

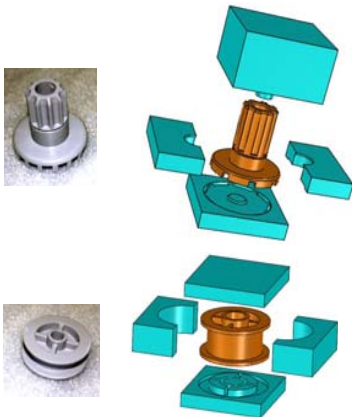
Next Generation Molding Technologies

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Injection Molding Using Permanent Multi-Piece Molds: Space Puzzle Molds

- **Enable Manufacturing of Geometrically Complex Objects**
 - Objects that are impossible to make using traditional two-piece molds
 - Potential users: automobile parts, consumer appliance housings
- **Current Research Thrust**
 - Development of design for manufacturing guidelines for parts being produced using space puzzle molds
 - draft angles, section dimensions, tolerances
 - Development of geometric reasoning algorithms for automated design of multi-piece permanent molds
 - disassembly-based spatial partitioning
 - Development of geometric reasoning algorithms for efficient cutter path planning
 - hybrid patterns, adaptive feed rate adjustments

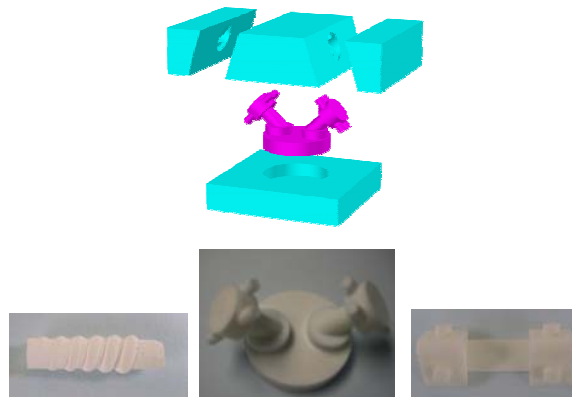
Examples of Objects Produced Using Permanent Multi-Piece Molds



Low Temperature Molding Using Sacrificial Multi-Piece Molds

- **Enable Manufacturing of Geometrically Complex Objects**
 - Objects that are impossible to make using permanent molding processes due to demolding problems
 - gelcasting of complex ceramic parts
 - Potential users: ceramic industry
- **Current Research Thrust**
 - Development of a molding process that combines CNC machining, layered fabrication, and injection molding for mold fabrication
 - large objects with very small features
 - low cost molds
 - Development of geometric reasoning algorithms for automated design of multi-piece sacrificial molds
 - accessibility and process driven spatial partitioning

Examples of Objects Produced Using Sacrificial Multi-Piece Molds



Multi-Stage Molds for Producing Multi-Material Objects

- **Enable Manufacturing of Multi-Material Objects**
 - Difference in compliance, color, and hardness can be utilized to create products with superior performance
 - In-mold assembly: no assembly operations are needed afterwards
 - Potential users: automobile industry, furniture industry, toy industry, consumer products
- **Current Research Thrust**
 - Development of a new multi-stage molding process for providing geometrically complex interfaces
 - chemical, macroscopic, and mesoscopic interfaces
 - articulated assemblies
 - Development of geometric reasoning algorithms for automated design of multi-stage molds
 - disassembly and assembly driven spatial partitioning

Examples of Parts Produced Using Multi-Stage Molding

