INFINITION

TestCenter 7

Doppler Radar Acquisition and Ballistic Analysis Software – Stable, Intuitive and Powerful, from the First Shot to the Final Result

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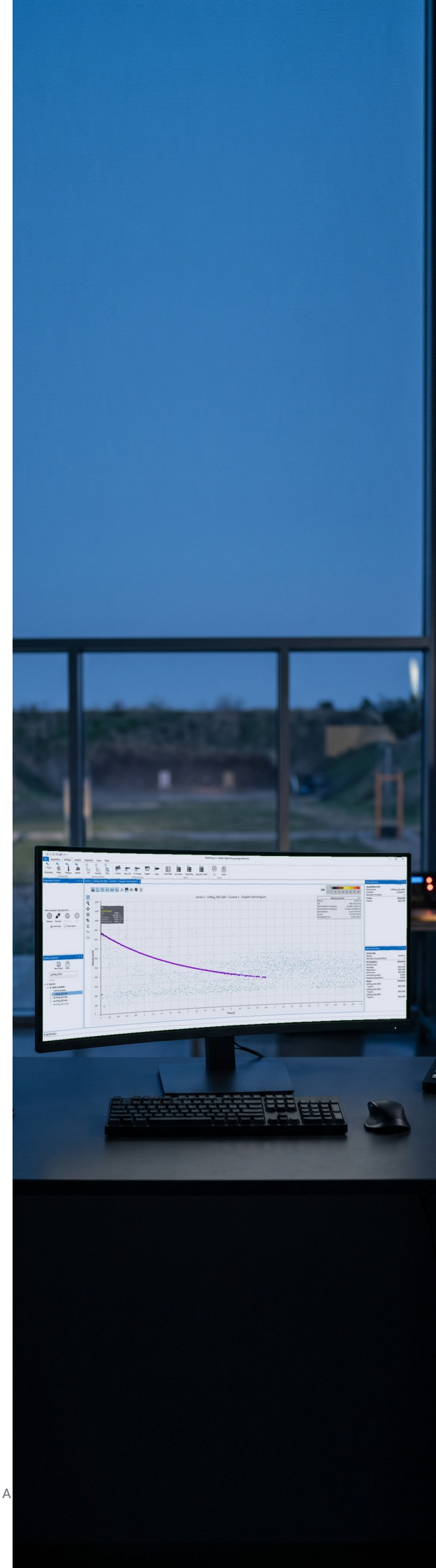

1. Introduction

TestCenter 7 is the software that drives every Infinition Doppler radar and turns its signal into ballistic results. It controls the radar and its acquisition hardware, records each shot, finds the projectile track, and computes the muzzle velocity, the velocity at any distance, the drag, the trajectory and the statistics of a whole firing campaign.

TestCenter 7 is the seventh generation of a software line used on test ranges for more than 20 years. It was rebuilt from the ground up around what our customers asked for after years of field use: a stable application that runs all day on the range, an interface that a new operator learns quickly, and analysis tools powerful enough for ammunition development and acceptance testing. The current release, TestCenter 7.3, supports the whole Infinition radar range and opens TestCenter 6.3.x files.

> **Stability, ease of use and a powerful, flexible interface: TestCenter 7 lets your team spend its time on the results, not on the software.**



Figure 1 – TestCenter 7 on a wide-screen display: the Doppler spectrogram, velocity versus distance, drag coefficient versus Mach and G7 ballistic coefficient of the same shot, side by side.

2. A Modern Workspace Built for Productivity

The TestCenter 7 window is organized around a central chart area, surrounded by panels that each user arranges to suit the task: the ribbon at the top, the acquisition control and the project explorer on the left, the shot and series overviews on the right. Every window can be docked, stacked as tabs, or detached and moved to a second monitor – keep the spectrogram on one screen and the velocity charts, tables or series analysis on the other.

