

## Technical Information about TachyCAD

The following pages give you a detailed overview of the possibilities using TachyCAD. For further questions or comments please do not hesitate to contact us or one of our local resellers.

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## **Q1 What is TachyCAD?**

TachyCAD is an AutoCAD application, that facilitates a surveying instrument for an online-surveying on-site. To do so, the surveying instrument (i.e. a total station) has to be connected to a laptop with a running version of AutoCAD or AutoCAD LT and TachyCAD. Inside this CAD environment, the total station serves as a 3D mouse. Supplemented with a variety of additional functionality, TachyCAD enables a fast and accurate on-site surveying of floor plans, elevations and sections.

## **Q2 When is it useful to work with TachyCAD?**

TachyCAD is recommended for all businesses where detailed and accurate as-built conditions have to be captured or have to be delivered.

TachyCAD clients can be found in the fields of engineering, surveying, heritage, archaeology, interior design etc. Even government organisations and universities are holding TachyCAD licences. In the last years, TachyCAD was used to survey and document a large variety of buildings. The spread goes from a small timbered houses to complex industrial assembly plants and even very detailed and historical castles. There is almost no type of building which is not surveyable with TachyCAD. Also for archaeology and as-built documentation for working plates in kitchen, TachyCAD has proved its value. The Base Module serves for an AutoCAD integrated and flexible surveying functionality – independent from the type of business. Additional extensions allows for a specific work in typical TachyCAD-fields. These extensions have functionalities which are focused on the special aspects in these fields. Therefore TachyCAD is adjustable to every task and the customer has to buy only those extensions he really needs for his job. The following extensions are available:

- **Measured Building Survey Extension**
- **Stake out Extension**
- **Archaeology Extension**
- **Plant Surveying Extension**

**Q3 What do you need to work with TachyCAD?**

- A total station
- AutoCAD ab Version 2007 bis 2010  
or AutoCAD LT ab Version 2007 bis 2010
- Notebook (the specifications equals the AutoCAD specifications)

**Q4 What types of total stations can be used with TachyCAD?**

Every total station with an external interface to transmit the measured data can be used. The measured data are distance, horizontal- and vertical angle to the observed point. TachyCAD supports total stations of all well known manufactures. For many tasks, especially inside buildings, it is highly recommended to use a reflectorless total station to easily enable a one-man solution. If you do not have a proper total station, we would be pleased to consult you finding the best choice for your daily tasks.

**Q5 How does the total station works together with the software?**

The measuring functionalities of TachyCAD are completely integrated in AutoCAD. The floor- and section plans can be measured and drawn directly on-site using the common AutoCAD in combination with the TachyCAD commands. A spatial point can be observed at every time, AutoCAD is expecting a 3D coordinate as an input.

**One simple example:**

You are intending to draw the contour of a wall as a line inside AutoCAD. To do so, you simply start this using the AutoCAD line-command. But instead of clicking starting- and end point of this line with the mouse or entering coordinates in the command-line, the points are aimed with the total station and measured. In the command-line of AutoCAD you can read the following:

```
Command: _line Specify first point:
  (Now you have to measure the first point)
Command: _line Specify first point: 0.123,-9.876,13.456
  (TachyCAD is transferring the coordinates of the first point)
Specify next point or [Undo]:
  (Now you have to measure the second point)
Specify next point or [Undo]: 1.123,-12.876,12.456
  (TachyCAD is transferring the coordinates of the second point)
```

