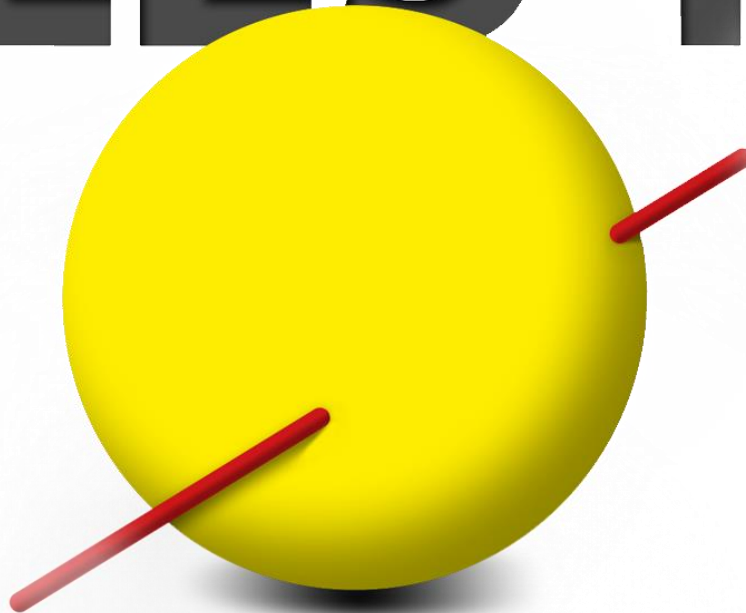


BestFit User Guide

Dimensional Control at your fingertips

LE34



BestFit

Part 2

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Introduction

BestFit is an application developed by LE34 for Trimble Access.

BestFit provides an integrated workflow which makes it possible for a surveyor to determine the mathematical best-fit solution for setting out or documentation of common geometric shapes whilst in the field.

The BestFit solutions are calculated using least square algorithms directly on a Trimble® Controller Unit.

BestFit generates a report for the resulting calculations with the BestFit points, lines and residuals. These are stored in a Trimble Controller job file at the office or in the field.

The reports may be used to check data immediately in the field, or as a means to transfer data from the field to your client or your office for further processing.

The supported mathematics is:

Basic Geometric Figures

- Line
- Plane
- Circle
- Sphere
- Cylinder

Intersections

- 2 Lines
- Line – plane
- 2 planes
- 3 planes

Projections

- Point onto a Line
- Point onto a Plane

The BestFit Workflow

The following is a step-by-step guide through the workflow of the application within Trimble Access.

The guide assumes a familiarity with Trimble Survey Controller and Trimble Access.

Summary

BestFit runs in the Trimble Access environment, allowing the user to determine bestfit shapes based on saved points and/or lines, and calculate intersections of these and other saved geometries on-the-fly, using the Controller itself for the calculations.

Calculate 3d shapes

To begin, please start the application by clicking on the LE34 BestFit Button

1. Open LE34 BestFit
2. Open an existing job
3. Choose the shape to be calculated
4. Add points – the shape will be calculated on the fly
5. Show result
6. Satisfied? Then store the result

Return to the main Trimble Access menus to perform a setting out or continue survey.

Calculate an Intersection

1. Choose the shapes to intersect
2. Add shapes
3. Show result
4. Satisfied? Then store the result

Calculate an projection

1. Choose the point and shapes to project
2. Add the point
3. Add shape
4. Show result
5. Satisfied? Then store the result