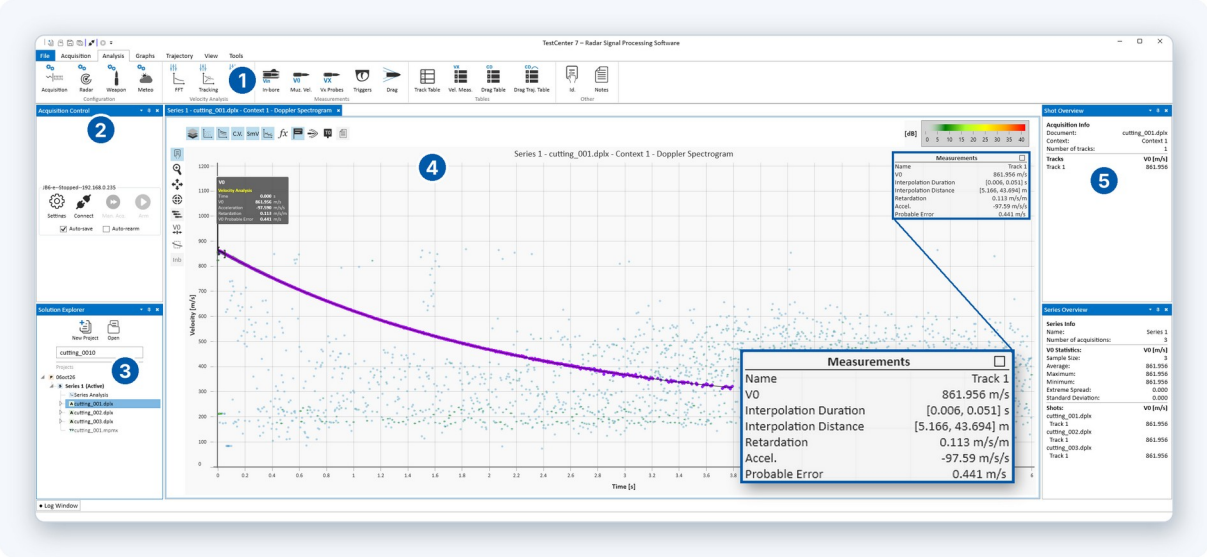

Figure 2 – The TestCenter 7 main window: (1) ribbon, (2) acquisition control, (3) project explorer, (4) Doppler spectrogram with its measurements, shown magnified, and (5) shot and series overviews.

- **Ribbon interface** – every command grouped by task (Acquisition, Analysis, Graphs, Trajectory, View, Tools), with simplified dialogs and intuitive navigation.
- **Dynamic graphic engine** – 3D-accelerated charts with layer management, zoom and pan, right-click quick menus and on-mouse-over track identification, fluid even with very large data sets.
- **Dockable windows and multi-monitor support** – saved docking presets recall a complete workspace in one click; an ultrawide display shows the whole workflow at once.
- **Units and language** – display units are selected per quantity and the interface language can be changed in the preferences.

2.1 Stable through long firing sessions

TestCenter 7 is engineered for full days on the range and for projects of hundreds of shots. Files are loaded in memory only when they are opened, which keeps the application responsive however large the project grows. Each new shot can be saved automatically and the radar re-armed automatically, so the operator follows the firing rather than the software. Every acquisition parameter is stored in a named configuration, and every recorded file keeps its own parameters: what was measured is never altered by a later change of configuration.

3. Projects, Series and DPLX Files

TestCenter 7 organizes the work the way a firing campaign is organized. A **project** groups one or more **series** – one per ammunition lot, test condition or day – and each series holds its **shots**. One series is marked active: every new acquisition is recorded directly into it, so information is filed as the trials are performed and you always know where you stand in the campaign. Switching to another series, or back to a previous one, is a double-click.

