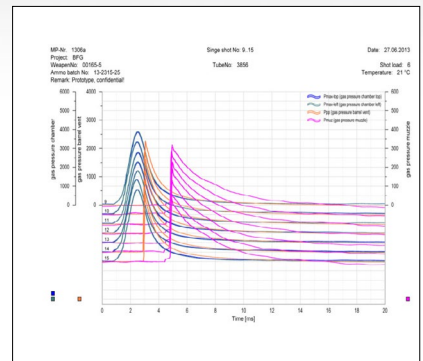
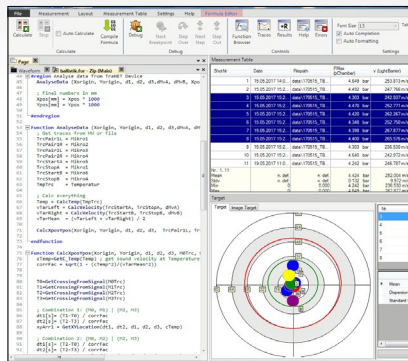
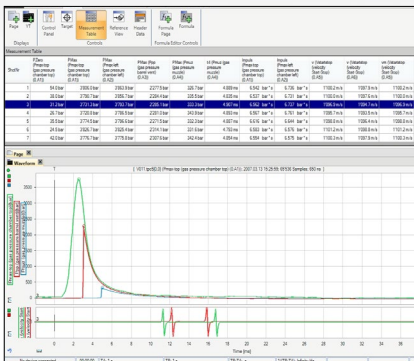


BallAX 4

Ballistic Analysis Software

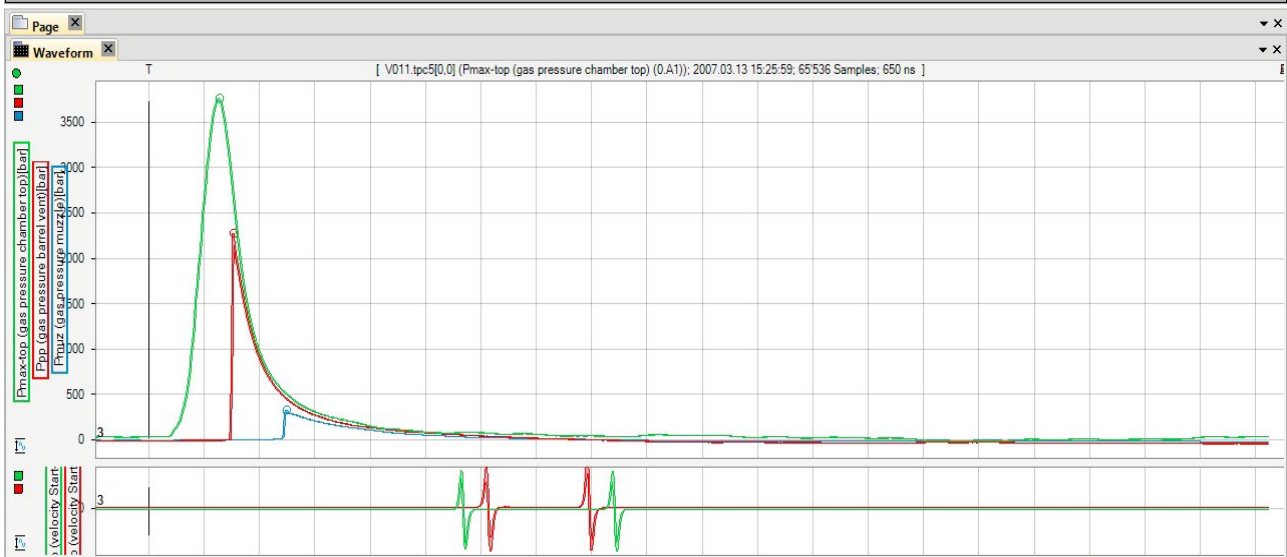


Measurement and Analysis Software

BallAX 4 is used for acquiring and analyzing of ballistic measurement data from firearms, guns, artillery, projectiles and grenades using different ammunition and explosive propellants.

Data gathered by the software aids in determining the accuracy and consistency of a projectile before it exits a firearm. Manufacturers of firearms ranging from basic hunting rifles to critical military artillery will benefit from the precision data afforded by this industry specific software module. BallAX 4 works with all different type of data acquisition instruments from Elsys, with pressure sensors from any different manufacturer and a wide range of Kistler charge amplifiers.

