

# **Advanced Virtual Engineering & Testing Laboratories**

# SMALL UNMANNED AIRCRAFT IMPACT TESTING





# **TESTING CAPABILITIES**

#### **AVET Lab Abilities**

- Adhere to standard test method as outlined by F3389/F3389M
- Able to meet all impact orientations as outlined by F3389/F3389M – Method B, C, & D
- Able to accommodate most small unmanned aircrafts (sUA) Categories 1, 2, & 3
- Capable of achieving both critical speeds & operational speeds for most sUAs
- Adaptability of test apparatus allows for fixed-wing & rotor-wing sUAs, sUA parts, and rigid impactors
- Worst case testing for probable impact orientations
- Photographic & video documentation of testing procedures
- Data collection using data acquisition, instrumentation, and photometric analysis per SAE J211
- Generation of reports with data analysis & results

GENERAL TSF I FORMATION  Customer:  FAA  FAA    Tert Facility  NLAR  Customer:  FAA    Facility Ten Number:  LUAI9A-109  Gran Number:  Task AI4    Tert Data and Time  11/2720185 20:49 PM  Tert Plan Date:  Boylin    CAV Workit:  Planatom 3  Tert Plan Date:  Boylin    CAV Workit:		WICHITA STATE UNIVERSITY						
Tert Facility:      NAR      Contoner:      FAA      FAA      Instandard        Feeling Test Number:      L104.009      Grant Number:      Task Al4      Instandard      <	GENERAL TEST INFORM	ATION				Cost Dynamics Lab		
Facility Text Number:    Table All Table All Deep Text Marker, Revelt    Woods, Alexander 2020/090      Carl Data and Times    Text Plan Number:    Table All Table All Pipti and Deep Text Marker, Revelt    Woods, Alexander All Pipti and Deep Text Marker, Revelt      UAV Model:    Phuntom 3    Text Plan Date:    80/18    Control Text Plan Date:    Biological Plan Text Number:    123      UAV Model:    2.33 Ibs    Text Plan Date:    80/18    Control Text Plan Deet Number:    123      UAV Wagit:    2.33 Ibs    Text Plan Text Number:    123    Control Text Plan Text Number:    123      UAV Roll:    0 deg    Control Text Plan Text Number:    123    Control Text Plan Text Number:    124      UAV Roll:    0 deg    Laboratory Temperature:    7.3.75    Control Text Number:    124/2016      UAV Roll:    0 deg    Laboratory Temperature:    7.3.75    Control Text Number:    176 Plan Text Number:    176 Plan Text Number:    172.80      Text Rest Case All Plan Text Number:    10% to 70% Maintanel for previous 4 hours:    PASS    Text UAMAH.00    Text UAMAH.00      Text Rest Case All Plan Text Number:    10% to 70% Maintanel for previous 4 hours:    PASS    Text UAMAH.00    Text UAMAH.00	Test Facility:	NIAR UA19A-109 11/27/2018 5:20:49 PM Phantom 3		Customer:	FAA	1845 N. Fairmount St. Wichta, Kansas 67260-0093 Tel: (316) 978-5239 Fax: (316) 978-3175 www.niar.wichta.edu		
Test Date and Time:      J.12/2016 5.20.49 MA      Test Plan Number:      A14 Fight and Drog Test Matrix, Rev48      Pract 2019 98-275        UAV Model:      Plantions      Test Plan Date:      8/018      Doc: No: COLUAISA-108:01        UAV Serial Number:	Facility Test Number:			Grant Nur	nber: Task A14			
UAV Model:      Plantom 3      Tet Plan Date:      89/18      unw.microlla.edd        UAV Weight:      2.53 lbs      Tet Plan Tet Number:      133      Dot. No: CDL.UA19A.109.01        UAV Weight:      2.53 lbs      Tet Plan Tet Number:      133      Dot. No: CDL.UA19A.109.01        TST CONDUTIONS      Tet Plan Tet Description:      59 Degree - Freat into freat of head      Dot. No: CDL.UA19A.109.01        TAY First:      50 degree      66° fro. 76° Mantanead for previous 4 hours:      PASS        CAV Roli:      0 deg      Laboratory Temperture:      72.37°        TST SULTS AND FNURY CHITERA      Tet UA19A.100      Tet UA19A.100        Test Field      Actions      ATD S/N: 200        TAX Vehicity:      71.10 %      71.71 B/s      Test UA19A.100        Test Market Values      Limit      Result      Pass Fail      Pass Fail        HC15      700      850.20      FAIL      Pass Fail      Pass Fail        Experimentation (Inf. 0)      412.9      PASS      200      10.20      20.40      50.60      70.70      70.70        HC15      700      850.20      FAIL      200	Test Date and Time:			Test Plan !	Number: A14 Fight and Drop Test Matrix_Rev48			