Calculate 3d shapes

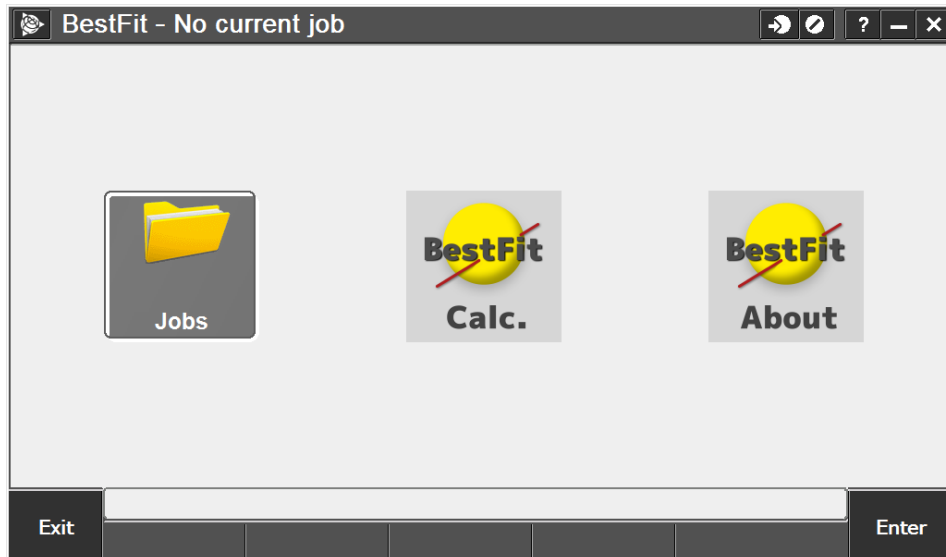
1. Open LE34 BestFit

The LE34 BestFit application is activated from the bottom line of Trimble Access main menu.



When starting the application, into main screen, three buttons are available:

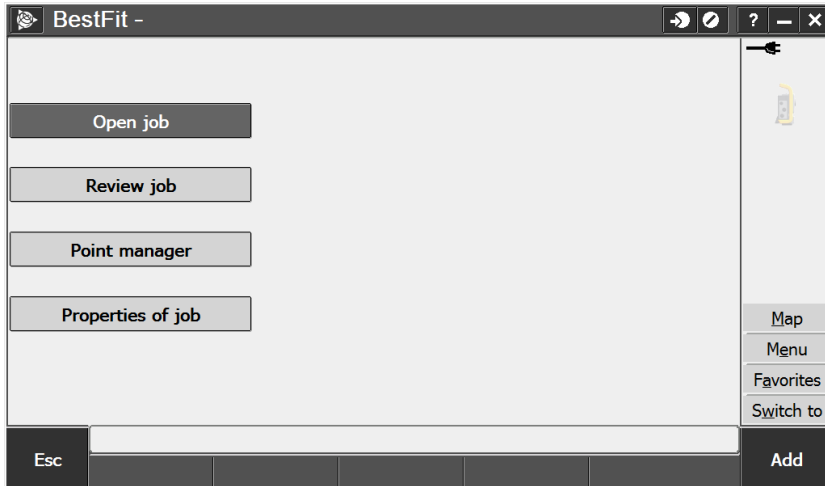
- Job Folder
- Calc. (The main application)
- About



2. Open an existing job

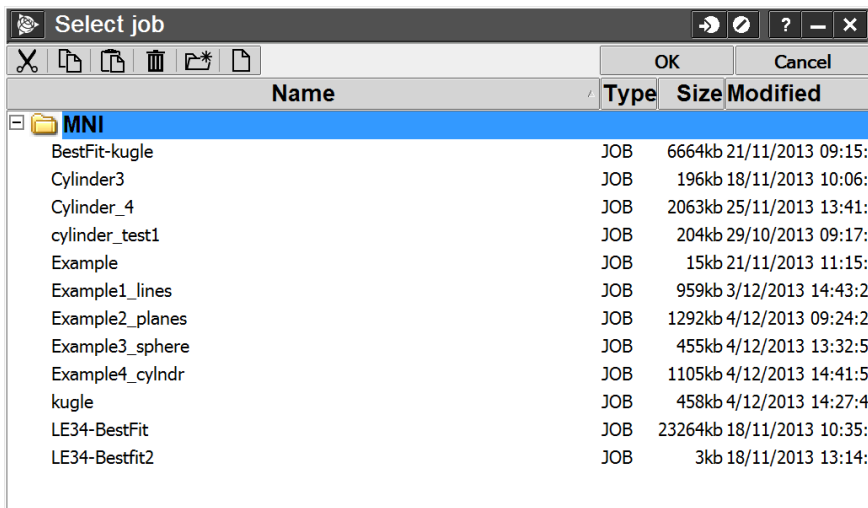
Please note that all new jobs must to be created, and points measured or keyed in beforehand using the BestFit application.

From the main click jobs and open job to choose a job, like normal.



