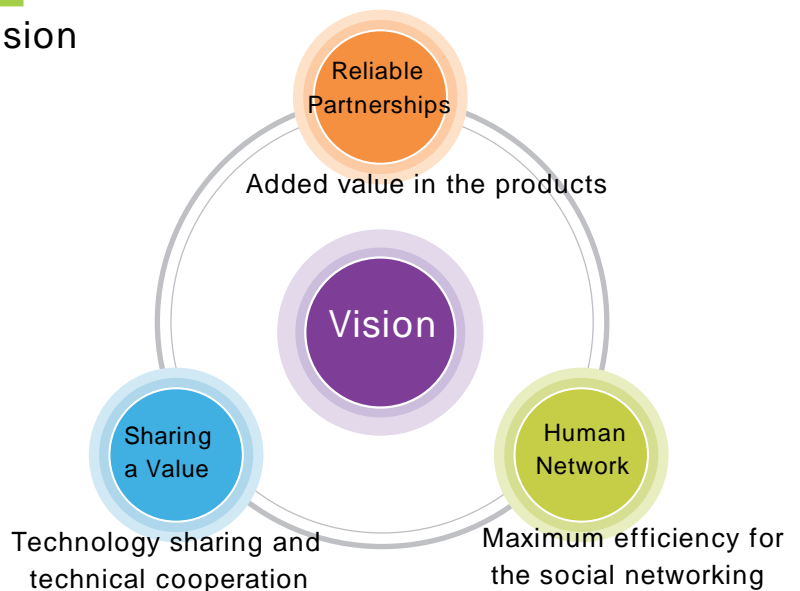
## History

- 2014. 09 R&D and Project Management Office
- 2013. 06 YoungSan Test LAB(Environment/Corrosion/Thermal)
- 2013. 10 ISO 9001, ISO 14001 Certification
- 2012. 05 Expand to Electronic Test Field at DongWon Test LAB.
- 2012. 11 Established R&D Core Department(KOITA)
- 2011. 12 Change Corporate Company from Private Company
- 2011. 12 Open GyungSan Test Support LAB.
- 2009. 05 Innotess establishment

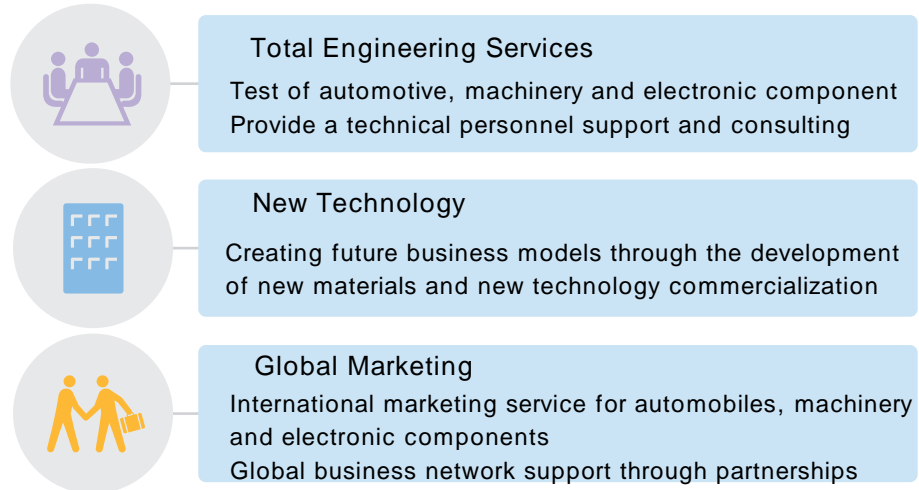
## Mission

Achieve the best engineering quality and service through a differentiated competitive and sustainable growth

## Vision



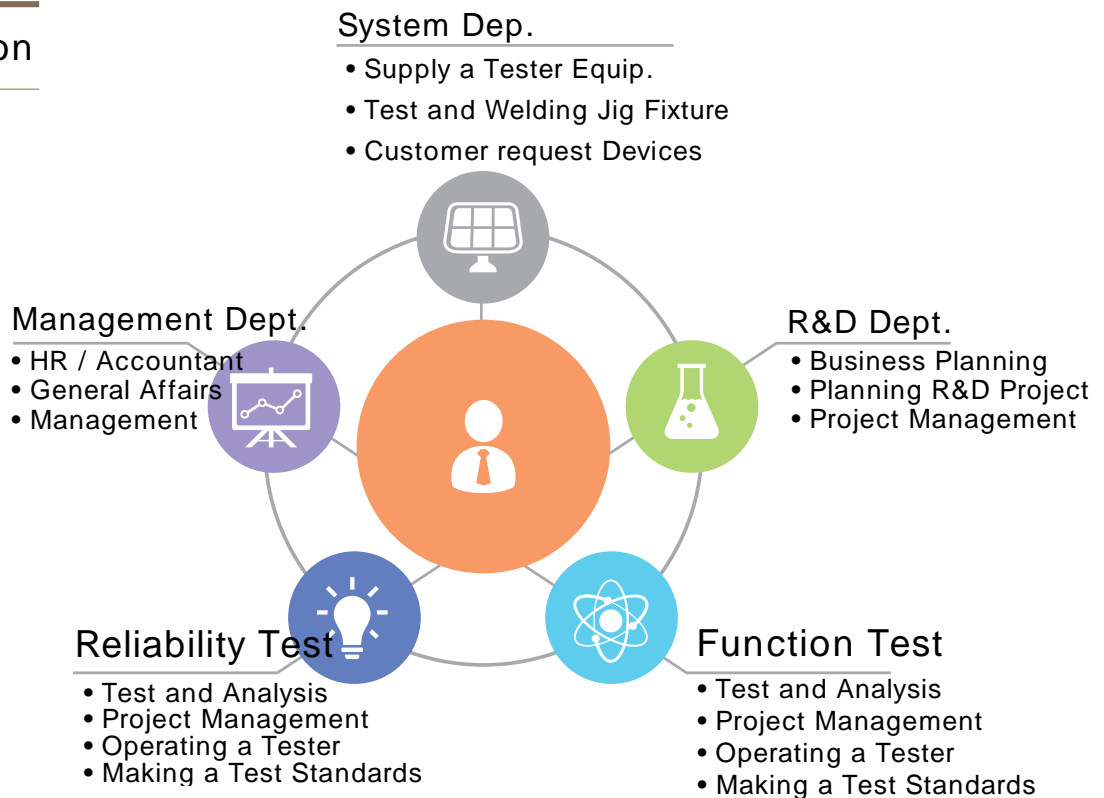
## Business Fields



## Areas

Test and R&D	Environment / Reliability / NVH / Electronic Function Vibration and durability / Vehicle Safety
System Design	Tester / Inspection / Test and Welding Jig Fixture Customer Request Test Equipment

## Organization



## Certification



최 2012162608 호

**연구개발전담부서 인정서**

1. 전담부서명: 연구개발전담부서  
[소속기업명: (주)이노티스]

2. 소 지 자: 경상남도 울산시 중남동 22번  
288 임소대학교 영송회관 3층 315호

3. 신고 연월일: 2014년 10월 10일  
[최종인정일: 2012년 11월 28일]

4. 등록번호: 2014년 10월 10일

미래창조과학부

'기초연구진흥 및 기술개발지원에 관한 법률' 제14조, 같은 법 시행령 제16조제2항 및 제27조제1항에 따라 위와 같이 기업의 연구개발전담부서로 인정합니다.