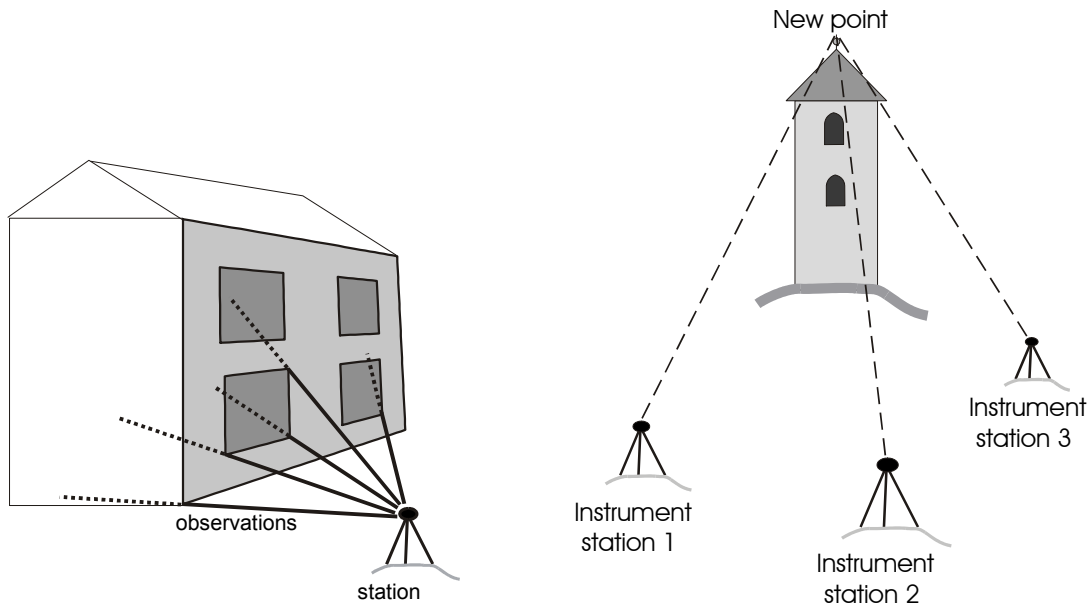
Instead of the command „line“, every other AutoCAD command can be used as long as this command is expecting a 2D or 3D coordinate. Even commands who are defined from other AutoCAD applications can be used without any restriction.

TachyCAD adopts only the measured raw data from the connected total station (i.e. the horizontal- and vertical direction and the slop distance to the observed point). All corrections needed (e.g. the height of the prism etc.) are taken into account from TachyCAD itself.

### **Q6 What functionalities are included in TachyCAD?**

The **TachyCAD base module** allows the surveying with the total station and can be used in combination with all AutoCAD commands (see also Q5). The following table gives a first overview about the functionalities:

- **Stationing:** To define the position of the total station, TachyCAD offers different geodetic possibilities (see also Q7).
- **Floorplans, sections and elevations:** Using the AutoCAD user coordinate system (UCS) all kinds of sections and elevations can be defined and measured.
- **TachyCAD programming interface:** User customizations and applications have complete access to the measuring functionalities.
- **Import and export of coordinates:** Coordinate files can be imported and exported from and to an Ascii-file. Code lists can also be used to be imported into TachyCAD.
- **Different modes:** In addition to a normal observations of points using both, the direction and the distance measurements, a derivation of the observed point using only the direction measurements is possible (forward intersection and plane intersection).The forward intersection is suitable for points who are far away or who are not able to be measured due to physical properties. The plane sections can be used for a fast and easy surveying of plane objects, such as floors or facades.



Plane intersection

Points by intersection

The TachyCAD base module is required in order to use the extensions.

### Q7 How can a station be defined?

In order to assure, the measurements from different stations are fitting together, a stationing has to be carried out. So it can be guaranteed that, for instance when doing a measured building survey, two neighboured rooms are situated next to each other or two storeys are above each other properly.

TachyCAD supports different methods to carry out the stationing:

- Free Station
- Station using existing control point
- Local orientation with a discrete height reference

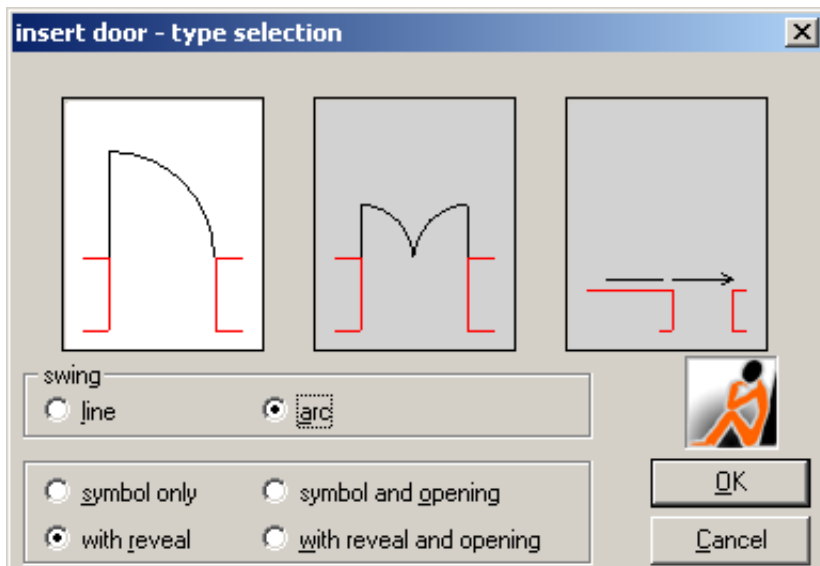
The whole management of control- and station points takes place within the AutoCAD drawing. If needed, control points can be imported.