CAV serial Number:      Calibration Test      Test Plan Test Number:      133      Dot: No: CDL/UA19A.108.00        CAV Weight:      2.33 lbs      Test Plan Test Number:      133      Dot: No: CDL/UA19A.108.00      Version: New        TST CONDITIONS      Impart Augle:      58      Storm into form int	UAV Model:			Test Plan I	Date: 8/9/18			
CAV Weight:      2-53 lbs      Test Plan Ted Part of Description:      SB Degree - Front into front of hand Impact Angle:      Version New        TEST CONSTITIONS      Impact Angle:      58      SB Degree - Front into front of hand Impact Angle:      Report New      Report New      Report New      Report New      Report New      Report Date:      1/28/2018        Laboratory Temperature:      2.3 set      66°T to 78°T Maintaned for previous 4 hours:      PASS      Curking FAA        LAV Fich:      0 deg      Laboratory Temperature:      9.0 %      Pass      Curking FAA        Test RESULTS AND POLICY CHITERIA      Atto SNI:      PASS      Definition 3.      Pute Name:        Maximum Peak Values      Limit      Result      Pass Fail      Atto SNI:      200        Hidd Acceleration (g)      0.0      31.127      FAIL      Mainterime for previous 4 hours:      Pass Fail        Upper Neck Emstein (th/)      31.29      PASS      200      10      10      10      10      10      10      10      10      10      10      10      10      10      10      10      10      10      10      10      10 </td <td>UAV Serial Number:</td> <td colspan="2">Calibration Test</td> <td>Test Plan</td> <td>Test Number: 133</td> <td>Doc. No : CDL-UA19A-109-01</td>	UAV Serial Number:	Calibration Test		Test Plan	Test Number: 133	Doc. No : CDL-UA19A-109-01		
Impact Augle: 58      Version New        Impact Augle: 58      Version New        Impact Augle: 58      Impact Augle: 58      Version New        Impact Augle: 58      Laboratory Temperature: 2.3.FF      Report Date: 112/2016        UAV Pircle: 58 deg      Laboratory Temperature: 2.3.FF      Outcomer FAA        LAV Roll: 0 deg      10% to 70% Maintained for previous 4 hours: PASS      Test: UA110A-109        TAX Roll: 0 deg      10% to 70% Maintained for previous 4 hours: PASS      Test: UA110A-109        LAV Velacity: 71 B/s      71.1 B/s      ATD Weight: 170 lbs      Percentaged Maintained for previous 4 hours: PASS        Maximum Peak Values      Linkit Result      Pass/Fail      Percentaged Maintained for previous 4 hours: PASS        Upper Neck Tension (db)      200      311 127      FAIL      Percentaged Maintained for previous 4 hours: PASS        Upper Neck Tension (db)      997      60.20      FAIL      Percentaged Maintained Maintained for previous 4 hours: PASS        Upper Neck Tension (db)      997      60.26      PASS      Percentaged Maintained M	UAV Weight:	2.53 lbs		Test Plan	Fest Description: 58 Degree - Front into front of head			
TEST CONSUMPORS      Report Date: 11/28/2018        Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018      Report Date: 11/28/2018        Date: 11/28/2018 <th 201<="" 28="" colspan="2" td=""><td></td><td></td><td></td><td>Impact An</td><td>gle:58</td><td>Version: New</td></th>	<td></td> <td></td> <td></td> <td>Impact An</td> <td>gle:58</td> <td>Version: New</td>					Impact An	gle:58	Version: New