2014년 10월 13일  
한국산업기술진흥협회장



**GERMAN CERT**  
Quality Management System Certificate

**INNOTESS CO., LTD.**  
(Yongnam University Culture Hall, Inno-2ndlg)  
431-15, 388 Inno-2nd, Yongnam-Au Gyeongsangnam-do, Korea

German Cert Co., Ltd. hereby certifies that the Quality Management System of the above organization has been evaluated and found to be in line with the requirements of the following standard:

**ISO 9001:2008**  
(Excluding Clause 7.1 Design & Development)

For the scope of:  
Inspection and Service of Engineering Parts  
(Automobile, Industry Machine, Electric & Electronic)

Certificate Number: KorQ-121500  
Certificate Valid Until: 03 October 2012 - 03 October 2015  
Initial Certification Date: 19 October 2012  
QC Certification Date: 09 October 2012 (CV: 14)  
Certificate Expiry Date: 18 October 2015

Subsidiary Status:  
IAF, DAKAS



**GERMAN CERT**  
Environmental Management System Certificate

**INNOTESS CO., LTD.**  
(Yongnam University Culture Hall, Inno-2ndlg)  
431-15, 388 Inno-2nd, Yongnam-Au Gyeongsangnam-do, Korea

German Cert Co., Ltd. hereby certifies that the Environmental Management System of the above organization has been evaluated and found to be in line with the requirements of the following standard:

**ISO 14001:2004**

For the scope of:  
Inspection of Engineering Parts  
(Automobile, Industry Machine, Electric & Electronic)

Certificate Number: KorE-124994  
Certificate Valid Until: 19 October 2012 - 19 October 2015  
Initial Certification Date: 19 October 2012  
QC Certification Date: 09 October 2012 (CV: 14)  
Certificate Expiry Date: 18 October 2015

Subsidiary Status:  
IAF, DAKAS

## Partnerships



**BUSINESS AGREEMENT**

(주)부산테크노파크 자동차부품기술지원센터(이하 센터)와 주식회사 이노티스는 일반공공 활동, 국가기술개발기회 확대 및 중소 기체 자동차 부품업체의 기술혁신과 독자기술 확보 지원을 위하여 아래와 같이 상호 협정을 체결한다.

제 1 조 이 협정은 자동차부품기술지원센터(이하 이노티스)가 자동차 부품개발 및 서비스 분야의 공적 활동을 지원하며, 센터가 이노티스에게 제공되는 지원은 무상이며, 센터가 이노티스에게 제공하는 지원은 상호 합의에 따라 이루어진다.

제 2 조 본 협정은 상호 이익을 위한 것이며, 어느 한쪽으로부터 손해배상 청구에 대한 책임은 본 협정 체결 시점부터 센터가 부담한다.

제 3 조 본 협정서에 명시되지 않은 사항에 대해서는 상호 합의에 따라 결정한다.

제 4 조 본 협정서 체결 시 본 협정서 및 센터의 운영규정(www.innotes.com/center)의 내용을 반드시 확인한다. 본 협정서 체결 시 본 협정서 및 센터의 운영규정(www.innotes.com/center)의 내용을 반드시 확인한다.