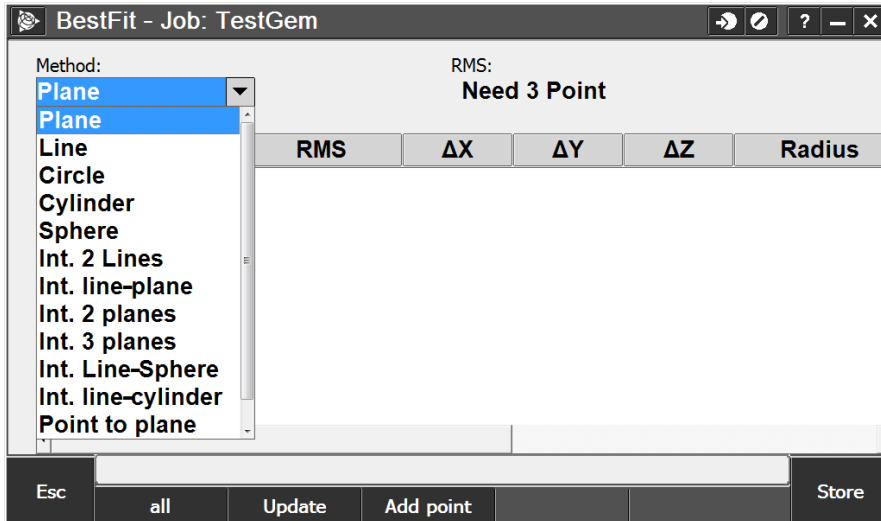
As seen in the figure some standard commands from the Trimble Access Job Menu are included.

If there's not selected any job and in the main there is clicked on Calc, you will automatically be prompted to select a job.



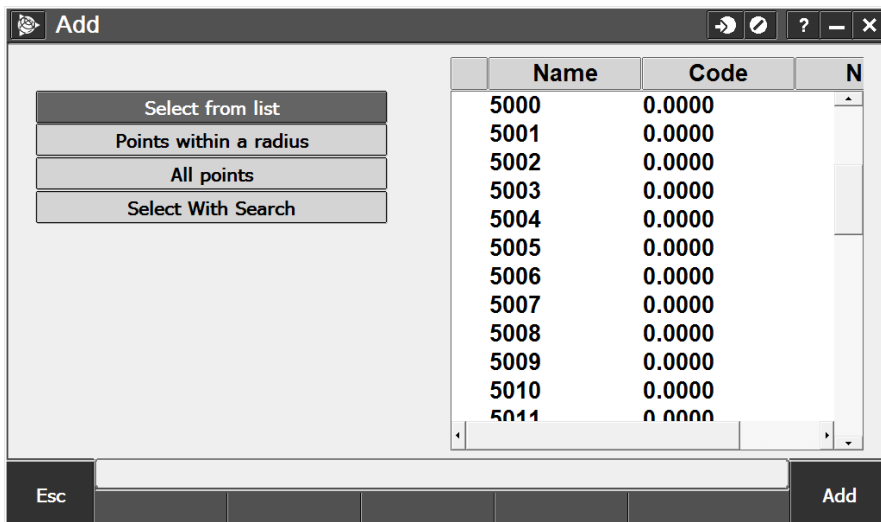
3. Choose the shape to be calculated

Next step is to choose the shape type to be calculated by the drop down menu and add 3D points.

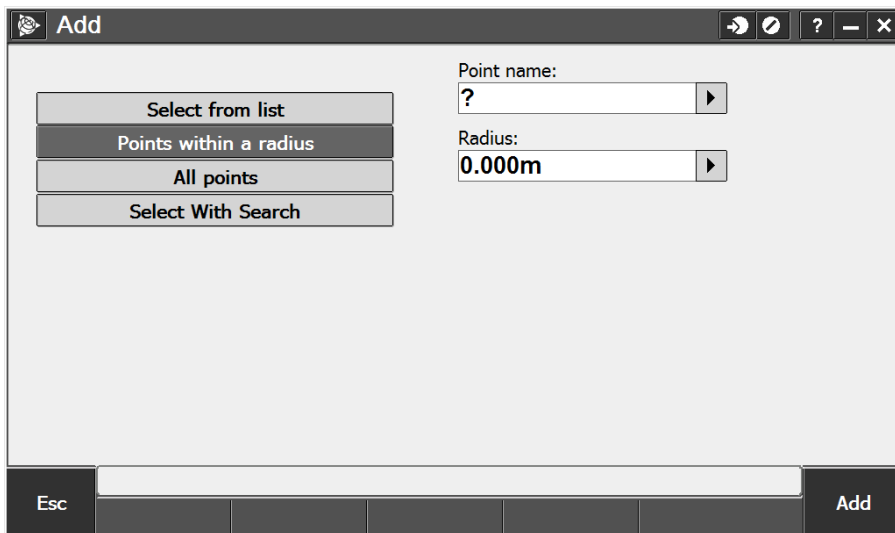


4. Add points – the shape will be calculated on the fly

Click add and following screen is shown:



From here you can choose the points you want by selecting them. All selected point will be marked with “√”. When you got the points you need click add end you will get back to the Calc screen.