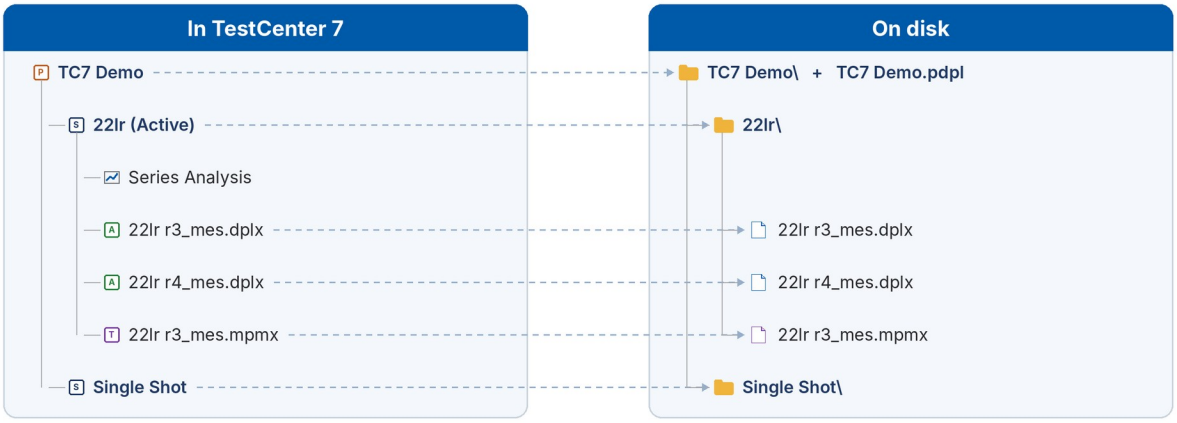

Figure 3 – A project in TestCenter 7 and the same project on disk: one folder per project, one sub-folder per series, one file per shot.

The project maps directly onto a standard Windows folder structure – a project folder, one sub-folder per series, one **DPLX** file per shot – so data are easy to locate, copy, share and back up with ordinary tools:

Element in TestCenter 7	On disk
Project	Project folder, with its .pdpl project file
Series	Sub-folder named after the series
Shot	.dplx file: raw radar signal, analysis parameters, tracks, probes and every computed result
Trajectory prediction	.mpmx file, stored in the series folder next to its shot

- **Everything in one file** – a DPLX file can be sent to a colleague and reopened with its complete analysis.
- **Several analyses of the same shot** – a file can hold several analysis contexts, each with its own parameters and tracks: the two channels of a dual-radar set-up, an alternative set of parameters, or a context tuned to reveal a sabot or a fragment hidden in the main analysis.
- **Post-processing series** – shots from different projects, days or set-ups can be gathered into a new series for comparative and statistical analysis.
- **Legacy data** – TestCenter 6.3.x files can be opened and are compatible.

4. Automatic Analysis on Every Shot

As soon as a shot is recorded, TestCenter 7 analyzes it and opens its spectrogram: the automatic tracker locks on the projectile, the muzzle velocity is computed and every requested measurement is placed on the track. A complete shot analysis takes seconds and needs no manual cursor placement.

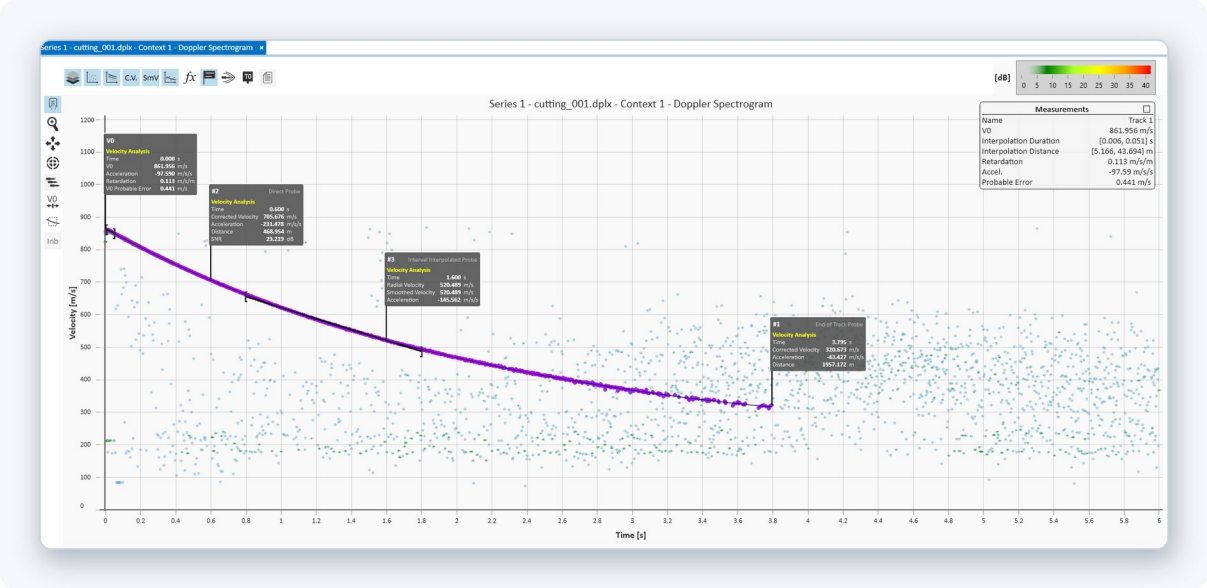

Figure 4 – Doppler spectrogram with the automatic track, the V0 and three Vx Probes (Direct, Interval Interpolated and End of Track), each reporting its results directly on the chart.