### Q8 What functionalities does TachyCAD offer for a measured building survey?

The TachyCAD extension „Measured Building Survey“ covers optimized AutoCAD functionalities for the measured building survey.

The extension offers multiple commands to survey the conditions of a building. All commands are subject to carry out already finished details of the building (e.g. walls, doors or windows) with as less measurements and inputs as necessary. The following table gives a brief overview about the most important functions:

- **Surveying hidden points:** Points which are not observable from the current station can be defined indirectly. (e.g. 3D extension, arc intersection, line intersection etc. ).
- **Measuring Tools:** Different commands allow for an input of both, measured points and hand measured values. With this, typical parts of a building can be obtained at once (e.g. wall intersections for a circumference, optimized doors and window measurement tools etc.).

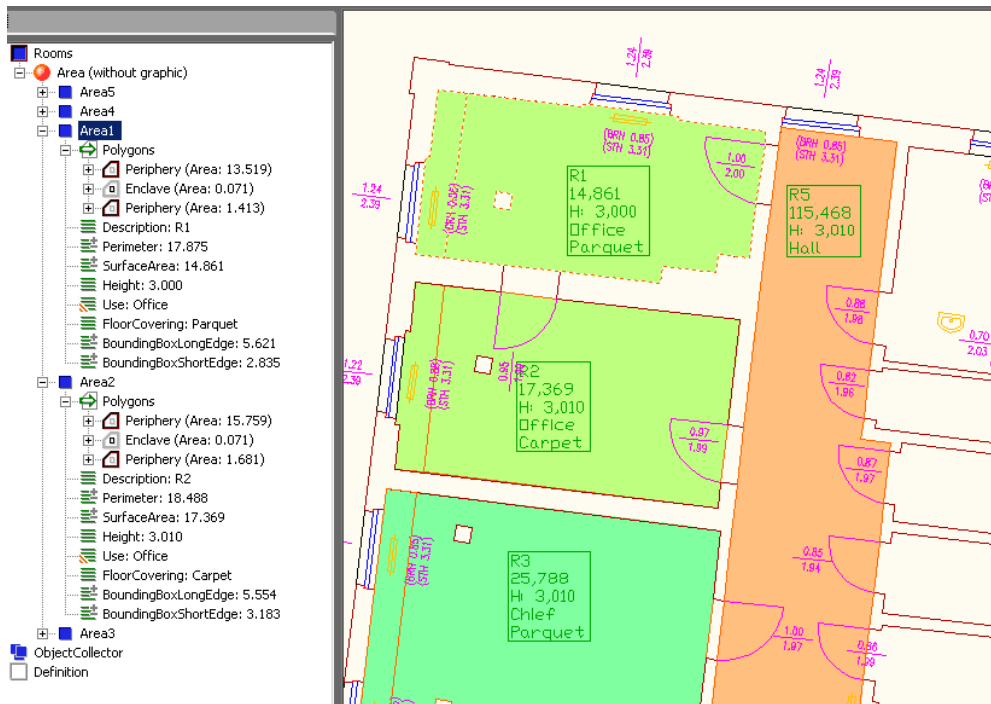


- **Measuring by hand:** Different functions allows for an input of hand measured values . This can be useful for small gaps, niches etc.

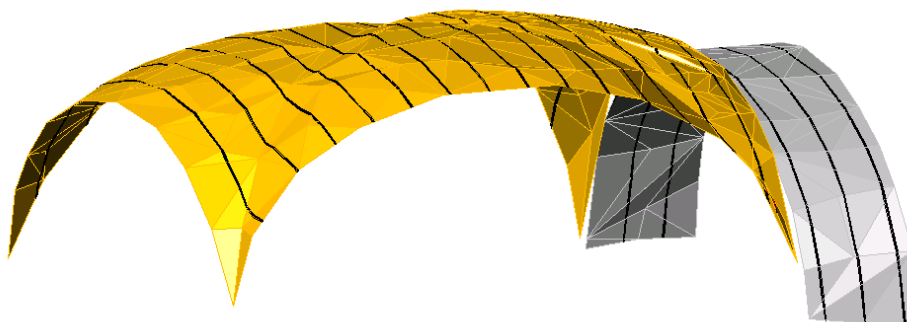
- Using a hand-held laser meter with a Bluetooth interface enables an online data transfer. This errorless communication transfers the measured distances either in the so-called Disto-box, the AutoCAD command line or the dialog box directly.