Impact Yaw and Direction: 0 deg Frontal      Laboratory Temperature:      2.3 FF      Customer FAA        CAV Prock:      0 deg      0 off for 70% Maintained for previous 4 hours:      PASS      Test UA190A-100        TAST RESULTS AND INTENCEMENT      0 deg      10% to 70% Maintained for previous 4 hours:      PASS      Test UA190A-100        TAST RESULTS AND INTENCEMENT      0 deg      10% to 70% Maintained for previous 4 hours:      PASS      Test UA190A-100        TAST RESULTS AND INTENCEMENT      0 deg      10% to 70% Maintained for previous 4 hours:      PASS      Test UA190A-100        Mainum Peak Values      10% 71.71 ft/s      ATD Weight: 170 lbs      Proceentaged Maintained for previous 4 hours:      PASS        Mainum Peak Values      Limit      Result      Pass Fail      Proceentaged Maintained for previous 4 hours:      Pass Fail        Heid Acceleration (g)      200      311.27      FAIL      Proceentaged Maintained for previous 4 hours:      Pass Fail        Upper Neck Tension (hdf)      31.26      PASS      20      10      10      10% 10.10      10% 10.26        Upper Neck Previous (hours)      31.26      PASS      20      10      14.24      PASS      20	TEST CONDITIONS					Report Date: 11/28/2018		
UAN Pitch:      58 dog.      66°F to 78°F Mantaned for privious 4 hours:      PASS      Luboratory Humidity:      39.6%        UAN Role:      0.deg.      Laboratory Humidity:      39.6%      Test Mathanel for privious 4 hours:      PASS        ItsT EXELTS AND NUER/CONTERNA      Destred      Achieved      ATD S/N: 290      Test Mathanel for privious 4 hours:      PASS        LAV Velocity:      71 fb/s      71.171 fb/s      ATD S/N: 290      Test Mathanel for privious 4 hours:      Test Mathanel for priva for privious 4 hours:	Impact Yaw and Direction: 0 deg Frontal			Laboratory Temperature: 72.3°F				
LAN Roll:      0.dg2      Laboratory Hundliny:      39.6%      Test: UA10A-109        LIGN to 70% Maintained for pervisors 4 hours:      PASS      Test: UA10A-109      Test: UA10A-109        LIGN to 70% Maintained for pervisors 4 hours:      PASS      ATD SN: 290      Test: UA10A-109        LIAN Velocity:      71.0 hs      Test: UA10A-109      Test: UA10A-109      Test: UA10A-109        Maximum Perk Values      Limit      Result      Parva Fail      Ferentinge of Laboratory 100 monotonia hours:      Test: UA10A-109        Maximum Perk Values      Limit      Result      Parva Fail      Ferentinge of Laboratory 100 monotonia hours:      Test: UA10A-109        Lipper Neck Nationa (bb 0)      907      60.26      PASS      Control 100 monotonia hours:      Test: UA10A-109        Upper Neck Nationa (bb 0)      31.29      PASS      Control 100 monotonia hours:      Test: UA10A-109        Upper Neck Nationa (bb 0)      31.29      PASS      Control 100 monotonia hours:      Hour Analysis 200 monotonia hours:      Test: Hours:      Hour Analysis 200 monotonia hours:        Upper Neck Nationa (bb 0)      31.29      PASS      Control 100 monotonia hours:      Hour Analysis 200 monotonin hours:      Hour Analysis 200 monotonin	UAV Pitch:	58 deg		66°F	to 78°F Maintained for previous 4 hours: PASS	Customer: FAA		
10% to 70% Maintained for previous 4 hours:      PASS        TEST RESCLETS AND INFERCENTITIENT      Test RESCLETS AND INFERCENTITIENT        Desired Achieved      ATD SN: 280        TEST RESCLETS AND INFERCENTITIENT        TEST RESCLETS AND INFERCENTION      Test RESCLETS AND INFERCENTION      Test RESCLETS AND INFERCENTION      Test RESCLETS AND INFERCENTION        MADIA Colspan="2">TEST RESCLETS AND INFERCENTION      TEST RESCLETS AND INFERCENTION        TEST RESCLETS AND INFERCENTION      TEST RESCLETS AND	UAV Roll:	0 deg	Laboratory Humidity: 39.6%		Test: UA19A-109			
