TRIMBLE ACCESS™

MINES

USER GUIDE

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Trimble Mines software

Trimble® Mines software is specifically designed for surveying in mining environments.

Use Mines to:

- Define and auto stake center, grade, and laser lines to align a drilling rig.
- Auto stake predefined blast hole positions.
- Auto stake predefined pivot points to position a drilling rig.
- Generate reports for the surveyed mine.

When starting a survey you are prompted to select the survey style you have configured for your equipment. To learn more about survey styles and related connection settings refer to the appropriate topics in the *Trimble Access Help.*

To switch between applications, tap the application icon in the status bar and then select the application to switch to.

To automatically stake out...	Select...
A line at set intervals along the mine backs (ceiling).	Center line
A line at set intervals along the mine walls.	Grade line
Intersection points between the mine walls and a line defined by two points.	Laser lines
Intersection points between the mine wall and laser lines defined at right angles relative to the center line at a defined interval.	Laser lines offset from a center line
The intersection point between a mine face and a line.	Project line
The intersection point between a mine face and a line defined by two points.	Blast holes
Pivot points that have been projected up onto the mine back.	Pivot points

To blink the laser when storing a point measured with DR, select **Instrument** / **EDM settings** and then set the number of times the laser will blink in the **Blink laser** field.

Tap the **Pause** button to temporarily halt the auto stake process. Use the **Prev** and **Next** softkeys to skip to the previous or next point.

Adding data to the job

You can add line work to the job from a DXF or STR (Surpac) file.

Points can be imported into the job, linked to the current job, or imported into another job and that job linked to the current job. Use the **Jobs / Import** option to import points. Depending on the features you want to stake, the points in the job must meet the following criteria:

- Pivot points must be identified by either a prefix or suffix in their point name.

- Laser line points must be matched pairs of points defined using their point names. A point must have a prefix or suffix to identify it as the left or the right hand end of the line. The remainder of the point name must be identical for a match pair to be found. For example, if the Left points prefix is L and the Right points prefix is R, then the following points would be identified as matched pairs: L1–R1, L15–R15, L101–R101, etc.

- Blast hole points must be matched pairs of points defined using their point names. A point must have a prefix or suffix to identify it as the blast hole collar or toe. The remainder of the point name must be identical for a match pair to be found. For example, if the collar points suffix is C and the toe points suffix is T, then the following points would be identified as matched pairs: 1C–1T, 15C–15T, A1C–A1T, etc.

To auto stake a center line

1. To create the center line:
   - In the map, select the line and then tap **Auto stake** / **Center line**.
   - Tap ≡ and select **Auto stake** / **Center line** and select the start and end points.
     When selecting points, select them from the map or tap ▶ for other selection methods.

   To reverse the direction of the line, tap **Swap**.

2. Then:
   a. Define an **Interval** for staking the line.
   b. If required, define offsets. The line can be offset by a:
      - **Horizontal offset** – applied left or right of the line
      - **Vertical offset** – applied up or down from the line
      - **Station offset** – applied backward or forward along the line

      These offsets are used to calculate the design positions.
   c. To extend the line, enter the extension distance in the **Extend beyond end point** field. To shorten the line, enter a negative value in this field.
   d. Tap **Next**.

3. Enter values for the **Point details, Position tolerance**, and **Settings** or accept the default values. Tap **Next**.

4. Tap **Next**.

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   The software will use the previous position to reduce the number of iterations required to find the next position. However if a position is not found within tolerance the software will use the design position of the previous position to reduce the number of iterations required to find the next position.

TIP – If the instrument points to the floor rather than the backs, during the **Start delay** period, you can manually point the instrument to the backs.

When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

TIP – Stakeout deltas indicate the direction you need to go to get to the target.

At the end of the **Mark delay** period the instrument auto stakes the next point.

5. When the end of the line is reached, the **Results** screen shows the number of points staked and the number of points skipped.

To auto stake a grade line

1. To create the grade line:

   - In the map, select the line and then tap **Auto stake** / **Grade line**.
   - Tap ☰ and select **Auto stake** / **Grade line** and select the start and end points.

     When selecting points, select them from the map or tap ▶ for other selection methods.

   To reverse the direction of the line, tap **Swap**.

2. Then:

   a. Define an **Interval** for staking the line.

   b. If required, define offsets. The line can be offset by a:

      - **Horizontal offset** – applied left or right of the line
      - **Vertical offset** – applied up or down from the line
      - **Station offset** – applied backward or forward along the line

      These offsets are used to calculate the design positions.

   c. To extend the line, enter the extension distance in the **Extend beyond end point** field. To shorten the line, enter a negative value in this field.

   d. Tap **Next**.

3. Enter values for the **Point details, Position tolerance**, and **Settings** or accept the default values. Tap **Next**.

