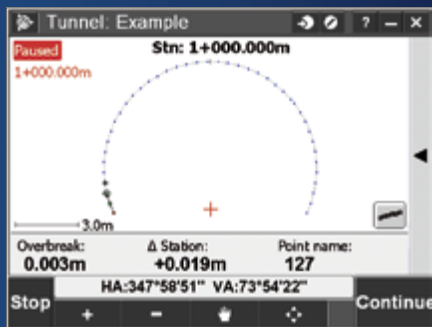


# Trimble Access Software: Tunnels

## Key Features

- Streamlined workflow
- Powerful tunnel survey features
- Customizable staked delta reporting
- Fully customizable outputs and reports



## Finish Tunneling Jobs Fast

### Streamlined Workflow

The easy to follow workflow for Trimble® Access™ Tunnels guides you through tasks such as marking areas of under- and over break with the laser pointer of a Trimble S Series total station, Trimble M3 total station or Trimble VX™ Spatial station.

### Define Your Tunnel

Key in the tunnel components from construction plans including horizontal and vertical alignments, templates, rotation records and station equations. You can also key in set-out positions (typically used for placing bolt holes) and, if required, you can offset the alignment.

Import a definition from a LandXML file that has been converted to a Trimble tunnel.

Alternatively define the tunnel alignment from the map by selecting points, lines or arcs or by selecting line work in DXF, SHP or LandXML files.

Review and confirm the tunnel design before going underground. The graphical interface and reporting allow you to easily check the tunnel design before you start surveying.

### Surveying and Positioning

You can auto-scan cross sections including options to manually measure and delete points, set out pre-defined positions, and position machinery, typically a drilling rig, relative to the tunnel.

The iterative measurement process ensures you are always measuring on station even with irregular surfaces. The powerful cross-section view provides easy identification of overbreak and underbreak.

### Output and Reports

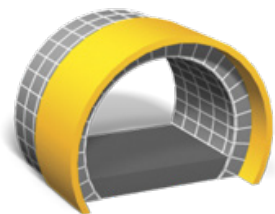
Review the surveyed tunnel including the auto scanned and manually measured points as well as set out points. Generate customized reports for surveyed tunnel data on the controller while in the field.

Use these reports to check data in the field, or to transfer from the field to your client or to the office for further processing with the office software.

### Designed for Demanding Customer Requirements

Trimble Access Tunnels is the ideal application for the engineering surveyor who needs to check tunnels for over or underbreak, set out bolt holes, or position a drilling rig and requires:

- Flexible software
- An extensive range of powerful stakeout routines
- Easy-to-use tunnel survey software that you can learn to be productive with after just a few hours of use



Learn more at:

<http://apps.trimbleaccess.com>

## Define the Tunnel

Feature	Details
<b>Horizontal Alignment</b>	<ul style="list-style-type: none"> <li>Length / Coordinates:               <ul style="list-style-type: none"> <li>Line elements</li> <li>Arc elements</li> <li>Entry transition / Exit transition elements</li> </ul> </li> <li>End station</li> <li>PI:               <ul style="list-style-type: none"> <li>Curve types:                   <ul style="list-style-type: none"> <li>Circular</li> <li>Transition   Arc   Transition</li> <li>Transition   Transition</li> </ul> </li> </ul> </li> <li>Selection via the map from DXF or SHP file</li> <li>Transition types:               <ul style="list-style-type: none"> <li>Clothoid spiral</li> <li>Egg-shaped clothoid spiral</li> <li>Cubic spiral</li> <li>Bloss spiral</li> <li>NSW cubic parabola</li> </ul> </li> <li>Station index increment</li> <li>Map selection</li> </ul>
<b>Vertical Alignment</b>	<ul style="list-style-type: none"> <li>Vertical points of intersection:               <ul style="list-style-type: none"> <li>Point elements</li> <li>Circular arc elements</li> <li>Symmetric parabola elements</li> <li>Asymmetric parabola elements</li> </ul> </li> <li>Start and end points:               <ul style="list-style-type: none"> <li>Point elements</li> <li>Circular arc elements</li> <li>Symmetric parabola elements</li> </ul> </li> </ul>
<b>Templates</b>	<ul style="list-style-type: none"> <li>Multiple Surfaces:               <ul style="list-style-type: none"> <li>Line elements, either keyed in or measured in the tunnel</li> <li>Arc elements</li> <li>Offset from another surface</li> </ul> </li> </ul>
<b>Template Positions</b>	<ul style="list-style-type: none"> <li>Multiple templates supported               <ul style="list-style-type: none"> <li>Templates applied relative to vertical alignment:                   <ul style="list-style-type: none"> <li>Perpendicular</li> <li>Vertical</li> </ul> </li> </ul> </li> </ul>
<b>Rotation</b>	<ul style="list-style-type: none"> <li>Use rotation to tilt or rotate a tunnel template               <ul style="list-style-type: none"> <li>Pivot position can be offset from the alignment:                   <ul style="list-style-type: none"> <li>Horizontal</li> <li>Vertical</li> </ul> </li> </ul> </li> </ul>
<b>Set out Positions</b>	<ul style="list-style-type: none"> <li>Defined by station and offset values and one of the following methods:               <ul style="list-style-type: none"> <li>Radial:                   <ul style="list-style-type: none"> <li>Includes support for offset center point</li> </ul> </li> <li>Vertical</li> <li>Horizontal</li> </ul> </li> </ul>
<b>Station Equations</b>	<ul style="list-style-type: none"> <li>Increasing and decreasing equations</li> </ul>
<b>Alignment Offsets</b>	<ul style="list-style-type: none"> <li>Use to offset an alignment at horizontal curves in a rail tunnel to ensure carriage clearance is maintained when the track is rotated</li> <li>Defined by               <ul style="list-style-type: none"> <li>Station</li> <li>Horizontal offset</li> <li>Vertical offset</li> </ul> </li> </ul>
<b>Review</b>	<ul style="list-style-type: none"> <li>Graphically:               <ul style="list-style-type: none"> <li>Plan</li> <li>Cross-section</li> </ul> </li> <li>Report</li> </ul>