2014. 9. 22

(주)부산테크노파크 대표이사 송재현  
자동차부품기술지원센터

이노티스 대표이사 김덕현



**Agreement of Test and Analysis**  
시험지원 및 정비비용 일부 지원

[제]용산테크노파크 자동차부품기술연구소와 이노티스는 시험 용역 및 기술개발에 대한 상호 협력을 위한 제1차, 2차, 3차, 4차, 5차, 6차, 7차, 8차, 9차, 10차, 11차, 12차, 13차, 14차, 15차, 16차, 17차, 18차, 19차, 20차, 21차, 22차, 23차, 24차, 25차, 26차, 27차, 28차, 29차, 30차, 31차, 32차, 33차, 34차, 35차, 36차, 37차, 38차, 39차, 40차, 41차, 42차, 43차, 44차, 45차, 46차, 47차, 48차, 49차, 50차, 51차, 52차, 53차, 54차, 55차, 56차, 57차, 58차, 59차, 60차, 61차, 62차, 63차, 64차, 65차, 66차, 67차, 68차, 69차, 70차, 71차, 72차, 73차, 74차, 75차, 76차, 77차, 78차, 79차, 80차, 81차, 82차, 83차, 84차, 85차, 86차, 87차, 88차, 89차, 90차, 91차, 92차, 93차, 94차, 95차, 96차, 97차, 98차, 99차, 100차, 101차, 102차, 103차, 104차, 105차, 106차, 107차, 108차, 109차, 110차, 111차, 112차, 113차, 114차, 115차, 116차, 117차, 118차, 119차, 120차, 121차, 122차, 123차, 124차, 125차, 126차, 127차, 128차, 129차, 130차, 131차, 132차, 133차, 134차, 135차, 136차, 137차, 138차, 139차, 140차, 141차, 142차, 143차, 144차, 145차, 146차, 147차, 148차, 149차, 150차, 151차, 152차, 153차, 154차, 155차, 156차, 157차, 158차, 159차, 160차, 161차, 162차, 163차, 164차, 165차, 166차, 167차, 168차, 169차, 170차, 171차, 172차, 173차, 174차, 175차, 176차, 177차, 178차, 179차, 180차, 181차, 182차, 183차, 184차, 185차, 186차, 187차, 188차, 189차, 190차, 191차, 192차, 193차, 194차, 195차, 196차, 197차, 198차, 199차, 200차, 201차, 202차, 203차, 204차, 205차, 206차, 207차, 208차, 209차, 210차, 211차, 212차, 213차, 214차, 215차, 216차, 217차, 218차, 219차, 220차, 221차, 222차, 223차, 224차, 225차, 226차, 227차, 228차, 229차, 230차, 231차, 232차, 233차, 234차, 235차, 236차, 237차, 238차, 239차, 240차, 241차, 242차, 243차, 244차, 245차, 246차, 247차, 248차, 249차, 250차, 251차, 252차, 253차, 254차, 255차, 256차, 257차, 258차, 259차, 260차, 261차, 262차, 263차, 264차, 265차, 266차, 267차, 268차, 269차, 270차, 271차, 272차, 273차, 274차, 275차, 276차, 277차, 278차, 279차, 280차, 281차, 282차, 283차, 284차, 285차, 286차, 287차, 288차, 289차, 290차, 291차, 292차, 293차, 294차, 295차, 296차, 297차, 298차, 299차, 300차, 301차, 302차, 303차, 304차, 305차, 306차, 307차, 308차, 309차, 310차, 311차, 312차, 313차, 314차, 315차, 316차, 317차, 318차, 319차, 320차, 321차, 322차, 323차, 324차, 325차, 326차, 327차, 328차, 329차, 330차, 331차, 332차, 333차, 334차, 335차, 336차, 337차, 338차, 339차, 340차, 341차, 342차, 343차, 344차, 345차, 346차, 347차, 348차, 349차, 350차, 351차, 352차, 353차, 354차, 355차, 356차, 357차, 358차, 359차, 360차, 361차, 362차, 363차, 364차, 365차, 366차, 367차, 368차, 369차, 370차, 371차, 372차, 373차, 374차, 375차, 376차, 377차, 378차, 379차, 380차, 381차, 382차, 383차, 384차, 385차, 386차, 387차, 388차, 389차, 390차, 391차, 392차, 393차, 394차, 395차, 396차, 397차, 398차, 399차, 400차, 401차, 402차, 403차, 404차, 405차, 406차, 407차, 408차, 409차, 410차, 411차, 412차, 413차, 414차, 415차, 416차, 417차, 418차, 419차, 420차, 421차, 422차, 423차, 424차, 425차, 426차, 427차, 428차, 429차, 430차, 431차, 432차, 433차, 434차, 435차, 436차, 437차, 438차, 439차, 440차, 441차, 442차, 443차, 444차, 445차, 446차, 447차, 448차, 449차, 450차, 451차, 452차, 453차, 454차, 455차, 456차, 457차, 458차, 459차, 460차, 461차, 462차, 463차, 464차, 465차, 466차, 467차, 468차, 469차, 470차, 471차, 472차, 473차, 474차, 475차, 476차, 477차, 478차, 479차, 480차, 481차, 482차, 483차, 484차, 485차, 486차, 487차, 488차, 489차, 490차, 491차, 492차, 493차, 494차, 495차, 496차, 497차, 498차, 499차, 500차, 501차, 502차, 503차, 504차, 505차, 506차, 507차, 508차, 509차, 510차, 511차, 512차, 513차, 514차, 515차, 516차, 517차, 518차, 519차, 520차, 521차, 522차, 523차, 524차, 525차, 526차, 527차, 528차, 529차, 530차, 531차, 532차, 533차, 534차, 535차, 536차, 537차, 538차, 539차, 540차, 541차, 542차, 543차, 544차, 545차, 546차, 547차, 548차, 549차, 550차, 551차, 552차, 553차, 554차, 555차, 556차, 557차, 558차, 559차, 560차, 561차, 562차, 563차, 564차, 565차, 566차, 567차, 568차, 569차, 570차, 571차, 572차, 573차, 574차, 575차, 576차, 577차, 578차, 579차, 580차, 581차, 582차, 583차, 584차, 585차, 586차, 587차, 588차, 589차, 590차, 591차, 592차, 593차, 594차, 595차, 596차, 597차, 598차, 599차, 600차, 601차, 602차, 603차, 604차, 605차, 606차, 607차, 608차, 609차, 610차, 611차, 612차, 613차, 614차, 615차, 616차, 617차, 618차, 619차, 620차, 621차, 622차, 623차, 624차, 625차, 626차, 627차, 628차, 629차, 630차, 631차, 632차, 633차, 634차, 635차, 636차, 637차, 638차, 639차, 640차, 641차, 642차, 643차, 644차, 645차, 646차, 647차, 648차, 649차, 650차, 651차, 652차, 653차, 654차, 655차, 656차, 657차, 658차, 659차, 660차, 661차, 662차, 663차, 664차, 665차, 666차, 667차, 668차, 669차, 670차, 671차, 672차, 673차, 674차, 675차, 676차, 677차, 678차, 679차, 680차, 681차, 682차, 683차, 684차, 685차, 686차, 687차, 688차, 689차, 690차, 691차, 692차, 693차, 694차, 695차, 696차, 697차, 698차, 699차, 700차, 701차, 702차, 703차, 704차, 705차, 706차, 707차, 708차, 709차, 710차, 711차, 712차, 713차, 714차, 715차, 716차, 717차, 718차, 719차, 720차, 721차, 722차, 723차, 724차, 725차, 726차, 727차, 728차, 729차, 730차, 731차, 732차, 733차, 734차, 735차, 736차, 737차, 738차, 739차, 740차, 741차, 742차, 743차, 744차, 745차, 746차, 747차, 748차, 749차, 750차, 751차, 752차, 753차, 754차, 755차, 756차, 757차, 758차, 759차, 760차, 761차, 762차, 763차, 764차, 765차, 766차, 767차, 768차, 769차, 770차, 771차, 772차, 773차, 774차, 775차, 776차, 777차, 778차, 779차, 780차, 781차, 782차, 783차, 784차, 785차, 786차, 787차, 788차, 789차, 790차, 791차, 792차, 793차, 794차, 795차, 796차, 797차, 798차, 799차, 800차, 801차, 802차, 803차, 804차, 805차, 806차, 807차, 808차, 809차, 810차, 811차, 812차, 813차, 814차, 815차, 816차, 817차, 818차, 819차, 820차, 821차, 822차, 823차, 824차, 825차, 826차, 827차, 828차, 829차, 830차, 831차, 832차, 833차, 834차, 835차, 836차, 837차, 838차, 839차, 840차, 841차, 842차, 843차, 844차, 845차, 846차, 847차, 848차, 849차, 850차, 851차, 852차, 853차, 854차, 855차, 856차, 857차, 858차, 859차, 860차, 861차, 862차, 863차, 864차, 865차, 866차, 867차, 868차, 869차, 870차, 871차, 872차, 873차, 874차, 875차, 876차, 877차, 878차, 879차, 880차, 881차, 882차, 