If you choose to add points by radius then first choose a point and radius, click add and all points within the radius of the point will be added.

Last option is to have all points added to the list.

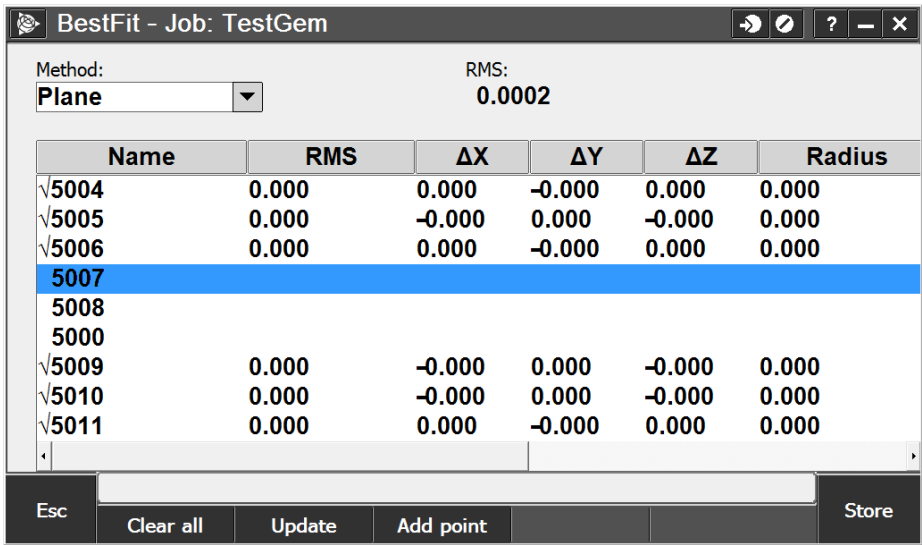
When its done then the points selected will be in the list in the calc screen.

Name	RMS	ΔX	ΔY	ΔZ	Radius
✓5003	0.000	-0.000	0.000	-0.000	0.000
✓5004	0.000	0.000	-0.000	0.000	0.000
✓5005	0.000	-0.000	0.000	-0.000	0.000
✓5006	0.000	0.000	-0.000	0.000	0.000
✓5007	0.000	-0.000	0.000	-0.000	0.000
✓5008	0.000	-0.000	0.000	-0.000	0.000
✓5009	0.000	0.000	-0.000	0.000	0.000

Clicking the ✓ on and off adds or removes the point from the dataset, and the shape is recalculated on the fly.

The top line will give the total RMS (Root Mean Square of the residuals) for the points used in the calculation.

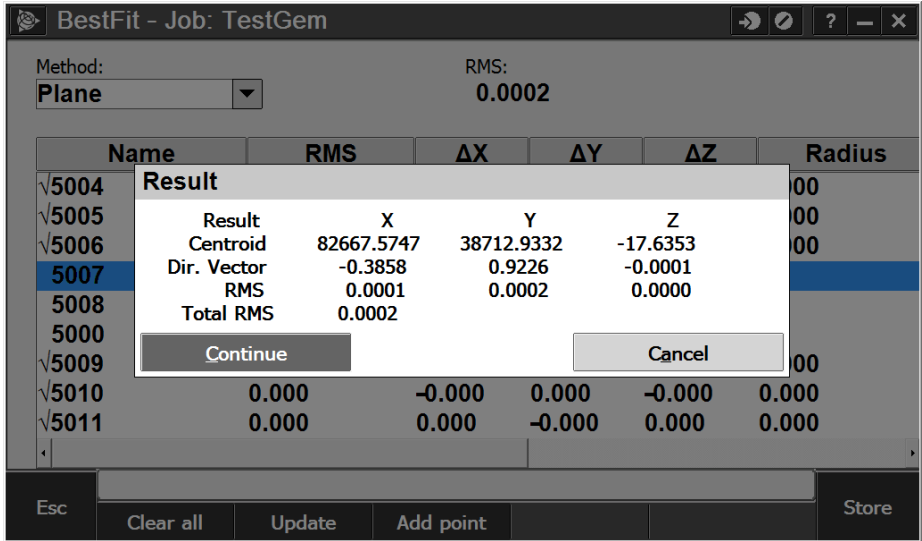
Points can be removed by removing the checkmark ✓ and clicking the update button.



