ăPriori

Manufacturing Process Models for Industrial Equipment

Physics-Based Process Models

Overview

aPriori's Manufacturing Process Models simulate manufacturing processes and deterministic routings to optimize production based on cost, sustainability, and manufacturability requirements. Our physics-based manufacturing process models allow engineering, manufacturing, and purchasing professionals to explore production alternatives down to the machine level. Use aPriori to unlock insights during early design stages to accelerate time-to-market and address market needs rapidly.



Manufacturing Process Group	Supported Sub Processes and Operations	Industrial Equipment Application and Example Components
Aluminum Extrusion Fabrication	 Die and Billet Preheating Release Agent Application Cooling Rough Cutoff Straightening Racking Aging Secondary Material Removal 	Structural framing systems for mining, farming, and civil engineering equipment and vehicles; solar, wind, and alternative energy components; railings, support structures, side sills, A-pillars, B-pillars and other body and closure components for heavy duty tractors and trailers.
Casting	 Sand Casting High Pressure Die Casting Gravity Die Casting Permanent Mold Investment Casting 	Engine Blocks, Transmission Housing, Transfer Cases, Oil Rig Structures, Pump Cases and Housings
Plastic Molding	 Single Shot Injection Molding Over-Molding Insert Molding Structural Foam Molding Structural Foam Molding 	Agro Equipment Exterior Panels, Cabin Interior Components, Windshields, Door Panels and Screens
Rotational Molding and Blow Molding	 Extrusion Blow Molding Material Grinding/ Pulverizing Trimming/Routing 	Gas Tanks, Ducting/Ventilation
Sheet Plastic Thermoforming	Vacuum Forming Drape Molding	Body Panels & Door Panels for Agro
Forging	 Closed Die Hammer Forging Ring Rolled Forging 	Steering Arms, Gears, Drive Components, Linkages
Machining: General Milling	 3-4-5 Axis CNC Milling Sawing/Cut-to-Length Gun Drilling Wire EDM Drill Press Deburring Jig Boring Assembly Milling (User-Guided) 	Engine and Drive Train Components, Hydraulic Cylinders for Arms/Buckets & Stabilizers, All Members at Interfacing/ Inflection Points, Down-hole Tools, Valves & Valve blocks. Directional Drilling Collars, Subs and Mandrels Artificial Lift Components such as Pockets, Mandrels, Bodies. Drill Rig Components, such as Top Drives, Links, Quills, Mandrels, Yokes, Pins Plastic Machining - Insulators, Fittings, Bushings, Valve Components, Gears, Bearings, Spacers

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Manufacturing Process Group	Supported Sub Processes and Operations	Industrial Equipment Application and Example Components
Machining: General Turning	 2-3-Axis CNC Conventional Lathes 2-3-Axis Bar Feed Lathes Mill-Turn Deep Bore/Trepanning Lathe Roughing (on castings) Lathe Roughing (on castings) Lathe Conventional Lathe Finishing Single Point Threading Single Point Threading Single Point Threading Single Plunge Grooving Multi-Plunge Grooving 	Engine and Drive Train Components, Hydraulic Cylinders for Arms/Buckets & Stabilizers, All Members at Interfacing/ Inflection Points, Down-hole Tools, Pipes, Valves & Valve Blocks. Directional Drilling Collars, Subs and Mandrels Artificial Lift Components Such as Pockets, Mandrels, Bodies. Drill Rig Components, such as Top Drives, Links, Quills, Mandrels, Yokes, Pins Plastic Machining - Insulators, Fittings, Bushings, Valve Components, Gears, Bearings, Spacers
Machining: General Grinding	 OD Grinding ID Grinding Surface Grinding Cylindrical Grinding 	Engine and Drive Train Components, Hydraulic Cylinders for Arms/Buckets & Stabilizers, All Members at Interfacing/ Inflection Points, Down-Hole Tools, Valves & Valve blocks
Gear Making	 Hobbing Shaping Shaping Profile Grinding Broaching Rolling Bevel Gear Cutting Spline Rolling 	Transmission Components, Steering Systems, Axle Shafts
Printed Circuit Board Assembly	 Component Preparation Kitting Surface Mount Assembly Conformal Coating 	Control Modules, ECU
Wire Harness	 Wire/Bundle/ Conduit Prep Braid Wire Termination Connector Assembly Splice Branch Covering Braid Harness Layout Labeling Testing 	Engine and Powertrain Control, Lighting, Radio, HVAC
Additive Manufacturing	SLA Material Jetting SLS DMLS	Prototypes, R&D Assembly, Service Components, JIT Oil and Gas Components of all Kinds



Manufacturing Process Group	Supported Sub Processes and Operations	Industrial Equipment Application and Example Components
Assembly Welding and Joining	 Riveting Lock Bolts Nutplate Installation Adhesive Bonding Manual MIG Welding Robotic MIG Welding Robotic Spot Welding Soldering* 	Large Body, Frame, Bucket, Box, Arms, & Stabilizer Assemblies, Oil Rig Structures
Heat Treatment	 Aging Annealing (3 types) Cyrogenic Freezing Solutioning Stress Relieving Surface Hardening (3 types) Tempering (2 types) Tempering (2 types) Through Hardening (4 types) Hot Isostatic Pressing Normalization* Chromizing* Borizing* Most Heat Treatments-both whole part and localized* 	Engine Components, Drive Components, Pump Components, High Pressure Componenets
Surface Treatment	 Shot Blast Degreasing Passivation Basic Painting Vibratory Deburr Anodizing Chem Film* Booth Painting* Protective Coat* Most Surface Treatments-both whole part and localized* Slik Screening Passivation Vibratory Deburr Chem Film* Booth Painting* Protective Coat* Most Surface Treatments-both whole part and localized* 	Exterior Painted Components, Under Water or Below-ground Components and Systems
User-Guided Processes (for costing without CAD)	 Turret Press Bend Brake Stage Tooling Progressive Die Injection Molding 	Early Costing with Minimal CAD Definition

*Additional cost required to develop and deliver the processes listed with an asterisk. The aPriori Applied Services team may also be able to deliver processes not in this list after evaluating the requested processes and confirming the capability to develop a solution.

WANT TO LEARN MORE?

<u>CLICK HERE</u> to schedule a demo of the aPriori Manufacturing Insights Platform.

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