- Online surveying with GPS-RTK Receiver: Together with a Leica GPS antenna and evaluation software the calculated and corrected coordinates can be used for drawing the AutoCAD plan directly onsite.
- **Height annotations:** Different commands for height measurements can be carried out to annotate relative or absolute heights.
- **Dimensioning:** Functionalities for capturing and dimensioning of building-specific objects such as windows, doors, columns, arcs etc.
- **Layer:** Commands for an efficient layer handling eases to workflow.
- **Plan analysis :** Tools for detecting double lines, small gaps and very short lines help to tidy up the drawing.
- **Area management:** Different commands allows for a structured capturing of area and object data. Area polygons (e.g. for a room) can be defined fast and easily. A configurable area-tree will be generated at the same time. At the end, the captured data can be exported with one mouse click to Excel etc..



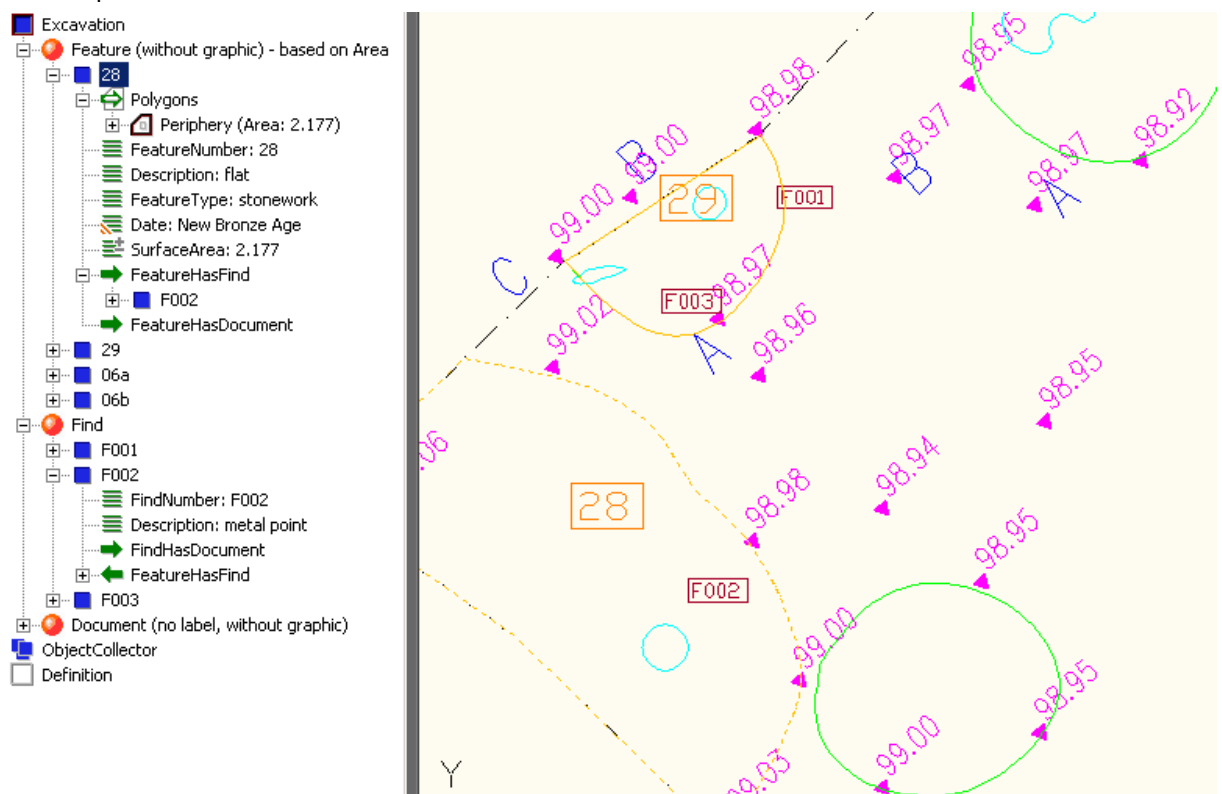
- **Surveying and adjustment of a net:** Mainly for huge and complex buildings, the definition of a net of precise control points is more than advisable. The adjustment functionalities are focused especially on the as-built surveying. So there is no need to apply a cost-intensive external adjustment software.
- **Triangulation:** A total station can be used to observe different points of an surface arbitrarily. TachyCAD is calculating a surface triangulation with this points. Different sections can be defined across this mesh afterwards. Examples of use can be found while surveying historical buildings , vaults or antic walls.



