IPPD System - Objectives

• Develop a tool that integrates product and process design in a single system Environment.
• Support ‘Design-to-Cost’ through generation & evaluation of alternate designs
• Integration of heterogeneous databases (including legacy systems)
• Multi-objective Optimization for Tradeoff.
• Integration will provide designer with qualitative relationship between process/technology & quality/cost.
Integration Manager GUI

- **Configuration**
  - Specify module executable paths
  - Design selection
  - Set Optimization constraints
  - Build manufacturing process sequence

- **Design Evaluation & Tradeoff Analysis**
  - Database Lookup
  - HTN Planner
  - Tradeoff Analysis
  - Solution Viewer
System Architecture & Data Flow

Database

Integration Manager

List of Alternate Parts

Supplier, Cost Info.

Alternative Designs

Tradeoff Optimizer

Process Plan

Process Planner

List of Alternate Parts

List of Parts

Process Template Editor

Integration Manager

Eesof CAD
Database lookup GUI

- Display list of original components from HP Eesof
- Browse the database with respect to parts or components or alternate components
- User friendly interface to query, enter, update or manipulate data.
- Select list of alternate components or parts for the HTN process planner.
Significance / Challenges

- Component information like attributes, cost data are stored in relational tables.
- Data is spread across many vendors and databases.
- Relational models unable to represent complex data structures in more intuitive hierarchical ways.
- Poor modeling power/structure, does not support OO techniques like association, aggregation, inheritance etc.
- Manufacturing data models are hierarchical in nature.
- Integration of the data models to the database is difficult due to impedance mismatch.
- Design & Build object-oriented applications with relational database for persistent storage.
- Combine the powerful object modeling techniques like abstractions, encapsulation, inheritance and the features of the modern RDBMS like reliability, concurrency and scalability to build object-relational models.
Manufacturing Data models

Functional Data model
Hierarchical top-down structure of Functional Block Elements
Each FBE is associated with a bill of material (FBOM) and list of processes (FLOP)

Assembly Data Model
Each assembly is a manufacturable unit.
Each assembly is associated with a Bill of Material and List of Processes

- Sub assembly components