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Application Note

Compute Cylinder Transformation

VIC-3D 10

2025

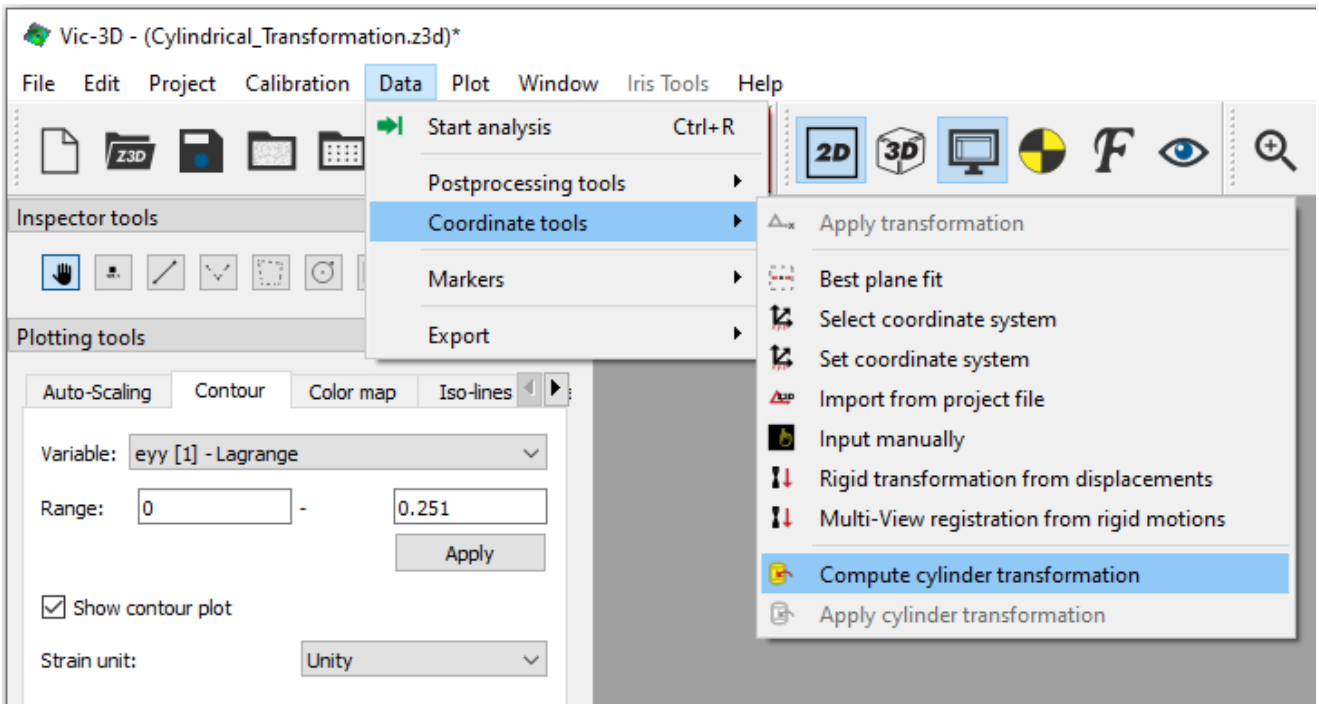
Compute Cylinder Transformation

Introduction

The cylindrical coordinates transformation in VIC-3D is used to orient the data in an appropriate orientation for looking at cylindrical data. This transformation allows viewing both the hoop and axial strain relative to the cylinder as well.

Cylindrical Transformation

In order to apply the cylindrical transformation, go through the typical calibration and image acquisition process. Once images have been acquired, import them into VIC-3D, run the analysis, and then compute the cylinder transformation found under *Data -> Coordinate Tools*.



Choose this option, click accept and the software will automatically compute the cylindrical transformation. The software will give how many iterations it took for convergence and give the radius of the cylinder as well as the standard deviation.