**Q9 What functionalities does TachyCAD offer for archaeology?**

The extension „Archaeology“ contains different functionalities who are coordinated to the needs and terms of an archaeological excavation. Commands from the extension “Measured Building Survey” are adapted and the terms are changed:

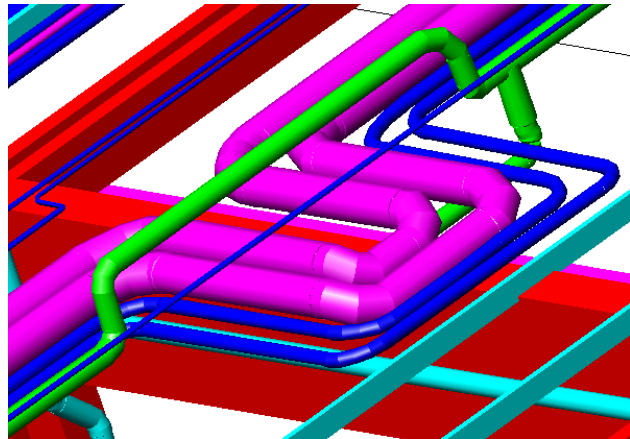
- **Findings management:** Different commands allow for a structured capturing of archaeological findings. Images and attributes can be added to those findings at the same time or afterwards. A configurable finding-tree will be generated at the same time. The captured data can be exported with one mouse click to Excel etc..



- **Stake-out:** This command yields to an easy and comfortable stake-out of points out of the AutoCAD drawing. It can always be used if the designated point exists already in the drawing. TachyCAD calculates the stake-out values, calculates the difference to the optimum solution and reports the residuals afterwards.

**Q10 What functionalities does TachyCAD offer for plant surveying?**

The extension „Plant Surveying“ is for an online surveying and editing of special 3D solids such as pipes or columns. Typical areas of application are the surveying of industrial plants or 3D building models. The 3D solids can be exported as centrelines and diameter to be used within other pipe applications.



**Q11 What is the advantage of TachyCAD compared with conventional surveying methods?**

TachyCAD combines the advantages of using state-of-the-art surveying technique with conventional as-built documentation on-site. While on-site, the user has access to a sophisticated CAD-system. This speeds up the surveying and the job can be done on-site. The usual post-processing of the data back in the office is set to a minimum.

Tasks can be solved in one step because TachyCAD vanishes the gap between surveying and post-processing. Therefore the most effective surveying method can be chosen. The user has an immediate control over accuracy and completeness of his work. Once you leaving the site, you know the job is done.

TachyCAD is a well sophisticated piece of software. In many situation you will recognize that our developers are knowing about the problems and tasks during your daily job. Therefore TachyCAD is offering solutions you don't want miss anymore.

**Q12 I am not working with AutoCAD. Am I able to use TachyCAD anyway?**

Yes! Even though TachyCAD is an AutoCAD / AutoCAD LT application. The results can be post-processed with every other CAD-system.

If you are working with another CAD application, we recommend the use of AutoCAD LT which is cheaper. If so, please understand the combination of TachyCAD and AutoCAD LT as a stand-alone surveying solution, where as AutoCAD LT can be taken as the graphical front-end supplemented with surveying functionality.

Kubit has chosen AutoCAD as a CAD-platform because it is a sophisticated piece of CAD software and offers a variety of commands which can be used during the surveying process. Since TachyCAD is using base functionalities from AutoCAD, we have been able to focus on the specific tasks of surveying only. In addition, the user has to know only a minimum on AutoCAD to use TachyCAD. We think, that makes sense.

**Q13 What is TachyCAD expecting from the user?**

Although TachyCAD is very sophisticated, it cannot and will not take away the creativity of the user. TachyCAD supports the user in doing the routines. But the result is heavily depending on the users experience and knowledge. From our point of view the ideal candidate should have the following conditions.

- An understanding for the construction and as-built relationship of the object to be surveyed.
- Basic knowledge in the use of AutoCAD.
- Basic knowledge in surveying.

Don't be scared. All these things can be studied.

**Q14 How can I test TachyCAD?**

We do offer the possibility to test TachyCAD for a limited period of time. During that time you are able to test TachyCAD within a real project. At the end, you are free to purchase the software or send it back to kubit without any obligations. Please contact kubit or your local reseller for more information.