



# Application Note

Full Report available at <https://bit.ly/3qffbXm>

## Measurement of Electrical Plug Connections

### Bruker alicona

Bruker Alicona is a leading global supplier of optical metrology solutions based on the principle of Focus Variation.

Focus Variation works on the basis of moving a focal plane over a surface and collecting robust 3D data which can then be used to measure geometric form and surface finish from a single optical sensor.

Measurement processes can be fully automated and provide GD&T measurement capabilities across all industrial & medical sectors.

The systems are in use in Industry, Industrial Research, Universities and production facilities globally.

[www.alicon.com](http://www.alicon.com)

## Introduction

In this issue, we summarise a measurement report that shows the measurement of ELO pins used in the Automotive and Aerospace industries.

The Bruker Alicona InfiniteFocusSL optical 3D metrology system, is used in the measurement of these plug connectors.

Full measurement report available here: <https://bit.ly/3qffbXm>

## Measurement Task

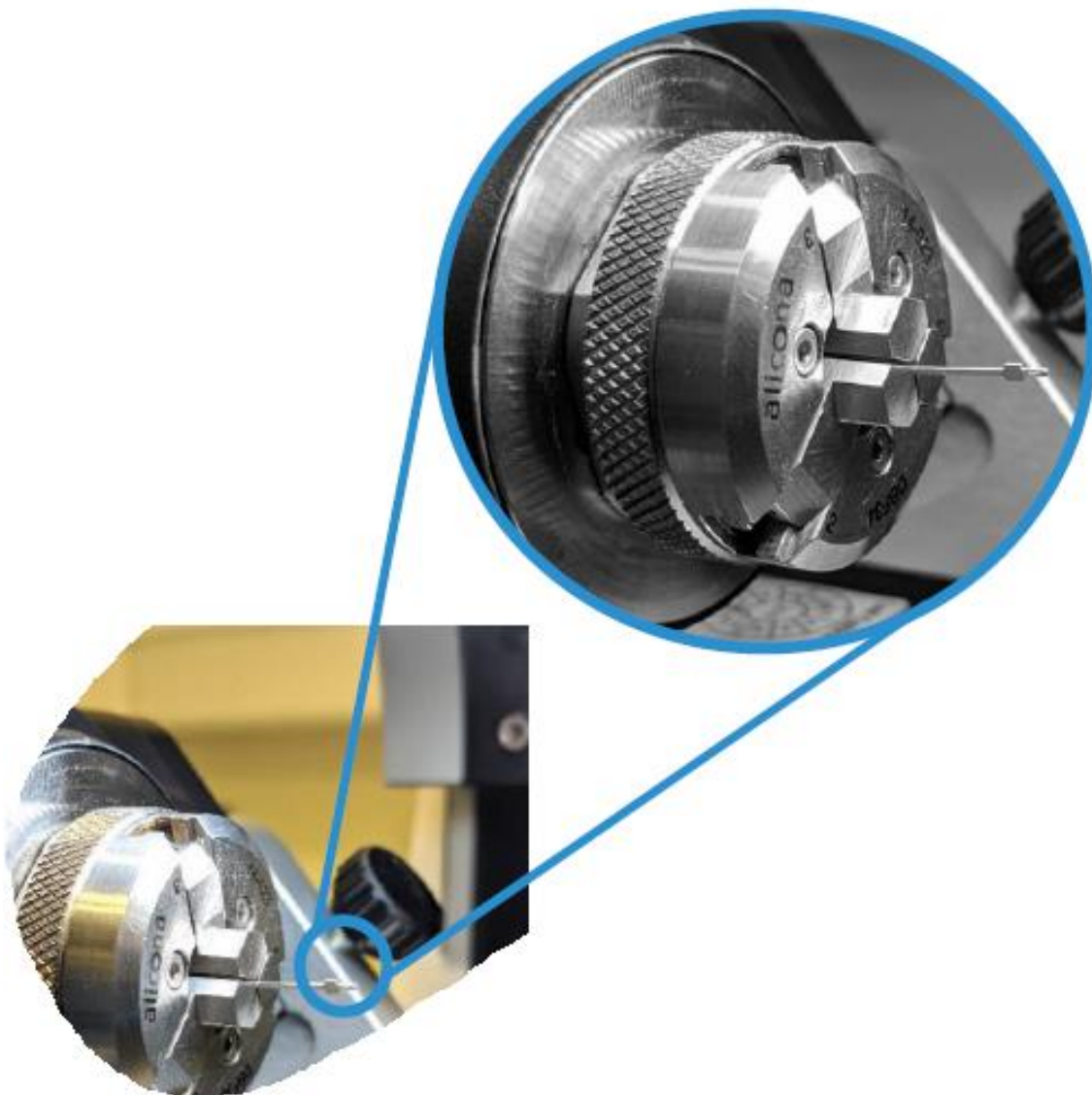
Plug connections of the most diverse types are used in electromechanical components (connection of semiconductor plates) in billions of cases.

- ELO pins are used all over the world for various applications, such as airbag electronics, and must therefore fulfil high quality requirements.
- A high precision and a perfect fit are mandatory for the long-lasting use of the components.
- The dimensional stability of the overall connector as well as the different geometries according to their tolerances are quality characteristics to be measured and proven.
- Influencing factors such as repeatability, minimal user influence, automatization and processing time are decisive decision criteria for choosing the appropriate measuring equipment.