- **Automatic V0, corrected for parallax** – the operator enters the position of the radar relative to the muzzle; TestCenter 7 converts the measured radial velocity into true velocity at every point, where the error is largest – at the muzzle.
- **Vx Probes** – measurements placed at a distance or a time on the track, in seven types: Direct, Interval Interpolated (fit between two bounds, to remove noise or bridge a gap in the signal), Constant Interval (a series of points at a regular step), Impact/Residual (velocity at impact and after the target), End of Track, Minimum and Maximum.
- **You choose what each probe reports** – time, distance, radial, corrected or smoothed velocity, acceleration, SNR and, with the drag analysis, Mach, drag coefficient, ballistic coefficients and positions.
- **Automatic tracking of multiple projectiles** – several tracks in the same shot, including bursts.



Figure 5 – The seven Vx Probe types of the Probe Manager.

5. Batch Processing: Push to Config and Apply to Series

Range time is limited and expensive; the analysis should never slow the firing down. TestCenter 7 lets the operator tune the analysis on one shot and spread it to all the others in a single click. Two buttons, found at the bottom of every analysis dialog – radar, weapon, meteo, FFT, tracking, filter, in-bore, muzzle velocity, Vx Probes and drag – do the work:

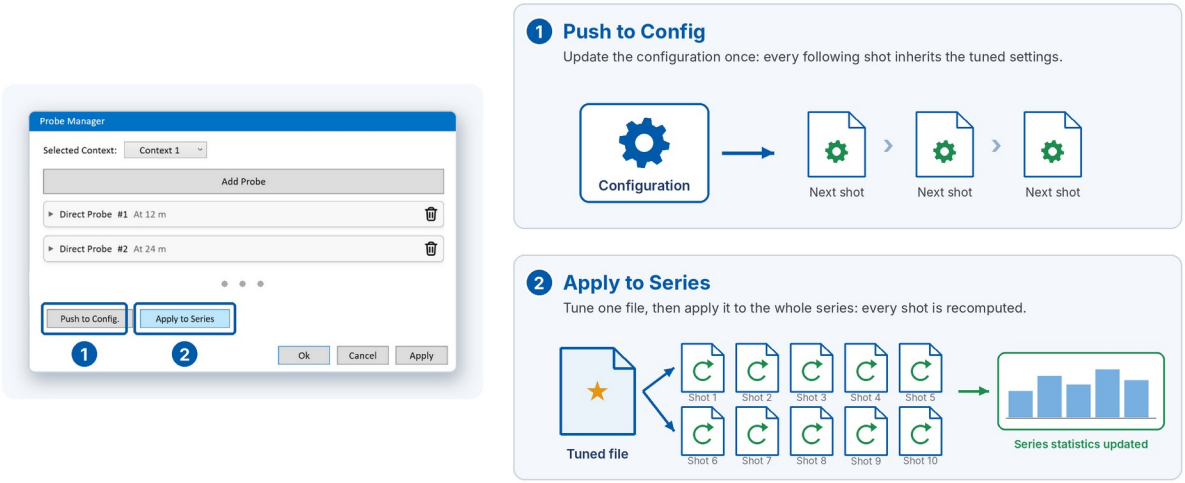

Figure 6 – The two batch buttons, here in the Probe Manager: (1) Push to Config carries the tuned settings to the next shots; (2) Apply to Series recomputes every shot of the series and updates its statistics.

- **Push to Config** – after optimizing the first shot of a session, update the configuration once: every following shot inherits the improved settings without any further effort.
- **Apply to Series** – after the session, set the analysis carefully on one file and apply it to the whole series, or to any other series of the project. All files are recomputed and the statistics update instantly.
- **Typical uses** – add a Vx Probe at a distance that was not requested before the test, change the FFT size for a new ammunition type, adjust a filter to remove unexpected noise, or retune the tracking for a difficult signal – across tens or hundreds of shots at once.