TEST BASELTS AND INDEX CATTERIA      Antive      ATD S/N: 290      Differions.        UAV Vehicity:      71.8%      71.71.8%      Att D S/N: 290      Att D S/N: 290        Maximum Pesk Values      Limit      Result      Pars Fail      Att D S/N: 290      The Name:        Maximum Pesk Values      Limit      Result      Pars Fail      Att D S/N: 290      The Name:        Upper Neck Person (b)      90      301.27      FAIL      Att D S/N: 290      The Name:        Upper Neck Person (b)      917      60.26      PASS      Att D S/N: 200      Att S 2 = 20.45%        Upper Neck Presion (b)      917      60.26      PASS      Att S 2 = 20.45%      Neck        Upper Neck Strustion (b)      10      31.29      PASS      Att S 2 = 24.25%      Att S 2 = 24.25%        Upper Neck Strustion (b)      076      PASS      Att S 2 = 20.45%      Att S 4 = 20.45%        Nonclast Works      NCE 0.44      NCE 0.47      NCE 0.47      Att S 2 = 20.35%      Att S 4 = 20.35%        Nonclast Works      NCE 0.47      NTE 0.17      NTE 0.17      NTE 0.17      NTE 0.17      NTE 0.17				10% 1	to 70% Maintained for previous 4 hours: PASS	Test Description:		
Desired      Achieved      ATD SN: 280      Plus Name:      Plus Name:<	TEST RESULTS AND INJU	RY CRITERIA				DJI Phantom 3		
Link      Result      Parts Fail      ATD Weight:      170 lbs      Fulls Name        Maximum Pesk Values      Link      Result      Parts Fail      In the set of the set		Desired	Achieved		ATD S/N: 290			
Percenting of Maximum Pesk Values      Limit      Result      Parts Fall        Maximum Pesk Values      Limit      Result      Parts Fall      Pa	UAV Velocity:	71 ft/s	71.71 ft/s		ATD Weight: 170 lbs	Pulse Name: 71 ft/s 58 deg - ATD Front		
Bited Acceleration (g)      200      311.27      FAIL      FAIL      FAIL        Upper Neck Tension (bb)      937      60.26      PASS      2      4      AIS Percent Injury Probability        Upper Neck Tension (bb)      937      60.26      PASS      2      4      AIS Percent Injury Probability        Upper Neck Tension (bb)      937      6.2.2      PASS      2      4      AIS 2 = 20.9 M %        Upper Neck Tension (bb)      859      999.53      FAIL      4      AIS 2 = 20.9 M %        Upper Neck Shearo (bb)      60.6      31.2.9      PASS      4      AIS 2 = 2.42 % S 42.7 %        Upper Neck Shearo (bb)      60.6      31.2.42      PASS      4      AIS 3 = 15.17 % 15.81 %        Upper Tentar Were Letter      Model M NCE 0.44      NCE 0.44      2      4      AIS 4.7 %        Name Letter      Model M NCE 0.77      NCE 0.76      1      4      4      4        Norther Model M NCE 0.77      NCE 0.77      NCE 0.77      1      4      4      4	Maximum Peak Values	Limit	Result	Pass/Fail	Percentage of Maximum 0 10 20 30 40 50 60 70 80 90 100 110 120 13	Rate: 20000 Pretrigger Samples: 80001 Total Samples: 160002 Rev: 5 SUCEscore 1.08.0714		
HIC1S      700      BS0.30      FAIL      All Partent injury Probability        Upper Neck Tension (bbf)      927      60.26      PASS      2      415        Upper Neck Direction (bbf)      899      995.35      FAIL      415      Partent injury Probability        Upper Neck Direction (bbf)      140      31.29      PASS      2      416      Past 2      206.4%        Upper Neck Direction (bbf)      120      PASS      2      1      415      Past 2      206.4%      Neck        Upper Neck Direction (bbf)      10      31.2.9      PASS      2      1      415      At 35.4      1.57.7%      5.2.1%      Neck      At 35.4      1.4.5%      At 35.4      1.4.6%      At 4.5%      At 35.4      1.	Head Acceleration (g)	200	311.27	FAIL		Test Date/Time: 11/27/2018 5:20:49 PM		
Upper Neck Tension (bb)      937      60.26      PASS      2      All Structure (bar) (Probability)        Upper Neck Compression (bb)      899      999-53      FAIL      Hadd      AllS 2 = 29.84 %        Upper Neck Compression (bb/fit)      140      31.29      PASS      2      Hadd      AllS 2 = 29.84 %        Upper Neck Shear (bb)      695      312.42      PASS      2      AllS 2 = 23.25 % 34.27 %        Upper Neck Shear (bb)      695      312.42      PASS      2      AllS 2 = 53.05 % 52.1 %        Upper Clair Merch (bar)      0.76      PASS      2      AllS 4 = 14.45 % 14.67 %      AllS 5 = 5.20 % 52.1 %        Model Clair (bar)      0.76      PASS      2      2      5 % 52.1 %        Mass 11011      0.76      PASS      2      4      AllS 5 = 5.20 % 52.1 %        Mass 11211      Mass 112111      14.05 % 14.07 %      4      AllS 5 = 5.20 % 52.1 %        Mass 11211      Mass 112111      10.7 %      10.7 %      4        Mass 112111      11.10 % 14.07 %      11.10 %      11.10 %        Mass 112111      11.10 %      11.10 %      1	HIC15	700	850.20	FAIL				