If the order of points is wrong (the first 3 points of a cylinder should be a plane circle) then add the first three points one at the time and then the rest.

5. Show result

Clicking the show button store the result of the unknowns are shown.



Fourth and fifth step: Show result and store

6. Satisfied? Then store the result

If you are satisfied then click continue and the result is stored. A txt file with the result is saved at the root of the Controller.

In the job folder the documentation of the calculations is shown in the file:

Job Id : Example1_lines
 Timestamp : 00:15:57 16/12/2013
 Version : BestFit 1.0.0

Special function: Plane

Recapitulation

Point	X	Y	Z
1	1000.9853	1996.9474	10.3860
2	1001.0460	1996.9103	10.5583
3	1001.1329	1996.8398	10.7863
4	1001.2487	1996.7145	11.0408

End of recapitulation

Result :	X	Y	Z
Gravity point 1001.1032	1996.8530	10.6928	
Direction vector -0.9071	-0.3443	0.2421	
RMS	0.0002	0.0001	0.0001
RMS Normal 0.0003			

Residuals:

Point	X	Y	Z	Normal
1	-0.0002	-0.0001	0.0000	0.0002
2	0.0004	0.0001	-0.0001	0.0004
3	-0.0003	-0.0001	0.0001	0.0003
4	0.0001	0.0000	-0.0000	0.0001
RMS	0.0002	0.0001	0.0001	0.0003

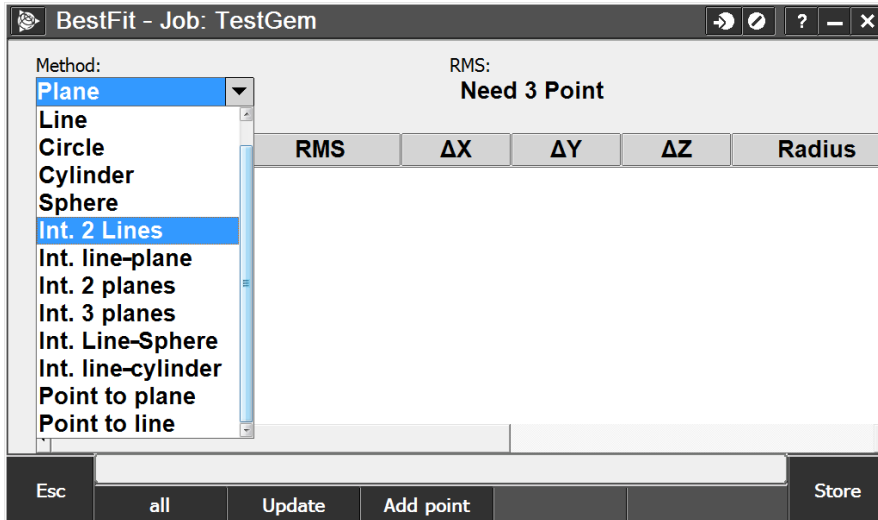
End of result

Resulting normal:	X	Y	Z	Feature code
Line7	1001.1032	1996.8530	10.6928	Pla16_A-Pla16_B
Line7 Dir.	0.9071	0.3443	-0.2421	
End of Resulting normal				

Intersections

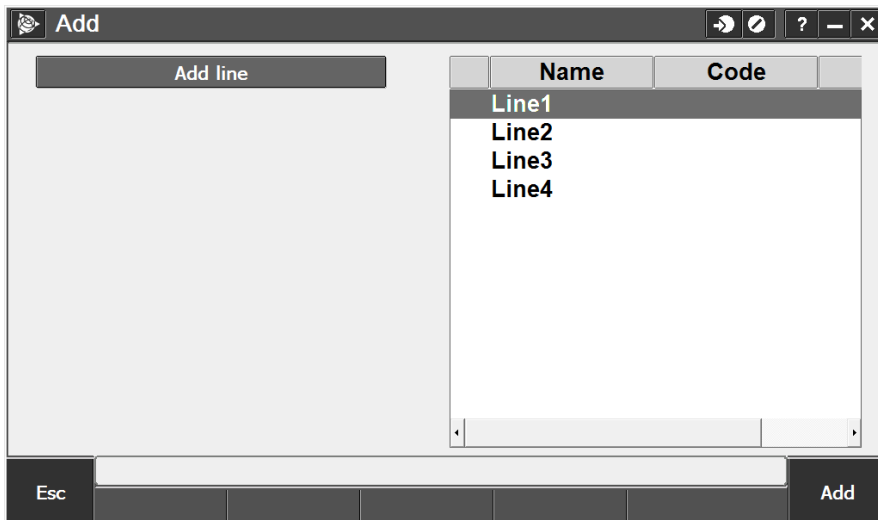
7. Choose the shapes to intersect

From the dropdown menu, you can choose between different intersection types:

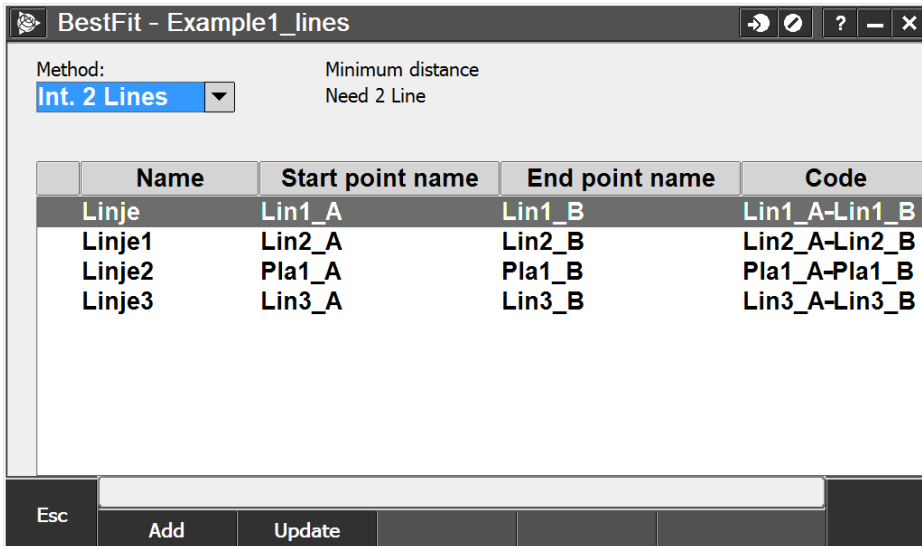


8. Add shapes

Like points we click "add" to add the calculated lines to the list:

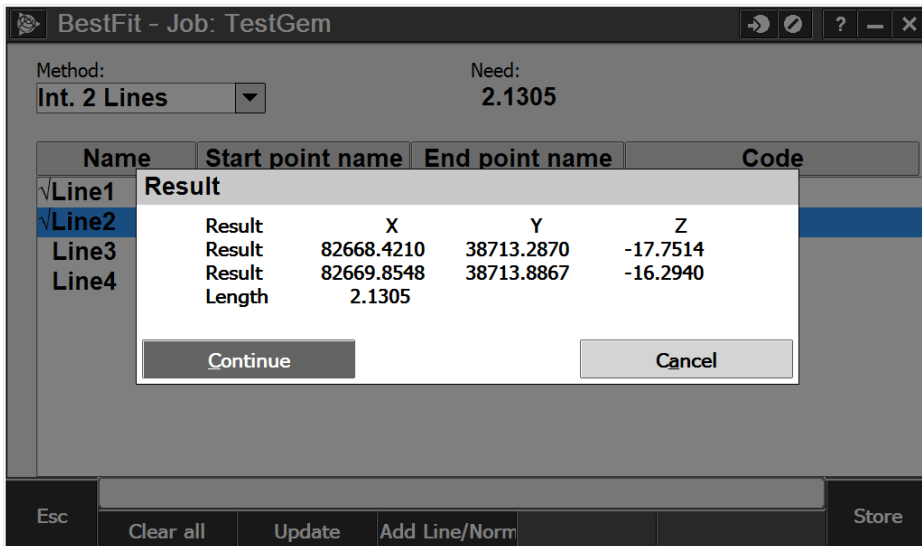


The calculated shapes are shown in the list like points, but when we select lines and normals to intersect the application will automatic show the result as if we clicked “Store” with shapes. You will always be guided to how many lines or normals you need for the calculation.



9. Show result

Selecting the right amount of lines/normals displays a resume of the calculation:



10. Satisfied? Then store the result

And we save the report of the calculation by clicking "Continue".

This is a general approach, which works for all intersections.