883차, 884차, 885차, 886차, 887차, 888차, 889차, 890차, 891차, 892차, 893차, 894차, 895차, 896차, 897차, 898차, 899차, 900차, 901차, 902차, 903차, 904차, 905차, 906차, 907차, 908차, 909차, 910차, 911차, 912차, 913차, 914차, 915차, 916차, 917차, 918차, 919차, 920차, 921차, 922차, 923차, 924차, 925차, 926차, 927차, 928차, 929차, 930차, 931차, 932차, 933차, 934차, 935차, 936차, 937차, 938차, 939차, 940차, 941차, 942차, 943차, 944차, 945차, 946차, 947차, 948차, 949차, 950차, 951차, 952차, 953차, 954차, 955차, 956차, 957차, 958차, 959차, 960차, 961차, 962차, 963차, 964차, 965차, 966차, 967차, 968차, 969차, 970차, 971차, 972차, 973차, 974차, 975차, 976차, 977차, 978차, 979차, 980차, 981차, 982차, 983차, 984차, 985차, 986차, 987차, 988차, 989차, 990차, 991차, 992차, 993차, 994차, 995차, 996차, 997차, 998차, 999차, 1000차, 1001차, 1002차, 1003차, 1004차, 1005차, 1006차, 1007차, 1008차, 1009차, 1010차, 1011차, 1012차, 1013차, 1014차, 1015차, 1016차, 1017차, 1018차, 1019차, 1020차, 1021차, 1022차, 1023차, 1024차, 1025차, 1026차, 1027차, 1028차, 1029차, 1030차, 1031차, 1032차, 1033차, 1034차, 1035차, 1036차, 1037차, 1038차, 1039차, 1040차, 1041차, 1042차, 1043차, 1044차, 1045차, 1046차, 1047차, 1048차, 1049차, 1050차, 1051차, 1052차, 1053차, 1054차, 1055차, 1056차, 1057차, 1058차, 1059차, 1060차, 1061차, 1062차, 1063차, 1064차, 1065차, 1066차, 1067차, 1068차, 1069차, 1070차, 1071차, 1072차, 1073차, 1074차, 1075차, 1076차, 1077차, 1078차, 1079차, 1080차, 1081차, 1082차, 1083차, 1084차, 1085차, 1086차, 1087차, 1088차, 1089차, 1090차, 1091차, 1092차, 1093차, 1094차, 1095차, 1096차, 1097차, 1098차, 1099차, 1100차, 1101차, 1102차, 1103차, 1104차, 1105차, 1106차, 1107차, 1108차, 1109차, 1110차, 1111차, 1112차, 1113차, 1114차, 1115차, 1116차, 1117차, 1118차, 1119차, 1120차, 1121차, 1122차, 1123차, 1124차, 1125차, 1126차, 1127차, 1128차, 1129차, 1130차, 1131차, 1132차, 1133차, 1134차, 1135차, 1136차, 1137차, 1138차, 1139차, 1140차, 1141차, 1142차, 1143차, 1144차, 1145차, 1146차, 1147차, 1148차, 1149차, 1150차, 1151차, 1152차, 1153차, 1154차, 1155차, 1156차, 1157차, 1158차, 1159차, 1160차, 1161차, 1162차, 1163차, 1164차, 1165차, 1166차, 1167차, 1168차, 1169차, 1170차, 1171차, 1172차, 1173차, 1174차, 1175차, 1176차, 1177차, 1178차, 1179차, 1180차, 1181차, 1182차, 1183차, 1184차, 1185차, 1186차, 1187차, 1188차, 1189차, 1190차, 1191차, 1192차, 1193차, 1194차, 1195차, 1196차, 1197차, 1198차, 1199차, 1200차, 1201차, 1202차, 1203차, 1204차, 1205차, 1206차, 1207차, 1208차, 1209차, 1210차, 1211차, 1212차, 1213차, 1214차, 1215차, 1216차, 1217차, 1218차, 1219차, 1220차, 1221차, 1222차, 1223차, 1224차, 1225차, 1226차, 1227차, 1228차, 1229차, 1230차, 1231차, 1232차, 1233차, 1234차, 1235차, 1236차, 1237차, 1238차, 1239차, 1240차, 1241차, 1242차, 1243차, 1244차, 1245차, 1246차, 1247차, 1248차, 1249차, 1250차, 1251차, 1252차, 1253차, 1254차, 1255차, 1256차, 1257차, 1258차, 1259차, 1260차, 1261차, 1262차, 1263차, 1264차, 1265차, 1266차, 1267차, 1268차, 1269차, 1270차, 1271차, 1272차, 1273차, 1274차, 1275차, 1276차, 1277차, 1278차, 1279차, 1280차, 1281차, 1282차, 1283차, 1284차, 1285차, 1286차, 1287차, 1288차, 1289차, 1290차, 1291차, 1292차, 1293차, 1294차, 1295차, 1296차, 1297차, 1298차, 1299차, 1300차, 1301차, 1302차, 1303차, 1304차, 1305차, 1306차, 1307차, 1308차, 1309차, 1310차, 1311차, 1312차, 1313차, 1314차, 1315차, 1316차, 1317차, 1318차, 1319차, 1320차, 1321차, 1322차, 1323차, 1324차, 1325차, 1326차, 1327차, 1328차, 1329차, 1330차, 1331차, 1332차, 1333차, 1334차, 1335차, 1336차, 1337차, 1338차, 1339차, 1340차, 1341차, 1342차, 1343차, 1344차, 1345차, 1346차, 1347차, 1348차, 1349차, 1350차, 1351차, 1352차, 1353차, 1354차, 1355차, 1356차, 1357차, 1358차, 1359차, 1360차, 1361차, 1362차, 1363차, 1364차, 1365차, 1366차, 1367차, 1368차, 1369차, 1370차, 1371차, 1372차, 1373차, 1374차, 1375차, 1376차, 1377차, 1378차, 1379차, 1380차, 1381차, 1382차, 1383차, 1384차, 1385차, 1386차, 1387차, 1388차, 1389차, 1390차, 1391차, 1392차, 1393차, 1394차, 1395차, 1396차, 1397차, 1398차, 1399차, 1400차, 1401차, 1402차, 1403차, 1404차, 1405차, 1406차, 1407차, 1408차, 1409차, 1410차, 1411차, 1412차, 1413차, 1414차, 1415차, 1416차, 1417차, 1418차, 1419차, 1420차, 1421차, 1422차, 1423차, 1424차, 1425차, 1426차, 1427차, 1428차, 1429차, 1430차, 1431차, 1432차, 1433차, 1434차, 1435차, 1436차, 1437차, 1438차, 1439차, 1440차, 1441차, 1442차, 1443차, 1444차, 1445차, 1446차, 1447차, 1448차, 1449차, 1450차, 1451차, 1452차, 1453차, 1454차, 1455차, 1456차, 1457차, 1458차, 1459차, 1460차, 1461차, 1462차, 1463차, 1464차, 1465차, 1466차, 1467차, 1468차, 1469차, 1470차, 1471차, 1472차, 1473차, 1474차, 1475차, 1476차, 1477차, 1478차, 1479차, 1480차, 1481차, 1482차, 1483차, 1484차, 1485차, 1486차, 1487차, 1488차, 1489차, 1490차, 1491차, 1492차, 1493차, 1494차, 1495차, 1496차, 1497차, 1498차, 1499차, 1500차, 1501차, 1502차, 1503차, 1504차, 1505차, 1506차, 1507차, 1508차, 1509차, 1510차, 1511차, 1512차, 1513차, 1514차, 1515차, 1516차, 1517차, 1518차, 1519차, 1520차, 1521차, 1522차, 1523차, 1524차, 1525차, 1526차, 1527차, 1528차, 1529차, 1530차, 1531차, 1532차, 1533차, 1534차, 1535차, 1536차, 1537차, 1538차, 1539차, 1540차, 1541차, 1542차, 1543차, 1544차, 1545차, 1546차, 1547차, 1548차, 1549차, 1550차, 1551차, 1552차, 1553차, 1554차, 1555차, 1556차, 1557차, 1558차, 1559차, 1560차, 1561차, 1562차, 1563차, 1564차, 1565차, 1566차, 1567차, 1568차, 1569차, 1570차, 1571차, 1572차, 1573차, 1574차, 1575차, 1576차, 1577차, 1578차, 1579차, 1580차, 1581차, 1582차, 1583차, 1584차, 1585차, 1586차, 1587차, 1588차, 1589차, 1590차, 1591차, 1592차, 1593차, 1594차, 1595차, 1596차, 1597차, 1598차, 1599차, 1600차, 1601차, 1602차, 1603차, 1604차, 1605차, 1606차, 1607차, 1608차, 1609차, 1610차, 1611차, 1612차, 1613차, 1614차, 1615차, 1616차, 1617차, 1618차, 1619차, 1620차, 1621차, 1622차, 1623차, 1624차, 1625차, 1626차, 1627차, 1628차, 1629차, 1630차, 1631차, 1632차, 1633차, 1634차, 1635차, 1636차, 1637차, 1638차, 1639차, 1640차, 1641차, 1642차, 1643차, 1644차, 1645차, 1646차, 1647차, 1648차, 1649차, 1650차, 1651차, 1652차, 1653차, 1654차, 1655차, 1656차, 1657차, 1658차, 1659차, 1660차, 1661차, 1662차, 1663차, 1664차, 1665차