Upper Neck Denom (bb/)      B99      999      53      FAIL      Umper Neck Plenion (bb/)      His2      His2        Upper Neck Plenion (bb/)      140      31.29      PASS      His2      His2      His2        Upper Neck Plenion (bb/)      42      14.22      PASS      His2      His2      His2        Upper Neck Plenion (bb/)      42      14.22      PASS      His2      His2      His2      His2        Upper Neck Nart (bb/)      00      0.76      PASS      His2	Upper Neck Tension (lbi	<b>D</b> 937	60.26	PASS		AIS Percent Injury Probabilit		
Upper Neck Blenkon (thi ft)      140      31.2.9      PASS      2022      All      Heck        Upper Neck Blenkon (thi ft)      42      1.4.42      PASS      2022      All	Upper Neck Compressio	on (lbf) 899	999.53	FAIL		Head AIS-2 = 39.84 %		
Upper Neck Extension (lbf-ft)      42      14.42      PASS      AllS-2 = 24.25 % 42.7 %        Upper Neck Sherr (lbf)      66      312.42      PASS      AllS-3 = 15.17 % 15.21 %        Upper Neck Sherr (lbf)      1.0      0.76      PASS      AllS-4 = 14.45 % 14.47 %        Upper Neck Sherr (lbf)      0.76      PASS      AllS-4 = 15.17 % 15.21 %        Madified Nij      NCE 0.76      AllS-5 = 5.20 % 5.21 %        Madified Nij      NCE 0.76      Head Sherr (01)        Modified Nij      NCE 0.76      Head Sherr (01)        Modified Nij      NCE 0.76      Head Sherr (01)        Modified Sherr (01)      10.17      TE 0.17	Upper Neck Flexion (lbf	-ft) 140	31.29	PASS		Neck		
Upper Neck Shear (lbt)      666      312.42      PASS      Mass = 1517 % 154.3 %        Vpper Neck Nij      10      0.76      PASS      Alls3 = 1517 % 154.3 %        Vpper Neck Nij      10      0.76      PASS      Alls3 = 1517 % 154.3 %        Vpper Neck Nij      0.076      PASS      Alls5 = 520 % 5.21 %        Madden Nic Pi or 7      NCE 0.76      Madden Nic Pi or 76        NDR Model (lbba)      Int Pi or 76      Head Smerit Nic Pi or 76        NDR Nic Pi or 7      NTE 0.17      NE 0.17	Upper Neck Extension (I	lbf-ft) 42	14.42	PASS		AIS-2 = 24.25 % 24.27 %		
Upper Net Nij      10      0.76      PASS      All 4      Nat 4      4	Upper Neck Shear (lbf)	696	312.42	PASS		AIS-3 = 15.17 % 15.21 %		
Improximati Server Level      Modelided Xij      NCE      0.44        DRA ANDER/DISHI (Group)      INCE 0.46      Addisorball      Addisorball        DRA ANDER/DISHI (Group)      INCE 0.46      NCE 0.76      Addisorball        DRA ANDER/DISHI (Group)      INCE 0.47      NCE 0.76      Head 3ms (g) 78.64        DRMSS (Group)      INCE 0.17      NE 0.17      Modified Shear (R)	Upper Neck Nij	1.0	0.76	PASS		AIS-4 = 14.45 % 14.47 %		
Deam unXCE 0.46 VCF 0.76 VCF 0.76 VCF 0.76 VCF 0.76 VCF 0.76 VCF 0.77 VCF 0	Injury Limit Source Legend	Modified Nij	NCE 0.44			Allo-0 = 0.20 % 5.21 %		
DALTALALIS      (Populo)        DALTALALIS      (Populo)        DALTALALIS      (Populo)        DALTALALIS      (Populo)        MOSTORIO      (Back)        mNTE      0.17        Modified Shear (IDIC)      12.44	Dance (Diss)	mNCE 0.46	NCE 0.76			Head 3ms (g) 78.54		
(hind) mNTE 0.17 MIE	FAA ANM-03-115-31 (Orange)							
	FAA ANM-03-115-31 (Orange) FAA Task A14 (Puple) TM/INS 208 (Black)	mNCF 0.77				Modified Shear (IN): 210.40		
	FAA ANM-03-115-31 (Orange) FAA Task A14 (Purple) FMVSS208 (Black) Lund (Pink) UN R94 (Gray)	mNCF 0.77 mNTE 0.17 mNTF 0.03	NTE 0.17 NTF 0.03			Modified Shear (lbf): 312.42 Lateral Moment (lbf-ft): 3.46		





