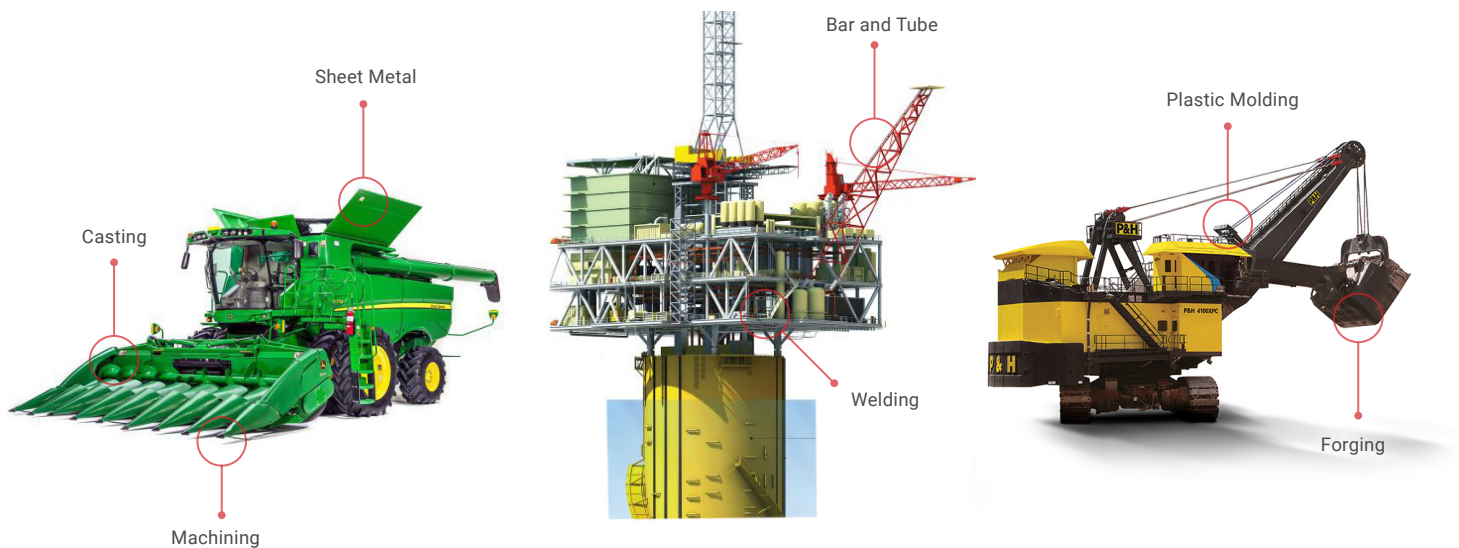



Manufacturing Process Models for Industrial Equipment






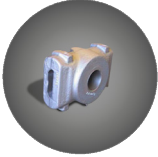
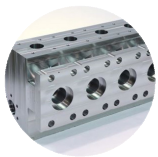
Physics-Based Process Models

Overview



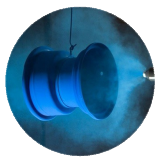
aPriori’s Manufacturing Process Models simulate manufacturing processes and deterministic routings to optimize production based on cost, sustainability, and manufacturability requirements. Our physics-based manufacturing process models allow engineering, manufacturing, and purchasing professionals to 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
Sheetmetal 	<ul style="list-style-type: none"> Basic Stamping Progressive Die Stamping Transfer Die Stamping Soft Toolled Processes Hydroforming Stretch Forming 	Body, Chassis, Box, Structural Plating, Bucket, Smaller stampings in Engine Bay and in Auxillary Agro Assemblies, Corrosion Resistant Brackets & Washers, Oil Rig Structure, Clamps
Bar & Tube Fabrication 	<ul style="list-style-type: none"> Bar Forming Expansion Flanging Flaring Flattening Knurling Notching Reduction Slotting 	Fluid Lines (Brake, Fuel, Hydraulics, Oil), Structure, Cage, Ladders, Cabs/Roll-Over-Protective-Structure, Oil Rig Structure

