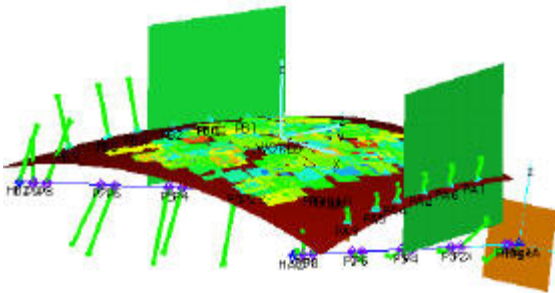


Quality Relationships are Engineered for Extreme Measures

Relationship optimization is a new type of spatial transformation capability added to SpatialAnalyzer (SA). Relationship optimization, simultaneously, best-fit distances between objects (e.g., measured points) and known geometric shapes (e.g., points, lines, planes, and surfaces.) The user is able weight each relationship individually relative to its importance to the part/tool performance requirements. The process is relatively simple to implement and at the same time easy to visualize in SA.

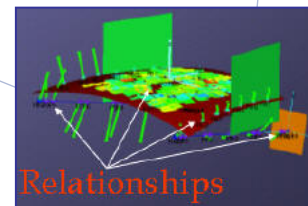


Relationships can be used as a general and extensible means of performing a best-fit optimization. You can use any object and the points can be in many relationships simultaneously. Simply weight the constraints to yield the orientation that produces the optimal fit. This technique may be quite different from the traditional process its application to complex optimizations is not limited and the implementation remains relatively simple.

SARELShips
by New River Kinematics

What are Geometric Relationships

- ▶ Collections of objects (describe common relationships) to Part Features
- ▶ Relationships capture the distances between objects
- ▶ Directly optimize part features → Best Performance
- ▶ Transform instruments and parts with Relationships
- ▶ Classic Optimization
 - ✓ Points to Points
 - ✓ Points to Surface
- ▶ Relationship Optimization
 - ✓ Point to Point
 - ✓ Point to Objects and Object to Object
 - ✓ Groups to Objects
 - ✓ Frame to Frame ... Etc.



Benefits of Relationship Fitting

- ▶ Optimize product performance
- ▶ Integrate assembly configuration for design/tolerance improvements
- ▶ Using part tolerances instead of tooling tolerances enables significant cost savings
- ▶ Relationships reduce the amount of required tolerance information
- ▶ Relationships between features are optimized directly! → Build / Inspect
- ▶ Set/Inspect part features directly from CAD
- ▶ Relationship Optimization will improve results over traditional processes
- ▶ Reduces measurement tolerance guess work
- ▶ Custom configurations directly on the shop floor
- ▶ Preparation, Setup, and Flow time are minimized
- ▶ Using the CAD Geometry in Relationships improves part and trend analysis