6. Series Analysis and Statistics

Every series has a **Series Analysis** view that overlays the curves of all its shots in a single chart – velocity, acceleration, distance and SNR versus time or distance, drag coefficient versus Mach, G1 and G7 ballistic coefficients versus distance. Comparing every track of a series takes a glance, and outliers stand out before any detailed analysis.

- **Live statistics** – the Series Overview gives the sample size, average, maximum, minimum, extreme spread and standard deviation of the V0 of the series, updated after every shot.
- **Statistics at every probe** – the Velocity Measurements Table lists, for the whole series, the result of each probe for every shot, followed by minimum, maximum, average, sample and population standard deviations and extreme spread.
- **Comparisons across campaigns** – a post-processing series gathers shots from different days, lots or projects and gives them the same overlay and statistics.
- **Export** – every table is exported to CSV in one click, at the units chosen by the user.

7. Drag Analysis

The drag module, included in the Advanced version of TestCenter 7, is a major improvement over earlier versions. It computes the aerodynamic drag of the projectile from the measured velocity track, the projectile data and the meteorological conditions, with the STANAG 4355 point mass (PM) model or the modified point mass (MPM) model. The smoothing of the drag results is controlled by a single analysis-bandwidth parameter whose effect is visible on the charts in real time, so the right balance between detail and noise is found in seconds.

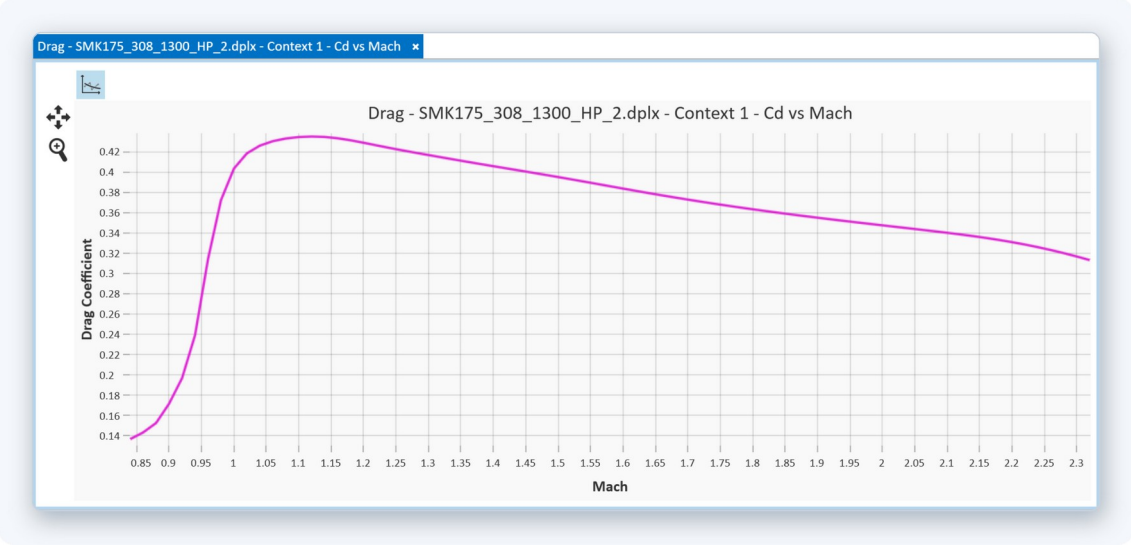

Figure 7 – Measured drag coefficient versus Mach number, through the transonic zone.

- **Drag coefficient versus Mach** and **G1 and G7 ballistic coefficients versus distance**, for one shot or for a whole series.
- **Drag trajectory table** – the reconstructed trajectory point by point, exportable to CSV.
- **Measured, not assumed** – the drag comes from the projectile actually fired, a decisive advantage for ammunition characterization and acceptance testing.

Measured over a long trajectory, a single shot covers the three flight regimes – supersonic, transonic and subsonic – and TestCenter 7 gives the drag coefficient across all of them, including the sharp change through the transonic zone (Figure 8).