---

## Test and Analysis Fields

---

- | Environment Test |
- | Vibration Test |
- | Electric Function Test |
- | Reliability & NVH Test |



# Environment Test

## 1. Defines

Environmental testing is the temperature that can occur in the environment, humidity, rain, wind, gas, etc. can be all of the elements in the condition

Among the most basic is the temperature at which the test to simulate the humidity environment and evaluating the reliability by applying the test conditions according to the test specification,

## 2. Test Items

- | 2.1 Low Temperature | Under low temperature condition, to verify components durability (IEC 60068 - 2 - 1)
- | 2.2 High Temperature | Under high temperature condition, to verify components durability(IEC 60068 - 2 - 2)
- | 2.3 Temperature Cycling | Test during temperature and humidity cycling condition (IEC 60068 - 2 - 38)
- | 2.4 Thermal Shock | Test under rapid temperature change condition (IEC 60068 - 2 - 14)
- | 2.5 Combined Corrosion | Cyclic corrosion test with salt mist(dry and humidity) (IEC 60068 - 2 - 52)
- | 2.6 Gas Corrosion | Test for gas effect under temperature condition (IEC 60068 - 2 - 60)
- | 2.7 Fluid Corrosion | Test for various type of fluid, to verify the fluid resistance
- | 2.8 Dust Test | Test for customer request test standards (ISO 20653, IP rating condition)
- | 2.9 Water Test | Test for customer request test standards (ISO 20653, IP rating condition)

## 3. Main Achivement

Environment test for automotive components : GMW 3431, GMW 3191, GMW 3172, Renault/Nissan, VW80000, ES/MS, SES, JLR

Display for mobile, sensor, actuator and machinery devices for customer request standards

Components for military, telecommunication device and electronic devices test for customer request

---

## 4. Equipments



### Thermal Shock Chamber

Specification	
Manufacturer	Taipei-TERCHY
Model	TS 200D
Working Temp	-65 ~ 150°C
Humidity	≤2.0°C
Dimension(inner)	650 X 460 X 670



### Dust Chamber

Specification	
Manufacturer	Taipei-TERCHY
Model	DT-1000CF
Working Temp	RT ~ 60°C
Humidity	45 ~ 85RH (natural humidity)
Cycle	1Sec ~ 99Hr (Work, Pause)
Dimension(inner)	1,000 X 1,000 X 1,000



### Cyclic Corrosion Tester (CCT)

Specification	
Manufacturer	Taipei-TERCHY
Model	CCT-16BT
Salt Spray test	Temperature Range : 35 ~ 50°C / ±1
Air drying test	Temperature Range : RT+10 ~ 60°C Humidity Range: ≤30%RH
Pressure tank temp	47°C ±1 / 63°C ±1
Spray quantum	1.0 ~ 2.0 (ml/80cm <sup>2</sup> /h)
Brine concentration	5%
Dimension(inner)	1,600 X 1,000 X 450





### Walk-in Chamber

Specification	
Manufacturer	JEIO ENG CO.,LTD.
Model	THC-S8000L
Working Temp	-40 ~ 150°C (3°C/Min)
Humidity	20 ~ 95%RH
Dimension(inner)	2,000 X 2,000 X 2000



### High Speed Temperature & Humidity Chamber

Specification	
Manufacturer	JINYOUNG TECH
Model	JY-500
Working Temp	-40 ~ 150°C (7°C/Min)
Humidity	30 ~ 98%
Temp. constancy	± 0.3°C
Humidity constancy	± 1.5%RH
Dimension(inner)	500 X 500 X 500



### Temperature & Humidity Chamber

Specification	
Manufacturer	Taipei-TERCHY
Model	MRU-408L
Working Temp	-40 ~ 150°C (3°C/Min)
Humidity	10 ~ 98%RH at 65 ~ 90°C
Dimension(inner)	600 X 800 X 850

## Vibration Test

### 1. Defines

Vibration test is to evaluate components and assemblies that can withstand the physical condition and to assess the reliability of test sample. The vibration is applied to the automobile module and parts, machinery parts, defense parts, electrical and electronic components and.