## **sUA IMPACT LAUNCHER**

#### sUA Impact Launcher with Rigid Seat

- Adjustability to allow for vertical drops, horizontal impacts, and angled impacts
- Ability to adjust launch speeds to meet various velocity requirements
- Attachable sled permits a variety of fixtures to be mounted to accommodate the variation in sUA orientations
- Lift table with fixed mounting plate provides adjustability and stability
- Rigid Seat offers ability to restrain ATD to increase stability and repeatability of impacts







### **ATD & DATA ACQUISITION**

### FAA 50<sup>TH</sup> Percentile Male Hybrid III

- Instrumented with three head accelerometers
- Three head angular rate sensors
- Six-axis upper neck load cell
- ATD & instrumentation meets standards outlined in SAE J211
- All instrumentation calibrations documented and traceable to national standard
- Targets located at head CGs for photometric tracking
- Colored chalk available to apply on sUA and/or ATD for easy identification of impact areas





- System is used to acquire data during sled tests & component tests and is typically ran at 20,000 samples/second.
- Shock hardened, mega-sample modular data acquisition system
- 96 channels; sampling rate up to 500K samples/sec/channel; programmable analog filtering; full- and half-bridge sensors; accuracy within 0.2%
- Compliant with SAE J211, ISO 6487, and FAA/NHTSA requirements
- NIST traceable calibration performed by Diversified Technical Services
- Uses DTS SLICEWare Data Collection Control and Processing Software





### PHOTOMETRIC INSTRUMENTATION

#### PHOTRON FASTCAM SA-Z Digital High Speed Cameras

- Two (2) Digital High-Speed, High Resolution, Color Imagers (Offboard)
- Two (2) Digital High-Speed, High Resolution, Monochrome Imagers (Off-board)
- 1024x1024 pixilation (at or below 20,000 frames/second)
- Up to 480,000 frames/second (at lower resolution)
- Various lens options

#### AOS S-VIT Digital High Speed Cameras

- Six (6) Digital High-Speed, High Resolution, Color Imagers (Onboard/Off-board capable)
- 1000 frames/second at 800x600 pixilation
- Onboard junction box and battery
- Color correction
- Improved light sensitivity
- Onscreen display of test number, camera location, time, and frame number
- Various lens options

#### TEMA Automotive Motion Analysis Photometric Software

- 2D and 3D trajectory plots from both left and right sides of sled
- Simplified lens correction
- Built-in perspective and parallax compensation
- Polynomial spline and other filtration
- 3D tracking with relative camera orientation
- Automatic target tracking
- Virtual point tracking

### GOM/Trilion Digital Image Correlation (DIC) Software

- Full-field and point based measurements
- 3D acceleration, velocity, and displacement plots
- Simple system calibration procedure
- Automatic target tracking
- Compatible with industry used CAD and FE software packages