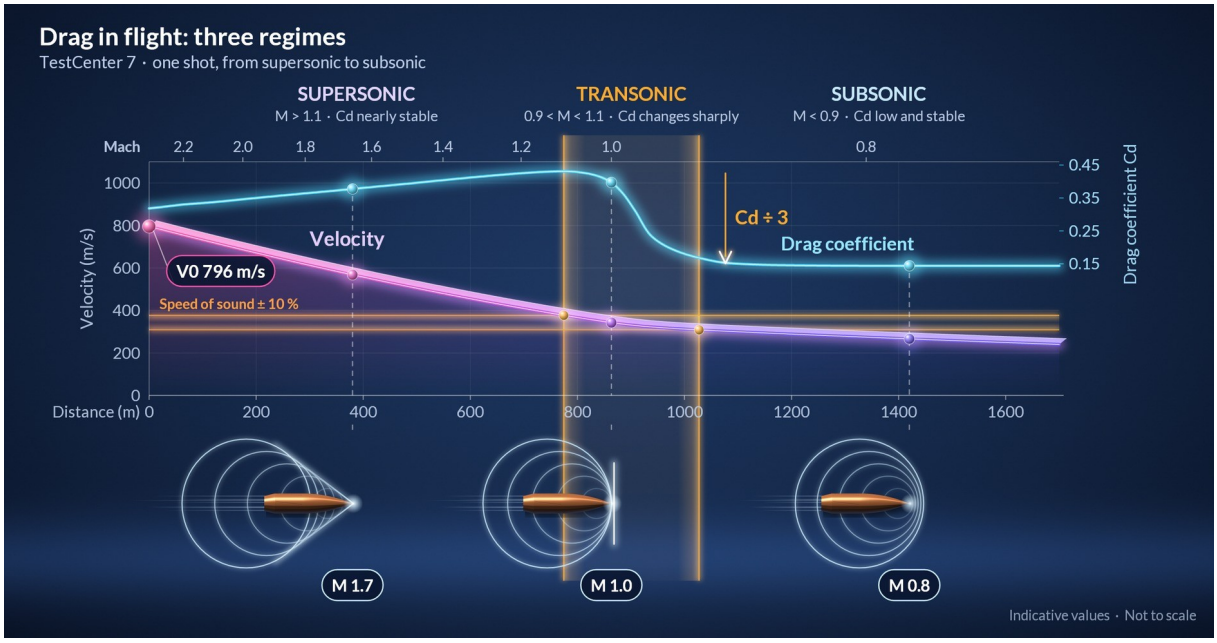

Figure 8 – Drag measured in flight: supersonic, transonic and subsonic regimes of one shot (indicative values).

8. Trajectory Prediction (MPM)

A Doppler radar measures the velocity of the projectile over the part of the flight it can see. TestCenter 7 reconstructs the rest: its trajectory prediction uses the STANAG 4355 modified point mass model to compute the complete flight path of the projectile. Created from an acquisition in one click, the prediction inherits the measured V0, the computed drag, the weapon data and the meteorological conditions of the shot; applied to a recorded shot, the reconstruction has proven highly accurate. Predictions can also be built from manually entered data, to simulate a trajectory before a test.

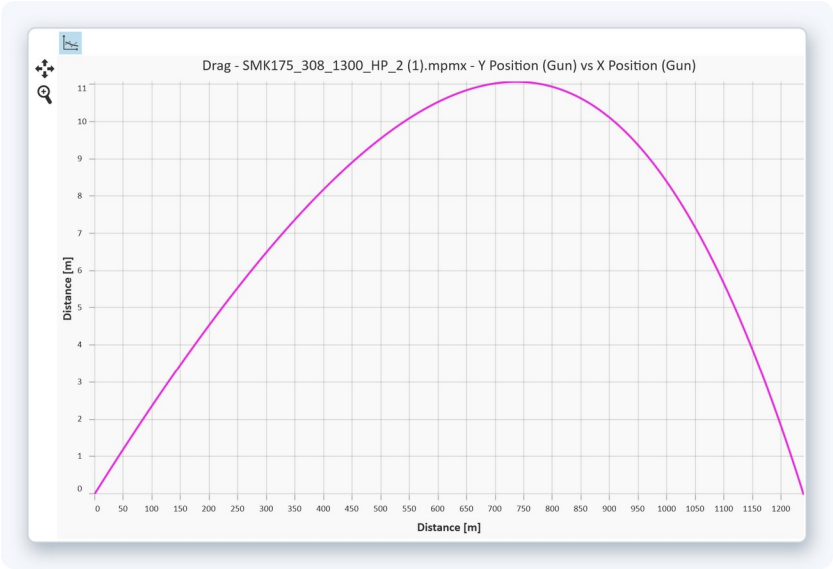

Figure 9 – Height versus downrange distance from a trajectory prediction.