4. Tap **Next**.

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   The software will use the previous position to reduce the number of iterations required to find the next position. However if a position is not found within tolerance the software will use the design position of the previous position to reduce the number of iterations required to find the next position.

TIP – If the instrument fails to point in the correct direction, during the **Start delay** period, you can manually point the instrument in the correct direction.

When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

TIP – Stakeout deltas indicate the direction you need to go to get to the target.

At the end of the **Mark delay** period the instrument auto stakes the next point.

5. When the end of the line is reached, the **Results** screen shows the number of points staked and the number of points skipped.

To auto stake laser lines

1. To create the laser lines:
   - In the map, select the line(s) and then tap **Auto stake** / **Laser lines**.
   - Tap ☰ and select **Auto stake** / **Laser lines** and select the points:
   a. Set the **Selection method** to either **Prefix** or **Suffix** so it matches the naming convention of the points in your job.
   b. Enter the **Left points prefix/suffix** and the **Right points prefix/suffix**. Tap **Next**.

      All matching pairs in the job with the correct prefix/suffix are listed.

      Matched pairs of points must be defined using their point names. A point must have a prefix or suffix to identify it as the left or the right hand end of the line. The remainder of the point name must be identical for a match pair to be found. For example, if the Left points prefix is L and the Right points prefix is R, then the following points would be identified as matched pairs: L1–R1, L15–R15, L101–R101, etc.
   c. If required, select and delete any points that do not require staking.
   d. Tap **Next**.

   To reverse the direction of the line, tap **Swap**.

2. Enter values for the **Point details** and **Settings**, or accept the default values. Tap **Next**.
3. Tap **Next**.

   The Mines software stakes all the points on the left, starting with the first line and finishing on the last. It then stakes all the points on the right side, starting with the last line and finishing on the first.

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   TIP – If the instrument fails to point in the correct direction, during the **Start delay** period, you can manually point the instrument in the correct direction.

When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

> **TIP –** Stakeout deltas indicate the direction you need to go to get to the target.

At the end of the **Mark delay** period the instrument auto stakes the next point.

4. When the process has finished, the **Results** screen shows the number of points staked and the number of points skipped.

To auto stake laser lines from a center line

1. To create the center line:
   - In the map, select the line(s) and then tap **Auto stake** / **Laser lines offset from CL**.
   - Tap ≡ and select **Auto stake** / **Laser lines offset from CL** and select the start and end points.
     When selecting points, select them from the map or tap ▶ for other selection methods.

   To reverse the direction of the line, tap **Swap**.

2. Then:
   a. Define an **Interval** for staking the line.
   b. If required, define offsets. The center line can be offset by a:
      - **Vertical offset** – applied up or down from the center line
      - **Station offset** – applied backward or forward along the center line

      These offsets are used to calculate the design positions.
   c. To extend the center line, enter the extension distance in the **Extend beyond end point** field. To shorten the center line, enter a negative value in this field.
   d. Tap **Next**.

3. Review the defined laser lines. Select and delete any lines that do not require staking. Tap **Next**.

4. Enter values for the **Point details** and **Settings**, or accept the default values. Tap **Next**.

5. To aid in the auto stakeout of the laser lines you are prompted to aim and measure a position on the right side of the mine. Repeat when prompted for the left side.

6. Tap **Next**.

   The Mines software stakes all the points on the left, starting with the first line and finishing on the last. It then stakes all the points on the right side, starting with the last line and finishing on the first..

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   > **TIP –** If the instrument fails to point in the correct direction, during the **Start delay** period, you can manually point the instrument in the correct direction.

When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

TIP – Stakeout deltas indicate the direction you need to go to get to the target.

At the end of the **Mark delay** period the instrument auto stakes the next point.

7. When the process has finished, the **Results** screen shows the number of points staked and the number of points skipped.

To project a line

1. To create the line:
   - In the map, select the line or two points from which to define the line and then tap **Auto stake** / **Project line**.
   - Tap ≡ and select **Auto stake** / **Project line** and select the start and end points.
     When selecting points, select them from the map or tap ▶ for other selection methods.

   To reverse the direction of the line, tap **Swap**.

2. If required, define offsets. The projected line can be offset by a:
   - **Horizontal offset** – applied left or right of the line
   - **Vertical offset** – applied up or down from the line

3. Tap **Next**.

4. Enter values for the **Point details, Position tolerance**, and **Settings** or accept the default values. Tap **Next**.

5. Tap **Next**.

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   If the instrument fails to point in the correct direction, during the **Start delay** period, you can manually point the instrument in the correct direction.

   When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

   TIP – Stakeout deltas indicate the direction you need to go to get to the target.

