



# Tool Geometry Measurement System



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## Objectives

To develop a new non-contact 3-D drill geometry measurement system which will measure:

- Drill bit geometry
- Drill flute cross section profile
- Drill wear

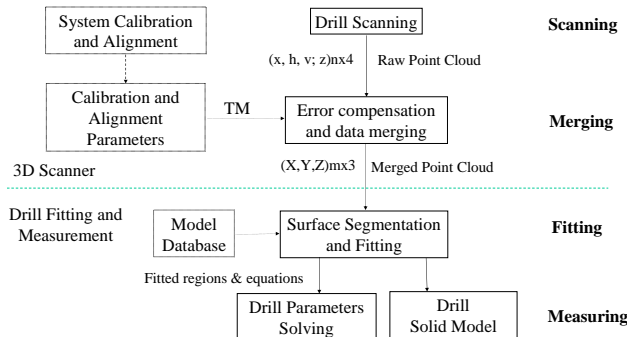
The system will greatly impact drill design, drill quality control, performance analysis, and reverse engineering.

## State-of-the-Art

Drilling performance is significantly affected by drill geometry properties. Due to the complexity of drill geometry and wear, it's difficult to measure effectively and accurately. Current drill measurement devices, such as PG1000 Cutting Tool Inspection Systems, can only get geometric parameters from 2-D silhouette images. With the 3-D Tools Geometry Measurement System, all the parameters can be obtained automatically and efficiently. 3-D scanner with the TriCam laser sensor can quickly measure the surface of a drill. 3-D scanner with the new ConoProbe laser sensor can accurately measure all the surface of a drill even with very small and very complex areas.

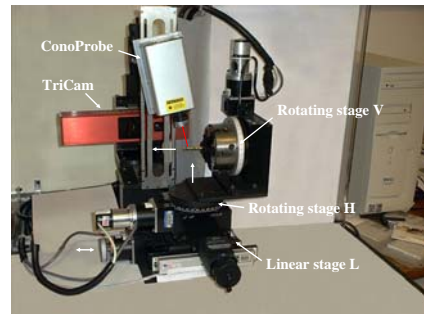
## Approaches

A new laser sensor, Optimet ConoProbe, is used to develop a new 3-D scanner to obtain both higher measurement accuracy and the ability to measure very small complex areas. Using special system configuration and new algorithms, the system can measure any design of drills and get all the geometry parameters. The following flowchart describes the approaches of drill scanning and measurement.

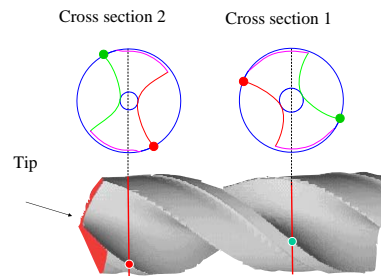


## Accomplishments

- Developed a new laser sensor 3-D scanner (non-contact, automatic, high accuracy, true 3-D, full 3-D)
- Developed all the algorithms (path planning, surface scanning; data filtering, merging, segmentation, fitting; parameter measurement, etc.) for measuring drills



System with two laser sensors



Drill scanning and fitting

## Future Work

- Implement and optimize all the software for current system
  - System calibration
  - System alignment
  - Data merging
  - Interactive path planner
  - Modeling and fitting

## Sponsors

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