Each prediction is saved as an MPMX file in its series, plotted with its own charts and listed in a results table. It is also the input of the TH-1000 motorized tracking head: the predicted direction and radial velocity drive the antenna to follow long trajectories.

9. Burst and Rate of Fire

For automatic weapons, TestCenter 7 records multiple trigger events in a single acquisition. Automatic Burst Tracking creates one track per round, and the Shot Overview gives the rate-of-fire measurements – minimum, maximum and mean time between rounds, rate of fire in rounds per minute – together with the V0 statistics of the burst. False triggers caused by noise between rounds are simply disabled in the triggers table.

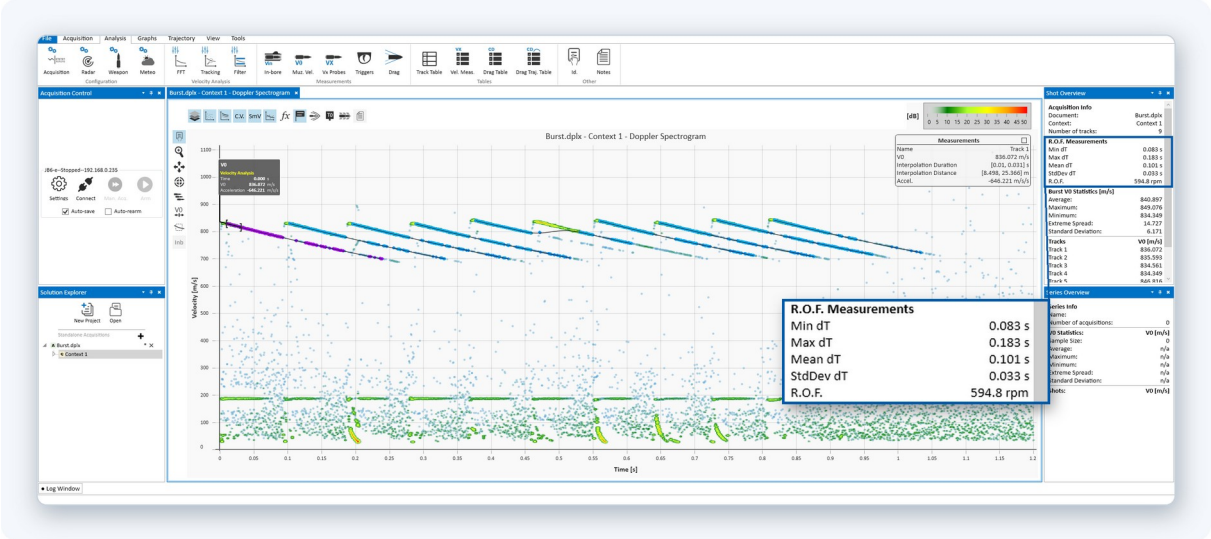

Figure 10 – A burst acquisition after Automatic Burst Tracking: one track per round, with the rate of fire and the burst V0 statistics in the Shot Overview, shown magnified.

10. In-Bore Measurement

With the BR-12201 in-bore radar, TestCenter 7 measures the projectile while it is still inside the barrel. The radar wave is guided by the bore to the projectile, and TestCenter 7 converts the Doppler signal into velocity and acceleration along the whole travel, up to muzzle exit (Figure 11). The in-bore velocity and acceleration profiles show precisely how the projectile is accelerated in the barrel – valuable data for weapon, barrel and ammunition development – and the muzzle velocity is read at the exact instant the projectile leaves the barrel.