### 2. Test Items

- | 2.1 Vibration | Durability and fatigue test under sine sweep, random vibration (KS R1034, IEC60068 2 - 64)
- | 2.2 Combined Vibration | Vibration under temperature condition (KS C 0293, KS C 0294, IEC60068 2 - 64)
- | 2.3 Shock, Collision | High performance shock test(Pot hole, Collision) (KS C 0241, IEC60068 2 - 27)
- | 2.4 Resonance Detection | Resonance detection test for test samples (KS R 1034, IEC60068 2 - 6)
- | 2.5 Resonance Durability | Key life and durability test at resonance frequency (KS R 1034, IEC60068 2 - 6)

### 3. Achivement

- Sine sweep test(Vibration sinusoidal test) : IEC 60068 - 2 - 6 Fc(Sinusoidal vibrations)
  - Vibration test under pressure(Vibration test with air leakage) : GMW14193(standard:IEC 60068 - 2 - 64 Fh)
  - Vibration shock test(Vibration and shock test) : MIL - STD - 810D
  - Key life test under temperature conditions : Side step ass ' y reliability test
  - HVAC, controller combined vibration test(Random vibration endurance test) : GMW14780
  - Packaging and shipping vibration(Vibration of package) : IEC 60068 - 2 - 64 Fh
  - Seat frame vibration test : IEC 60068 - 2 - 64 Fh
  - Shock test of battery pack and module : UN 38.3 T4
  - Solenoide valve vibration endurance test : ES90000 - 04
  - Vibration test for mobile LCD panel : IEC 60068 - 2 - 64 Fh
  - Vibration test for blower motor : REF 7931Z - W8CB - V000 - 7.7
  - Random vibration endurance test for HVAC module : GMW3172 9.3.1
  - Fuel tank random vibration endurance test :
  - Tail lamp vibration test for vehicle : ES 92101 - 01
  - Shock and vibration test for slip ring : MIL - STD - 810F 516.5, MIL - STD - 810C 514.2
  - Random vibration endurance test for fuel tank pad : customer request standards
  - Reservoir tank vibration test for vehicle : customer request standards
  - Vibration test for military device : MIL - STD - 810F
  - Shock test for electronic vehicle unit : customer request standards
-

## 4. Equipments



### Combined Environmental Vibration Testing System

Specification	
Manufacturer	ETS
Model	745A
Working Temp	-50 ~ 150°C
Humidity Range	10 ~ 95%RH
Rated peak force	7,000kgf / Sine, Random, Shock
Frequency Range	3 ~ 2,000Hz
Max. Acceleration	100 G
Dimension(inner)	1,000 X 1,000 X 1,000



### Combined Environmental Vibration Testing System(External)

Specification	
Manufacturer	Shinken, ESPEC
Model	G-0220NH, PVS-5kPH
Working Temp	-70 ~ 150°C
Humidity Range	20 ~ 95%RH
Rated peak force	2,040kgf / Sine, Random, Shock
Frequency Range	3 ~ 2,000Hz
Max. Acceleration	92G
Dimension(inner)	800 X 800 X 800



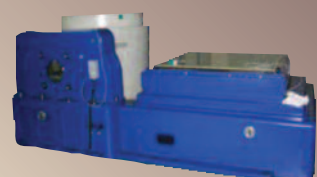
### Electronic Exciter (External)

Specification	
Manufacturer	FAM TECH
Model	EDS7000
Frequency Range	5 ~ 2,200Hz
Rated peak force	7,000kgf / Sine, Random, Shock



### Electronic Exciter (External)

Specification	
Manufacturer	B&K
Model	V875-640
Exciting Force	3,633kgf / Sine, Random, Shock
Exciting Frequency	Max 3,000Hz



### Electronic Exciter (External)

Specification	
Manufacturer	FAM TECH
Model	EDS16000
Frequency Range	5 ~ 2, 200Hz
Rated peak force	4,000kgf (long stroke) / Sine, Random, Shock

## Electric Function Test

### 1. Defines

The effects of the installation location of the potential environmental stress and product component in the electronic system in accordance with the test specification by applying the test conditions should ensure the reliability of the product

EMC (Electromagnetic compatibility) Definition: An unnecessary electromagnetic radiation which is incidentally generated from electronic devices in space or other factors that are falling due to the phenomenon of electromagnetic induction device groups or communications failure or ride itself

EMI (Electromagnetic interference) definition: the electromagnetic waves coming from the device for generating an electromagnetic wave capable of normal operation even from the effects of electromagnetic waves from the other devices without a fault on the performance of other equipment,

EMS (Electromagnetic susceptibility) definition: ability in the environment with electromagnetic interference devices, apparatus, and the performance of the system can operate continuously without falling

### 2. Test Items

- | RE(Radiated Emission) | CISPR 25
- | CE(Conducted Emission) | CISPR 25
- | CTE(Conducted Transient Emission) | ISO 7637 - 2
- | RS(Radiated susceptibility) | ALSE, BCI, Strip line, MFS, ISO 11452 - 2/4
- | CS(Conducted susceptibility) | Transient Pulse, ISO 7637 - 2
- | ESD(Electrostatic Discharge) | Power On/Off – ISO 10605

### 3. Achivement

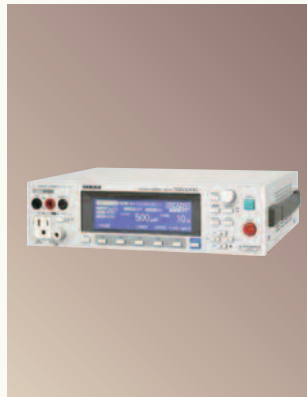
- EMC test for battery pack and module at electronic vehicle : customer request standards
  - Electronic function test for gear knob and LED system for vehicle : GMW3172
  - Electronic function test for BMS at electronic vehicle : VW80000
  - Monitoring and function test for ECU : ISO 16750
  - ESD test for for vehicle interior light parts : customer request standard
-

## 4. Equipments

### Electronic function test and measuring devices



Transient test system (External)