ShotNr	PZero (Pmax-top (gas pressure chamber top) (0.A1))	PMax (Pmax-top (gas pressure chamber top) (0.A1))	PMax (Pmax-left (gas pressure chamber left) (0.A2))	PMax (Ppp (gas pressure barrel vent) (0.A3))	PMax (Pmuz (gas pressure muzzle) (0.A4))	t4 (Pmuz (gas pressure muzzle) (0.A4))	Impuls (Pmax-top (gas pressure chamber top) (0.A1))	Impuls (Pmax-left (gas pressure chamber left) (0.A2))	v (Vstartstop (velocity Start-Stop) (0.A5))	v (Vstartstop (velocity Start-Stop) (0.A6))	vm (Vstartstop (velocity Start-Stop) (0.A5))	Remarks
1	54.0 bar	3806.0 bar	3863.9 bar	2277.5 bar	326.7 bar	4.889 ms	6.542 bar * s	6.736 bar * s	1100.2 m/s	1097.9 m/s	1100.2 m/s	Prototype, confid...
2	38.0 bar	3790.7 bar	3856.7 bar	2284.4 bar	335.5 bar	4.835 ms	6.537 bar * s	6.731 bar * s	1100.0 m/s	1097.6 m/s	1100.0 m/s	Prototype, confid...
3	31.2 bar	3731.3 bar	3793.7 bar	2285.1 bar	333.3 bar	4.907 ms	6.562 bar * s	6.737 bar * s	1096.9 m/s	1094.7 m/s	1096.9 m/s	Prototype, confid...
4	26.7 bar	3720.8 bar	3786.5 bar	2281.0 bar	343.9 bar	4.893 ms	6.567 bar * s	6.761 bar * s	1095.7 m/s	1093.5 m/s	1095.7 m/s	Prototype, confid...
5	35.5 bar	3774.5 bar	3796.6 bar	2271.5 bar	332.3 bar	4.887 ms	6.616 bar * s	6.644 bar * s	1098.8 m/s	1096.4 m/s	1098.8 m/s	Prototype, confid...
6	24.5 bar	3826.7 bar	3825.4 bar	2314.1 bar	331.6 bar	4.793 ms	6.583 bar * s	6.576 bar * s	1101.2 m/s	1098.8 m/s	1101.2 m/s	Prototype, confid...
7	42.0 bar	3776.7 bar	3775.8 bar	2307.6 bar	342.4 bar	4.854 ms	6.554 bar * s	6.575 bar * s	1100.3 m/s	1097.9 m/s	1100.3 m/s	Prototype, confid...



- Single Shot and Continues Fire analysis
- Quick and easy configuration of many analog input channels
- Data visualization of complete test series
- Closed Vessel analysis according to TL 1376-0600
- No programming required
- Target visualization
- More than 30 scalar functions to calculate ballistic specific parameters
- English and German version
- Data export to TPC5 and ASCII data format
- Report generator, based on freely editable MS-Excel templates

Measurement Table

Parameters

The measurement table shows all measured and calculated data. After each shot, a new line is inserted and the calculation of the wished parameters is started. A parameter can be either a predefined scalar calculation like Pmax, t1- 6, bullet speed or any results from a generic formula.

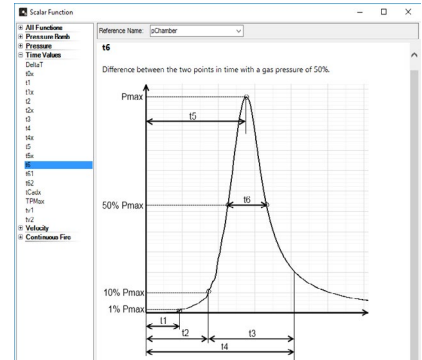
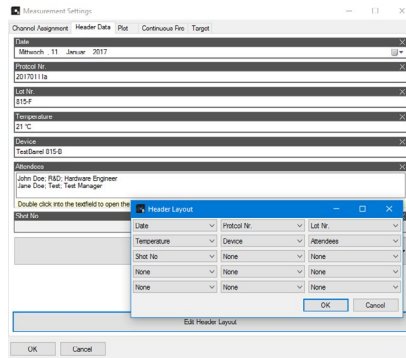
Statistic Calculation

Statistic lines can be inserted after any number of shots for calculation of Mean, Standard Deviation, Min and Max values.

Header Data

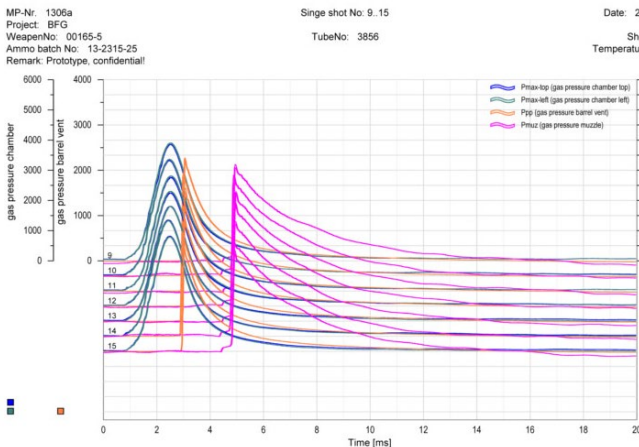
The header data can be modified and adapted to your needs. All these fields and information can be re-used later on for generating the measurement report.