## Survey the Tunnel

Feature	Details
<b>Auto Scanning Positions</b>	<ul style="list-style-type: none"> <li>Auto scan measures points at a defined scan interval for selected stations</li> </ul>
<b>Scan zones</b>	<ul style="list-style-type: none"> <li>Use scan zones when parts of the tunnel profile either do not require measuring or cannot be measured, for example, areas behind ventilation ducts</li> </ul>
<b>Cross-section guidelines</b>	<ul style="list-style-type: none"> <li>Display horizontal line (spring line) and vertical line</li> </ul>
<b>On station adjustment</b>	<ul style="list-style-type: none"> <li>Controls where the position will be measured when the tunnel surface does not match the design</li> </ul>
<b>VX Scanning</b>	<ul style="list-style-type: none"> <li>Enable Trimble VX scanning option for improved scanning performance</li> </ul>
<b>High power laser pointer</b>	<ul style="list-style-type: none"> <li>Supported</li> </ul>
<b>During a scan</b>	<ul style="list-style-type: none"> <li>Review overbreak and underbreak values for recently scanned stations</li> </ul>
<b>After a scan</b>	<ul style="list-style-type: none"> <li>Review summary for each station</li> <li>Review overbreak and underbreak values</li> <li>Update tolerances and see the Station, Overbreak, and Underbreak deltas updated</li> </ul>
<b>Manual measure</b>	<ul style="list-style-type: none"> <li>Manually measure positions that could not be measured by a scan</li> <li>Delete a scanned or manually measured position</li> </ul>
<b>Position in Tunnel</b>	<ul style="list-style-type: none"> <li>Measure a position at any station within the tunnel               <ul style="list-style-type: none"> <li>Compare the position with the design parameters of the tunnel</li> </ul> </li> <li>Reported details:               <ul style="list-style-type: none"> <li>Station value</li> <li>Under/Overbreak value</li> <li>Rotation value of the cross section at the current position</li> <li>Horizontal offset of the current position from the tunnel centerline</li> <li>Vertical offset from the tunnel centerline                   <ul style="list-style-type: none"> <li>Perpendicular</li> <li>True vertical</li> </ul> </li> <li>Profile distance measured along the tunnel design's template from its start</li> <li>Horizontal offset from the rotated tunnel centerline</li> <li>Vertical offset from the rotated tunnel centerline</li> <li>Distance to vertex</li> <li>Northing / Easting / Elevation</li> </ul> </li> </ul>
<b>Set out positions</b>	<ul style="list-style-type: none"> <li>Set out positions that typically define bolt holes within a tunnel</li> </ul>
<b>Machine positioning</b>	<ul style="list-style-type: none"> <li>Position machines, typically a drilling rig, relative to a defined reference line</li> <li>Offsets               <ul style="list-style-type: none"> <li>Transverse</li> <li>Vertical</li> </ul> </li> </ul>
<b>Review</b>	<ul style="list-style-type: none"> <li>Scanned points               <ul style="list-style-type: none"> <li>Summary for each station</li> <li>Overbreak and underbreak</li> <li>Update tolerances and see the Station, Overbreak, and Underbreak deltas updated</li> </ul> </li> <li>Set out points</li> </ul>
<b>Reports</b>	<ul style="list-style-type: none"> <li>Fully customizable reporting of the surveyed tunnel</li> </ul>

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