Leakage current tester



Multi-Hipot tester



Data logger - 20ch

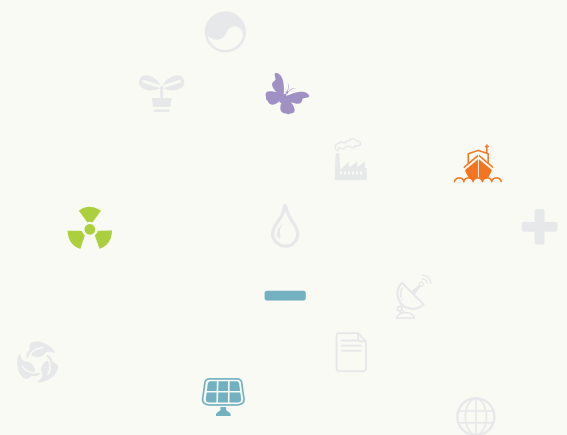
### EMC test chamber and devices



ESD test system (External)



RE, CE, MFE tester (External)



## Reliability & NVH Test

### 1. Defines

Reliability test must ensure the quality of materials and products and keep stable quality in the early stages of development.

Environmental test, safety test, NVH test and other reliability test (eg electronic function test, mechanical test, resistance test for circumstance..) have to verify at DV/PV stage.

### 2. Test Items

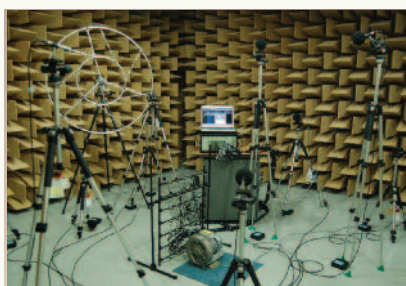
- | 2.1 Environment test | Low and high temperature condition, humidity, rapid temperature change cyclic corrosion test and fluid resistance test, etc
- | 2.2 Safety test | Electronic function test, vehicle crash and module SLED test
- | 2.3 NVH test | Noise measuring, vibration behavior and modal test
- | 2.4 Mechanical test | Free fall, elbow load test, terminal tension and insertion test, etc
- | 2.5 Leakage test | Dust test, water test and sealing test
- | 2.6 Hydraulic actuator test | Linear fatigue test, durability test, rotational test and key life test

### 3. Achivement

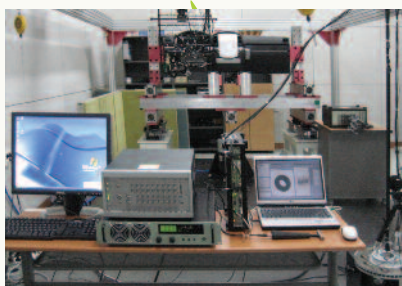
- Sound absorption and insulation test : KS F 2814 - 2:2002
  - Fatigue and durability test of seat cushion : customer request standard
  - Side step assembly reliability test
  - Altitude test for slip ring and vehicle components
  - Free fall test of packaging
  - Liquid tightness water test : Liquid tightness water test IP X2
  - Terminal strength test at ECU & BMS
  - Brackets, fasteners load test
-

## 4. Equipments

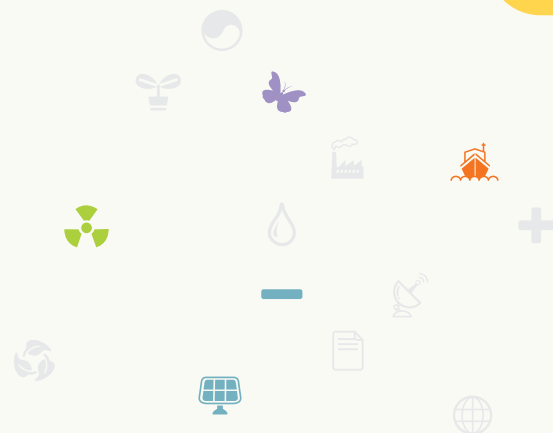
### NVH test equipments



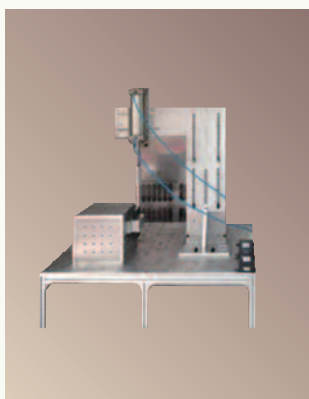
Noise measurement system(External)



Electronic Exciter (External)



### Mechanical durability tester



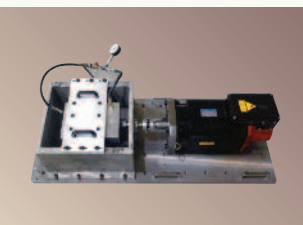
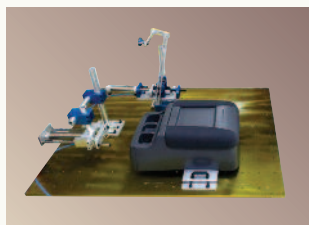
Cycle force test equipments

# Engineering System

- Tester
- Inspection and checker
- Customer request test devices
- Test and welding jig fixture

## 1. Testing Equipment

- |   |   |
|---|---|
| <u>NVH Test Devices</u>                             | <u>BSM Durability Tester</u>                    |
| <u>Door Trim Impact and Durability tester</u>       | <u>Mechanical Exciter</u>                       |
| <u>Free Fall Tester</u>                             | <u>Vacuum Waterlogging Tester</u>               |
| <u>Strength and Durability Test for Glow Box</u>    | <u>Function Test for Heat Pump</u>              |
| <u>Engine Cover Durability Tester</u>               | <u>Friction Coefficient Tester</u>              |
| <u>Drop Ball Tester</u>                             | <u>Static Loading Tester</u>                    |
| <u>Abrasion Tester</u>                              | <u>Environment Chamber(General/High Speed))</u> |
| <u>Thermal Tester</u>                               | <u>Cyclic Corrosion Tester(CCT)</u>             |
| <u>Vehicle Interior Trim Disassemble Tester</u>     | <u>Luggage Board Durability Tester</u>          |
| <u>Air Conditioner Controller Durability Tester</u> | <u>Window and Glass Durability Tester</u>       |
| <u>Reservoir Tank for Coolant Scattering Teste</u>  | <u>Sun visor Durability Tester</u>              |
| <u>Vehicle Door Open/Close Durability Tester</u>    | <u>Vertical Water Tester</u>                    |
| <u>Console Durability Tester</u>                    |   |