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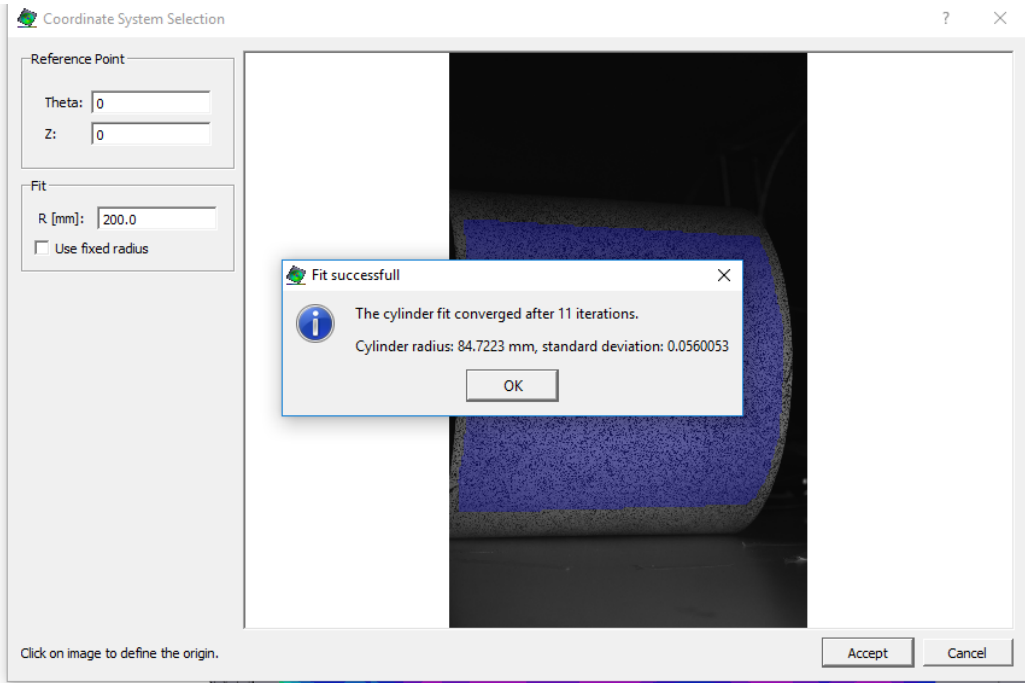
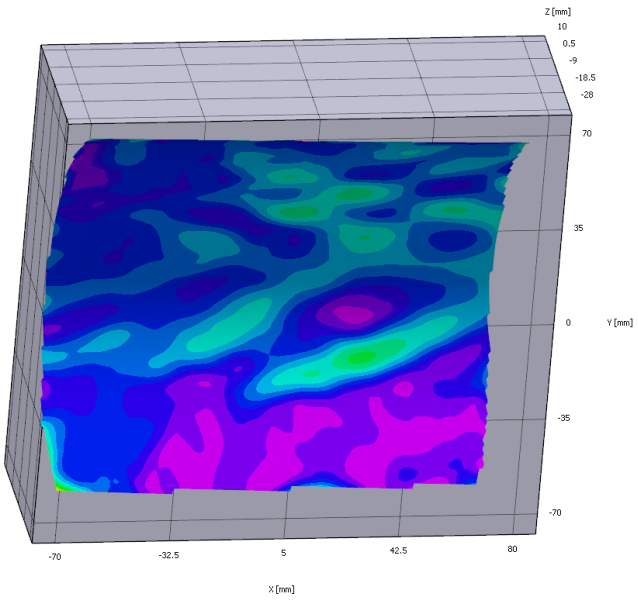
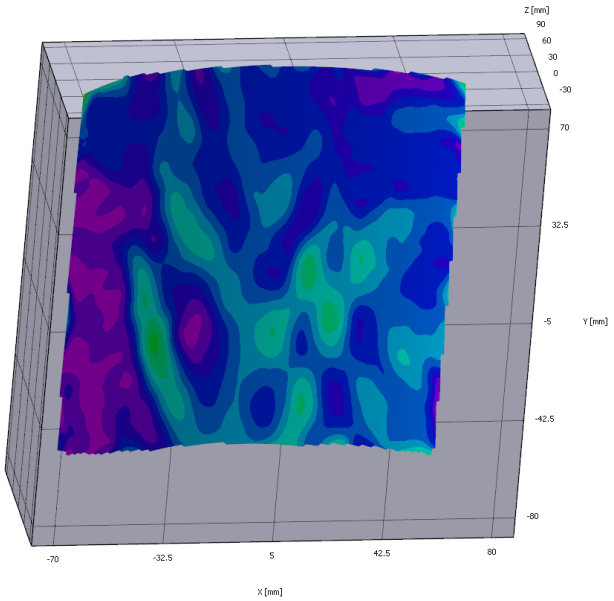


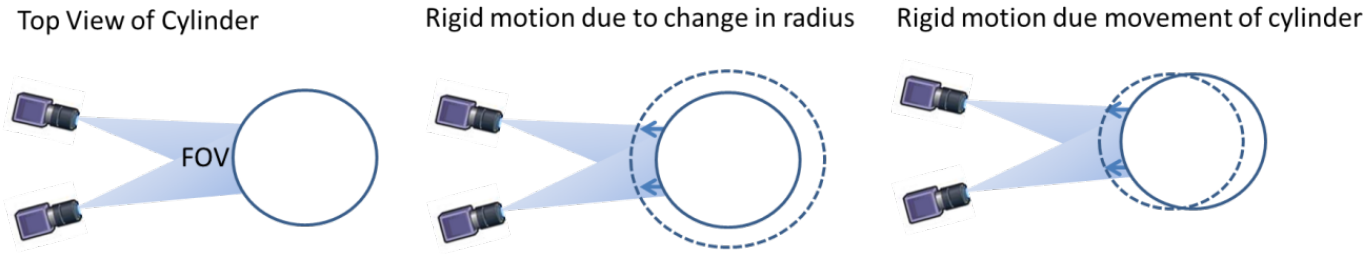




After the transformation, the software will orient the cylinder so that the y axis is axial with the cylinder. This change is shown in the two above images, where the left image is before the transformation and the right image is after the transformation.

Once this transformation is finished, recalculate the strain *Data -> Postprocessing Tools -> Calculate Strain*. After recalculating the strain, exx will now be representative of hoop strain and eyy will be representative as axial strain.

The computed R value after cylindrical transformation is the distance from the given surface point to the initial polar axis; if rigid motion is present, the object may no longer be centered about the initial polar axis, so the R values no longer accurately reflect the cylinder radius. Because of this, it is often useful to remove rigid motion prior to computing the cylinder transform.



Variable Definitions

- **Exx** – Hoop Strain (Only if Re-Computed strain after transform)
- **Eyy** – Axial Strain (Only if Re-Computed strain after transform)
- **R [mm]** – Distance from polar axis to point. If the object moves rigidly the polar axis is still the reference location
- **Z [mm]** (cylinder) – Axial distance along cylinder
- **dR [mm]** – Change in distance from polar axis to point
- **dZ [mm]** (cylinder) – The change in axial distance from reference image along cylinder
- **Theta [rad]** – The angle from the polar axis
- **dTheta [rad]** – The change in angle from the polar axis from reference image

Support

If you have any questions about this document or any other questions, comments, or concerns about our software, please contact us at support@correlatedsolutions.com, or visit our website at support/correlatedsolutions.com.