Timestamp : 00:31:29 16/12/2013
 Version : BestFit 1.0.0

Special function: Int. 2 planes

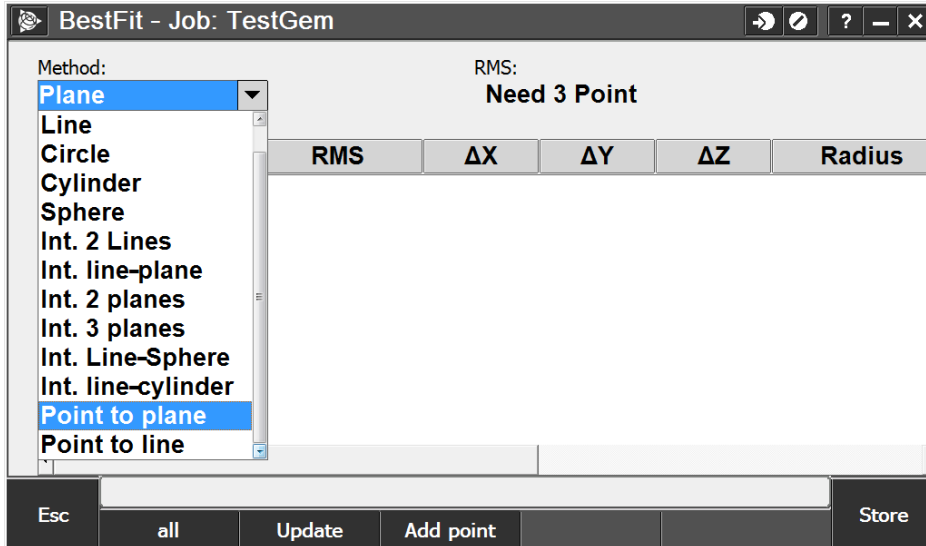
Recapitulation	X	Y	Z
Linje1	1001.2775	1996.7762	11.1209
Linje1 Dir.	-0.4484	-0.8927	-0.0449
Linje	1000.9846	1996.9507	10.3871
Linje Dir.	-0.3359	0.2468	-0.9090
End of recapitulation			

Result :	X	Y	Z
Line of intersection point	1000.5862	1996.1172	10.3757
Line of intersection direction	0.8225	-0.3925	-0.4105
End of result			

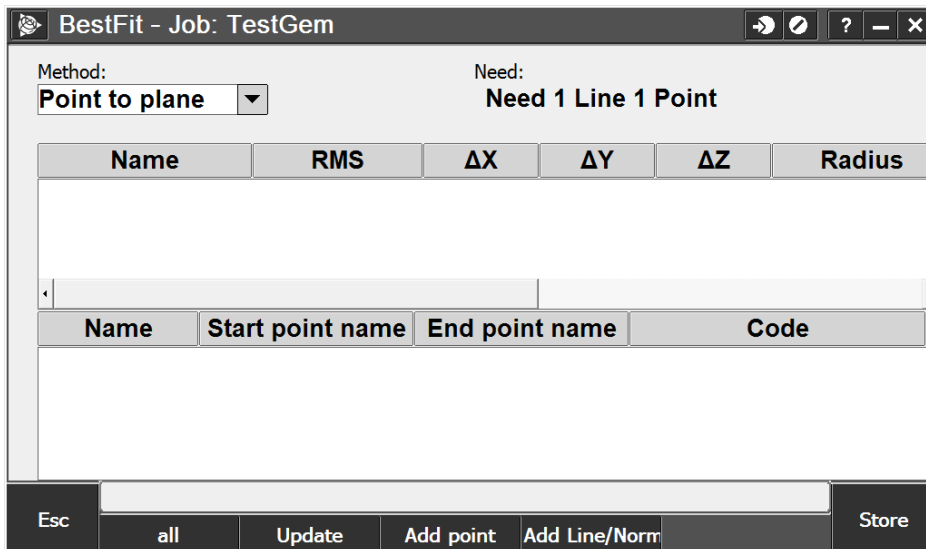
Resulting normal:	X	Y	Z	Feature code
Line8	1000.5862	1996.1172	10.3757	X10_A-X10_B
Line8 Dir.	-0.8225	0.3925	0.4105	
End of Resulting normal				

Projections

11. Choose the projection



Choose the point to be projected and the line/Normal



12. Satisfied? Then store the result

And store the result by clicking Continue.