6. When the process has finished, the **Results** screen shows the number of points staked and the number of points skipped.

To auto stake blast holes

1. To define the blast holes:

   - In the map, select the line(s) that define the blast holes and then tap **Auto stake** / **Blast holes**.

   - Tap ≡ and select **Auto stake** / **Blast holes** and select the points:

     a. Set the **Selection method** to either **Prefix** or **Suffix** so it matches the naming convention of the points in your job.

     b. Enter the **Collar points prefix/suffix** and the **Toe points prefix/suffix**. Tap **Next**.

        All matching pairs in the job with the correct prefix/suffix are listed.

        Matched pairs of points must be defined using their point names. A point must have a prefix or suffix to identify it as the blast hole collar or toe. The remainder of the point name must be identical for a match pair to be found. For example, if the collar points suffix is C and the toe points suffix is T, then the following points would be identified as matched pairs: 1C–1T, 15C–15T, A1C–A1T, etc.

     c. If required, select and delete any points that do not require staking.

     d. Tap **Next**.

     To reverse the direction of the line, tap **Swap**.

2. Enter values for the **Point details** and **Settings**, or accept the default values. Tap **Next**.

3. Tap **Next**.

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   TIP – If the instrument fails to point in the correct direction, during the **Start delay** period, you can manually point the instrument in the correct direction.

   When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

   TIP – Stakeout deltas indicate the direction you need to go to get to the target.

   At the end of the **Mark delay** period the instrument auto stakes the next point.

4. When the process has finished, the **Results** screen shows the number of points staked and the number of points skipped.

To auto stake pivot points

1. To define the pivot points:

   - In the map, select the pivot points and then tap **Auto stake** / **Pivot points**.

     TIP – If the job does not contain already contain pivot points, you can select other points in the map and use them to define pivot points. See To define pivot points from other map points, page 9.

   - Tap ☰ and select **Auto stake** / **Pivot points** and select the points:

     a. Set the **Selection method** to either **Prefix** or **Suffix** so it matches the naming convention of the points in your job.

     b. Enter the **Pivot points prefix/suffix**. Tap **Next**.

        All points in the job with the correct prefix/suffix are listed.

     c. If required, select and delete any points that do not require staking.

     d. Tap **Next**.

   To reverse the direction of the line, tap **Swap**.

2. Enter values for the **Point details** and **Settings**, or accept the default values. Tap **Next**.

3. When prompted, aim the instrument at the mine back and then tap **Measure**. This ensures that the auto staked points will be located on the back.

   The instrument turns to the design point, measures a position and then checks this position against the defined tolerances. If it is outside the tolerances it turns to a new position and repeats the process until a position within tolerance is found, or the maximum number of iterations is reached.

   When a position is found within tolerance, the **Mark point** event sounds and the laser point flashes for the period defined in the **Mark delay** field in Settings. If a point within tolerance cannot be found, the point is skipped.

   TIP – Stakeout deltas indicate the direction you need to go to get to the target.

   At the end of the **Mark delay** period the instrument auto stakes the next point.

4. When the process has finished, the **Results** screen shows the number of points staked and the number of points skipped.

To define pivot points from other map points

Defining pivot points from points in the map is useful if the drive deviates from design and a new center line has to be defined, requiring the pivot points defined by the intersection of the center line with the laser lines to be recomputed.

To define pivot points from map points:

a. Select the two points that define the center line and a laser line and then select the **Compute intersection** option from the tap and hold menu to compute a point at the intersection with the option to derive the elevation from the center line.

b. Once the computed point is stored select the next laser line from the map and repeat the process.

c. When all pivot points have been computed you can select them ready for auto staking.

Auto stake settings

Point details

Specify the **Start point** and **Point code**.

Position tolerance

Specify the tolerances for a center line or grade line.

The **Station** tolerance value applies forward and back along the line.

The **Offset** tolerance is defined left and right of the line.

The **Grade** tolerance is defined up and down from the line and perpendicular to the line.

Settings

The **Mark delay** is the length of time, in seconds, that the laser point flashes once the position is found.

The **Start delay** gives you time to walk to the location of the first point to be marked. If the number of **Iterations** is exceeded, or the EDM times out, the point is skipped.

To improve performance, reduce the length of the **EDM timeout**. If the instrument struggles to get a measurement due to, for example, reflective or dark surfaces, increase the EDM timeout.

Select the **Measure to define laser line elevation** check box when:

- You want to override the elevation of the points used to define the laser line.
- The points defining the laser line have no elevation or have an arbitrary elevation of 0. This can be the case when the laser lines are defined from lines in a DXF file.

If you select the **Measure to define laser line elevation** check box, you are prompted to take a measurement before the autostake process begins. The measured elevation is then used to define the elevation for the line.