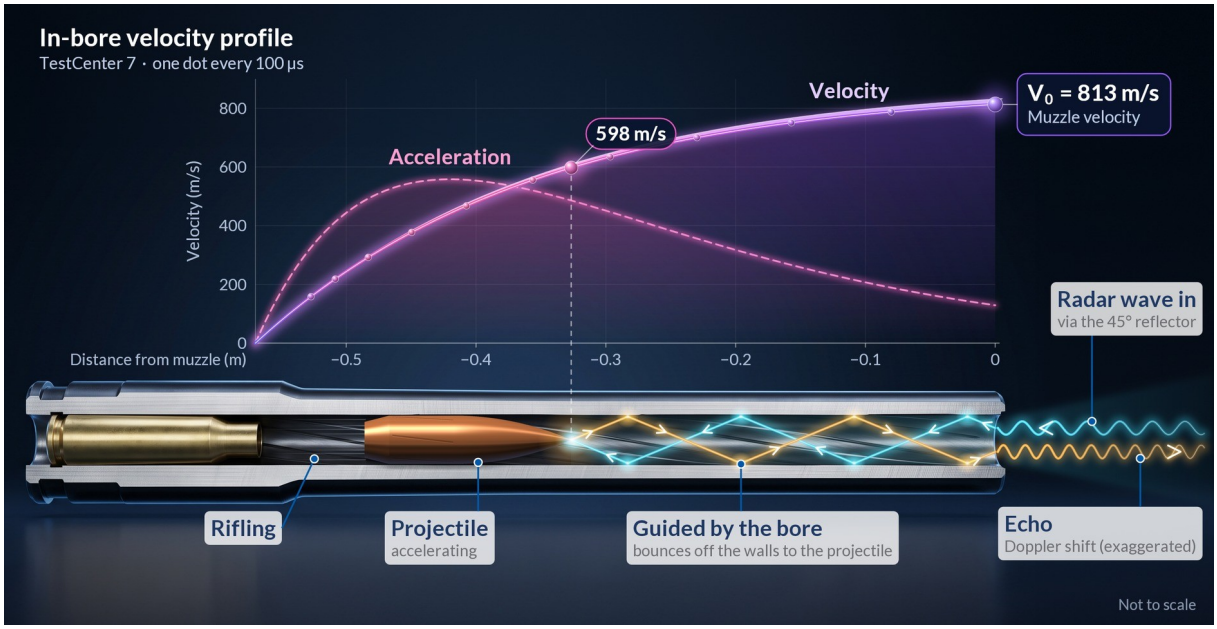

Figure 11 – In-bore velocity and acceleration measured with TestCenter 7 and the BR-12201 radar (indicative values).

11. Results, Export and Reporting

- **Result tables** – Track Table, Velocity Measurements Table, Drag Trajectory Table and Trajectory Prediction Table, rebuilt automatically whenever a parameter changes.
- **CSV export** – of every table, at the units chosen in the preferences.
- **Charts** – any chart can be copied as a picture from its right-click menu; custom charts plot any computed quantity against any other.

12. Compatibility and Requirements

Radars	Every Infinition Doppler radar (BR-2401, BR-3502, BR-3503, BR-12201, BR-1001, BR-1022, BR-29015, BR-33030 and more)
Acquisition	JB-6e junction box (two radars per JB-6e); BR-2401 integrated acquisition
Triggers	AT-01 acoustic trigger, OT-01 optical trigger, AT-02 trigger for low-noise and subsonic shots, external TTL signal through the optional BNC adapter
Tracking head	TH-1000 motorized tracking head (Ethernet control)
Legacy files	TestCenter 6.3.x files
Computer	Standard desktop PC, minimum configuration: Windows 10 and 11, Intel Core i5 processor or better, 16 GB RAM, SSD drive and Ethernet port; ultrawide display recommended
Licensing	USB license key; several license levels, including an Advanced version with the drag analysis module and an Office version for analysis without radar control
Documentation	Complete user manual in English and French

13. Why TestCenter 7

- **Stability** – rebuilt from the ground up to run all day on the range, with projects of hundreds of shots.
- **Ease of use** – a modern, intuitive interface that new operators learn quickly; automatic analysis on every shot.
- **Power and flexibility** – seven probe types, several analysis contexts per shot, measured drag, MPM trajectory prediction, burst analysis.
- **Productivity** – projects and series filed as you shoot, batch processing with Apply to Series, live statistics and one-click export.
- **Investment protection** – one software for the whole Infinition radar range, and TestCenter 6.3.x files can be opened.
- **Single-source support** – Infinition designs the radars, the acquisition hardware and the software in-house, and provides installation, on-site training and support worldwide.

14. Contact

Request a quotation, a demonstration or technical information

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