Prescient Technologies

Case Study

Surface Fitting

Introduction

In Reverse Engineering the two major steps are converting point cloud data to to a mesh and converting mesh to surfaces. We developed SurFitLib a library that converts the mesh to surfaces. This is a semi automatic conversion process where patches are given by the user in the form of curve network. This library generates smooth surfaces ensuring g0, g1 and g2 continuity across the boundaries.

Highlights

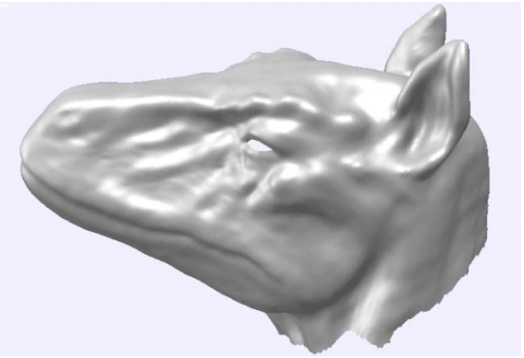
- Maintains good surface quality
- Maintains g0,g1, g2 continuity across boundaries (g1 less than 1 degree)
- Makes trade off between Fairing (smoothness) and Fitting accuracy
- Works with large data (more than 4000 patches)
- Handles T-Junction well

Key Features

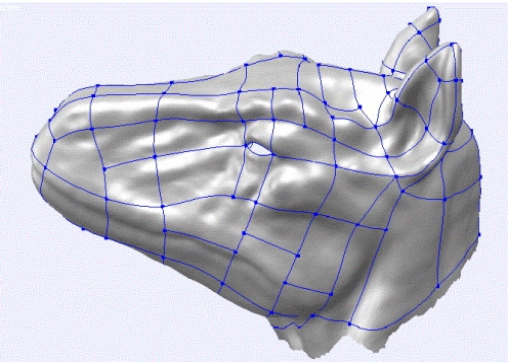
- Fits surfaces using the mesh
- Ensures g0, g1, g2 continuities to the extent possible
- Fits trimmed and untrimmed surfaces
- Handles multiple boundary patches
- Supports triangular patches and T junctions

Algorithms Developed/Implemented

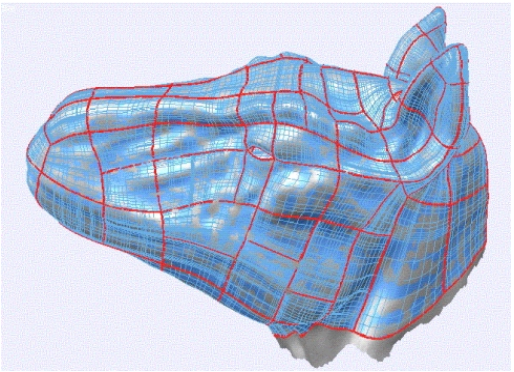
- Core NURBs algorithms
- Least square surface fitting
- Boundary based iterative minimization algorithm
- Iterative factor based algorithm for fitting accuracy
- Trimmed and untrimmed patches (handling of triangular patches and T junctions)



Mesh



Mesh with Curve Network



NURBS Surfaces