Manufacturing Process Group	Supported Sub Processes and Operations	Industrial Equipment Application and Example Components
Aluminum Extrusion Fabrication 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Single Shot Injection Molding Over-Molding Insert Molding Structural Foam Molding Reaction Injection Molding Rubber Molding (Small Plugs for Body Holes, Grommets, O-Rings, Seals)* 	Agro Equipment Exterior Panels, Cabin Interior Components, Windshields, Door Panels and Screens
Rotational Molding and Blow Molding 	<ul style="list-style-type: none"> Extrusion Blow Molding Material Grinding/Pulverizing Trimming/Routing 	Gas Tanks, Ducting/Ventilation
Sheet Plastic Thermoforming 	<ul style="list-style-type: none"> Vacuum Forming Drape Molding 	Body Panels & Door Panels for Agro
Forging 	<ul style="list-style-type: none"> Closed Die Hammer Forging Ring Rolled Forging 	Steering Arms, Gears, Drive Components, Linkages
Machining: General Milling 	<ul style="list-style-type: none"> 3-4-5 Axis CNC Milling Sawing/Cut-to-Length Gun Drilling Wire EDM Drill Press Deburring Jig Boring Assembly Milling (User-Guided) 	<p>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</p> <p>Plastic Machining - Insulators, Fittings, Bushings, Valve Components, Gears, Bearings, Spacers</p>

Manufacturing Process Group		Supported Sub Processes and Operations	Industrial Equipment Application and Example Components
Machining: General Turning 		<ul style="list-style-type: none"> • 2-3-Axis CNC Conventional Lathes • 2-3-Axis Bar Feed Lathes • Mill-Turn • Deep Bore/Trepanning • Lathe Roughing (on castings) • Lathe Finishing • Single Point Threading • Single Plunge Grooving • Multi-Plunge Grooving 	<p>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</p> <p>Plastic Machining - Insulators, Fittings, Bushings, Valve Components, Gears, Bearings, Spacers</p>
Machining: General Grinding 		<ul style="list-style-type: none"> • OD Grinding • ID Grinding • Surface Grinding • Rotor Grinding • Jig Grinding • Cylindrical Grinding 	<p>Engine and Drive Train Components, Hydraulic Cylinders for Arms/Buckets & Stabilizers, All Members at Interfacing/ Inflection Points, Down-Hole Tools, Valves & Valve blocks</p>
Gear Making 		<ul style="list-style-type: none"> • Hobbing • Shaping • Broaching • Rolling • Bevel Gear Cutting • Shaving • Profile Grinding • Threaded Wheel Grinding • Spline Rolling 	<p>Transmission Components, Steering Systems, Axle Shafts</p>
Printed Circuit Board Assembly 		<ul style="list-style-type: none"> • Component Preparation • Kitting • Surface Mount Assembly • Plated through Hole Assembly • Depanelization • Testing • Conformal Coating 	<p>Control Modules, ECU</p>
Wire Harness 		<ul style="list-style-type: none"> • Wire/Bundle/Conduit Prep • Wire Termination • Connector Assembly • Splice • Branch Covering • Braid • Harness Layout • Labeling • Testing 	<p>Engine and Powertrain Control, Lighting, Radio, HVAC</p>
Additive Manufacturing 		<ul style="list-style-type: none"> • SLA • SLS • DMLS • Material Jetting • SLM* 	<p>Prototypes, R&D Assembly, Service Components, JIT Oil and Gas Components of all Kinds</p>

Manufacturing Process Group		Supported Sub Processes and Operations	Industrial Equipment Application and Example Components
Assembly Welding and Joining		<ul style="list-style-type: none"> Riveting Lock Bolts Nutplate Installation Adhesive Bonding Manual MIG Welding Manual Spot Welding Robotic MIG Welding Robotic Spot Welding TIG Welding, Laser Welding Electro-Beam Welding Resistance* Ultrasonic and Friction Welding* Brazing* Soldering* 	Large Body, Frame, Bucket, Box, Arms, & Stabilizer Assemblies, Oil Rig Structures
Heat Treatment		<ul style="list-style-type: none"> Aging Annealing (3 types) Cryogenic Freezing Solutioning Stress Relieving Surface Hardening (3 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		<ul style="list-style-type: none"> Shot Blast Degreasing Basic Painting Anodizing Powder-Coat Cart Painting Wet-Coat Line Painting One-Sided Fraction Painting Plating (4 types) Silk 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)		<ul style="list-style-type: none"> 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?

[CLICK HERE](#) to schedule a demo of the aPriori Manufacturing Insights Platform.

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