ShotNr	PMax (pChamber)	PMax (pBarrelvent)	PMax (pMuzzle)
1	3'864.004 bar	2'277.393 bar	326.738 bar
2	3'864.004 bar	2'277.407 bar	326.749 bar
3	3'863.974 bar	2'277.393 bar	326.741 bar
Nr: 3.3	3.863.974	2.277.393	326.741
Mean	NaN	NaN	NaN
Stdv	3.863.974	2.277.393	326.741
Min	3.863.974	2.277.393	326.741
Max	3.863.974	2.277.393	326.741
4	3'863.996 bar	2'277.408 bar	326.730 bar



Report Generator

Measurement Reports are generated in BallAX with Excel Templates. Key Words in the template are replaced by the measurement data and header information once the report is generated.



Report	
Test Declaration	%TestDeclaration%
Location	%Location%
Job Number	%JobNumber%
MP-No.	%MPNo%
Project	%Project%
Ammo Batch Number	%AmmoBatchNo%
Tube Number	%TubeNo%
Shot Load	%Shotload%
Weapon Number	%WeaponNo%

Formula Editor

The Formula Editor is a powerful tool for post processing your measurement data or to calculate any parameter which is not already defined in the Scalar Function list of the measurement table.

Target

Target data can be visualized with the built-in Target display. BallAX is compatible with any kind of target hardware type and manufacturer. The calculation of the coordinates can be defined and modified in a formula file.

The screenshot displays the BallAX 4.0 software interface. The top menu bar includes File, Measurement, Layout, Measurement Table, Settings, and Help. The Formula Editor is active, showing a script for data analysis. The Measurement Table displays 11 shots with columns for ShotNr, Date, Filepath, PMax (pChamber), v (Light Barier), For (Xpos), and For (Ypos). The Target display shows a circular target with 8 hits and a summary table of their coordinates.

ShotNr	Date	Filepath	PMax (pChamber)	v (Light Barier)	For (Xpos)	For (Ypos)
1	15.05.2017 14:0...	data\170515_TB...	4.649 bar	253.813 m/s	-6.6 mm	-8.960 mm
2	15.05.2017 15:2...	data\170515_TB...	4.492 bar	247.766 m/s	-0.5 mm	-28.404 mm
3	15.05.2017 15:2...	data\170515_TB...	4.303 bar	242.937 m/s	-4.8 mm	10.434 mm
4	15.05.2017 15:2...	data\170515_TB...	4.470 bar	252.771 m/s	1.3 mm	2.357 mm
5	15.05.2017 15:2...	data\170515_TB...	4.420 bar	262.267 m/s	-6.7 mm	-6.559 mm
6	15.05.2017 15:2...	data\170515_TB...	4.348 bar	252.750 m/s	-3.5 mm	-0.437 mm
7	15.05.2017 15:2...	data\170515_TB...	4.398 bar	267.877 m/s	-0.6 mm	21.221 mm
8	15.05.2017 15:2...	data\170515_TB...	4.400 bar	265.576 m/s	-0.5 mm	-17.788 mm
9	15.05.2017 15:2...	data\170515_TB...	4.303 bar	236.530 m/s	-0.5 mm	-9.775 mm
10	15.05.2017 15:2...	data\170515_TB...	4.640 bar	242.972 m/s	-6.5 mm	9.215 mm
11	19.05.2017 11:0...	data\170515_TB...	4.242 bar	246.787 m/s	1.3 mm	-0.838 mm
Nr.: 1..11						
Mean	n. def.	n. def.	4.424 bar	252.004 m/s	-2.5 mm	-2.685 mm
Stdv	n. def.	n. def.	0.132 bar	9.972 m/s	3.2 mm	13.832 mm
Min	0	0.000	4.242 bar	236.530 m/s	-6.7 mm	-28.404 mm
Max	0	0.000	4.649 bar	267.877 m/s	1.3 mm	21.221 mm

Nr.	X [mm]	Y [mm]
3	-4.8	10
4	1.3	2.4
5	-6.7	-6.6
6	-3.5	-0.44
7	-0.56	21
8	-0.54	-18
Mean		
	2.5	1.5
Dispersion		
	-0.55	1.7
Standard Deviation		
	3	13

Supported Hardware

Data Acquisition Devices

- Elsys TPCX, TPCE, TPCE-LE and TPCI DAQ cards
- Elsys TraNET FE, TraNET PPC and TraNET EPC Data Acquisition Instruments

Charge Amplifier

- Kistler 5011 GPIB
- Kistler 5015A RS232
- Kistler 5017 GPIB
- Kistler 5018A RS232/USB
- Kistler 5080A RS232/USB

Velocity Measurement Systems

- Light Barriers with analog or digital output signals
- Inductive Sensing Coils
- Radar

Targets

- Light Barriers based optical targets
- Acoustic Targets based on microphone arrays

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www.elsys-instruments.com



TraNET EPC up to 64 Channel DAQ
2 - 240 MHz, ICP/IEPE, 14/16 Bit



TraNET FE 4 - 16 Channel DAQ
2 - 240 MHz, ICP/IEPE, 14/16 Bit