These connectors are quite complex in nature and are difficult to accurately measure.

The system used to perform this measurement is the Bruker Alicona InfiniteFocusSL system fitted with a Real3D RotationUnit.

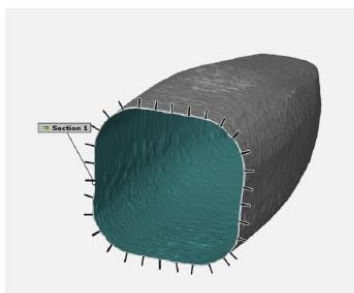
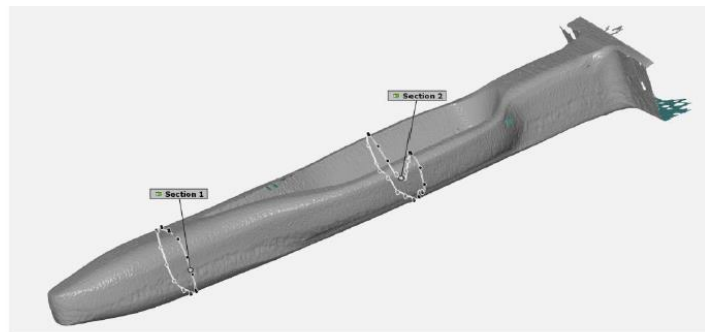
In use the sample can be simply placed in the rotation holder on the motorised XY stage as illustrated below; the small ELO pin can be seen held in the rotation chuck.



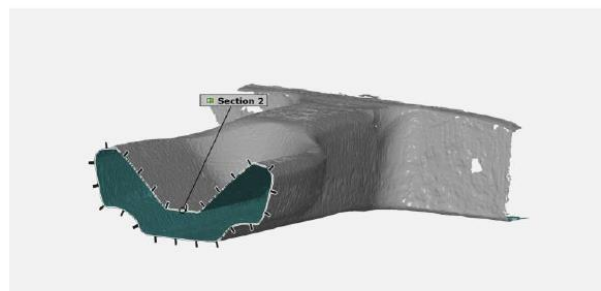
By rotating the sample in the holder, a full 360° 3D model is created on which the measurements are made as shown below.

## Plug connection Press-fit zone Measurement strategy

The parameters of the inserting zone are measured section based at section plane 1 and 2.



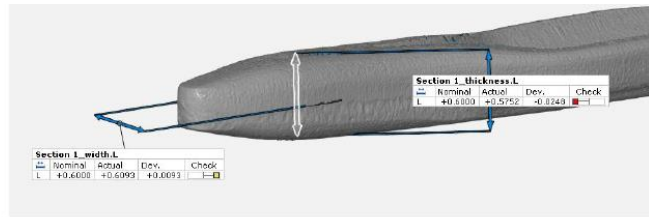
Section plane 1



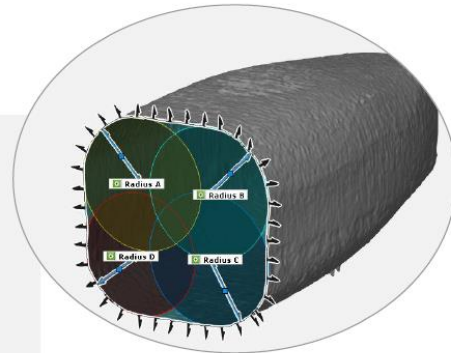
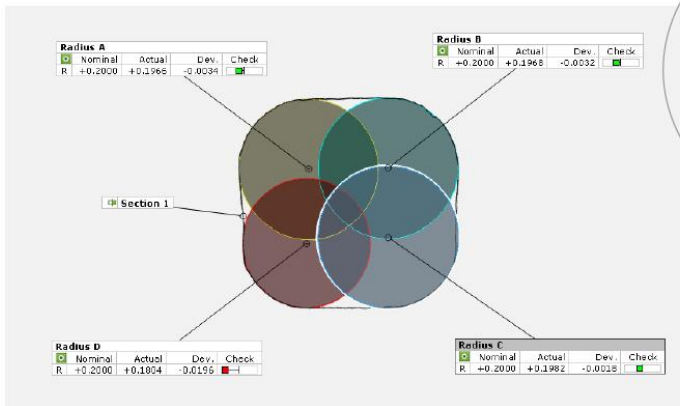
Section plane 2

From these model's full 3D measurements can be made as illustrated below and all measurements are shown on the measurement report available at <https://bit.ly/3qffbXm>.

## Plug connection Press-fit zone Section – Plane 1



Thickness and width



Edge radii section plane 1

## Summary

With the optical InfiniteFocusSL all required parameters of the pins are measured easily and fast.

- ✓ 360° measurements are performed with high repeatability.
- ✓ The complete measuring process is automated by means of a one-button solution.
- ✓ The results are repeatable and user independent.
- ✓ Full-surface deviations from CAD files are possible.
- ✓ Surface roughness is evaluated profile and area based, according to DIN.
- ✓ Various pin variants with different surfaces can be measured.