2. Inspection Devices

- Knob Actuation Force for Glow Box
- Aluminum Die Casting Auto Inspector
- Head Lining Multi Inspector
- Actuating Force Inspector for Retainer and Pivot Arm
- Power Engagement and Force Test for MCCB
- Radiator Switch for Vehicle Function Inspector



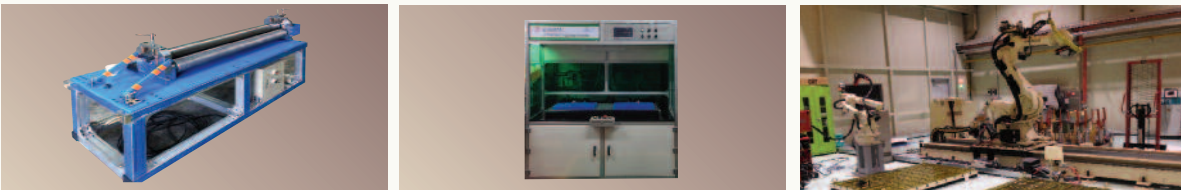
3. Customer Request

- Roll Bending Devices
- Multi Jig Fixture for Testing and Measuring
- Rotary Type Washing Devices
- Assembly Jig and Tools
- Ultra Sonic Melting Machine
- Testing Plate and Base

Roll Bending machine

Ultra Sonic Melting Machine

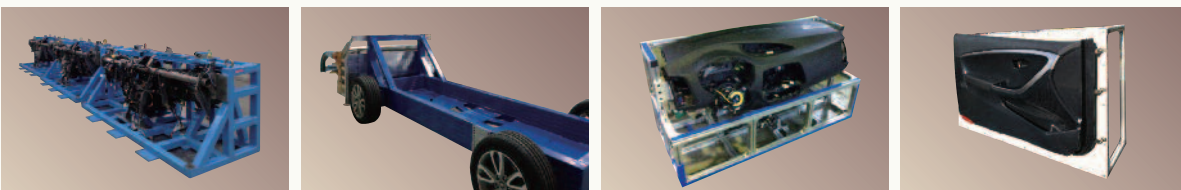
Testing Plate and Base



4. Welding JIG / Testing JIG & FIXTUR

- Vibration, Crash and SLED, Static/Dynamic Strength, BSR, Lighting, Durability, Key Life Test
- 3 Dimension Measuring Fixture and Customer request Testing and Measuring Devices

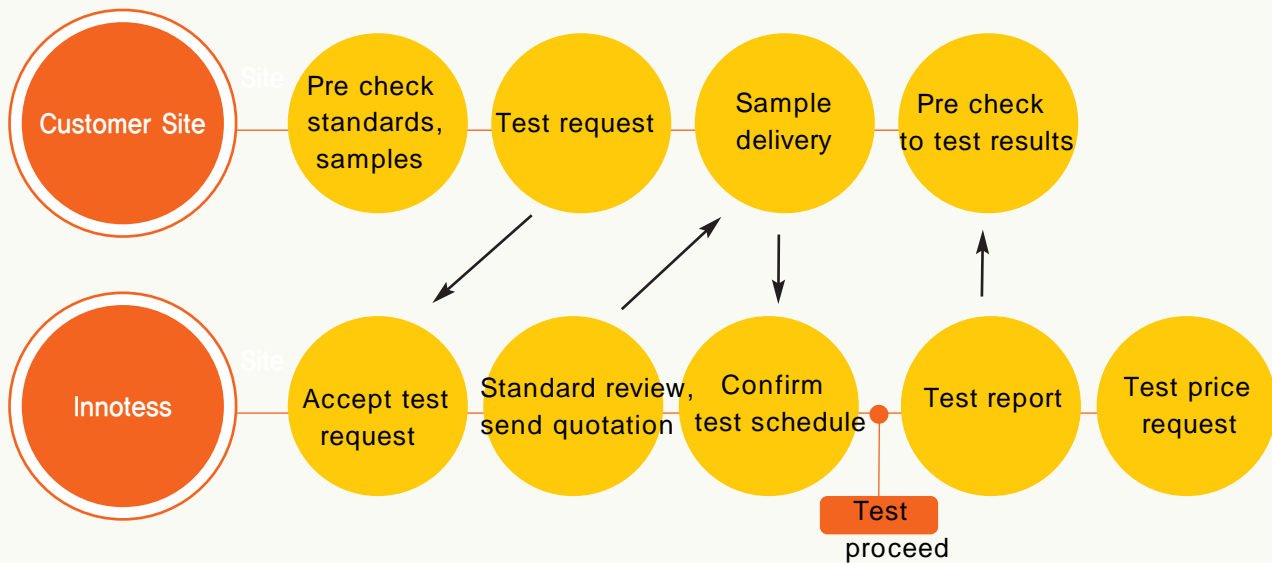
JIG & FIXTURE for Testing



Main engineering Fields

Test item	Test components
Environment	ECU, BMS, Battery pack/module/cell, Relay, Knob, Control module, LED indicators, LED, Pedal sensors, Ring terminal, Wiring harness, PCB Panel, Power steering pump, Mobile display device, Knob switch Fuel tank, Motors, Connectors, Electronic components and element for vehicle, Cable, Optical device etc
Vibration	ECU, BMS, Battery pack/module/cell, Relay, Gear knobs, LED indicators, Pedal sensors, Fuel tank, Lamps, Solenoid valves, Plastic panel, Engine cover, Regulator, Ring terminal, Wiring harness, Slip ring, Gear knob switch, Package box, LED, Mobile display device, Motors etc.
Electronic	BMS, Battery pack/module, Knob switch, PCB panel etc..
NVH and	Knob switch, Solenoid, Sun visor, Window screen, Package box, Lamp, LED, PCB panel, Optical Cable, Fuel tank, Fuel inlet lines etc

Engineering Process



## Map

### Ulsan R&D Support Office

R202 - 21, Automotive Parts Institute Center, Ulsan City



### Yangsan office and LAB.

3516, Youngsan Univ. Yangsan City



### Dongwon Lab.

321, Dongwon Univ. Yangsan City



## Contact

| Environment, Electronic function test |

Tel : 070 - 4633 - 1333

E - mail : davidshim@innotess.com

| Vibration(NVH) and reliability test |

Tel : 070 - 4633 - 6049

E - mail : zoekim@innotess.com

| System supply and manufacturing |

Tel : 070 - 4633 - 1332

E - mail : justinkim@innotess.com



| Tel. | 070-4633-1330

| Fax | 070-8610-5383

| E-mail | [innotess@innotess.com](mailto:innotess@innotess.com)

| Homepage | <http://www.innotess.com>