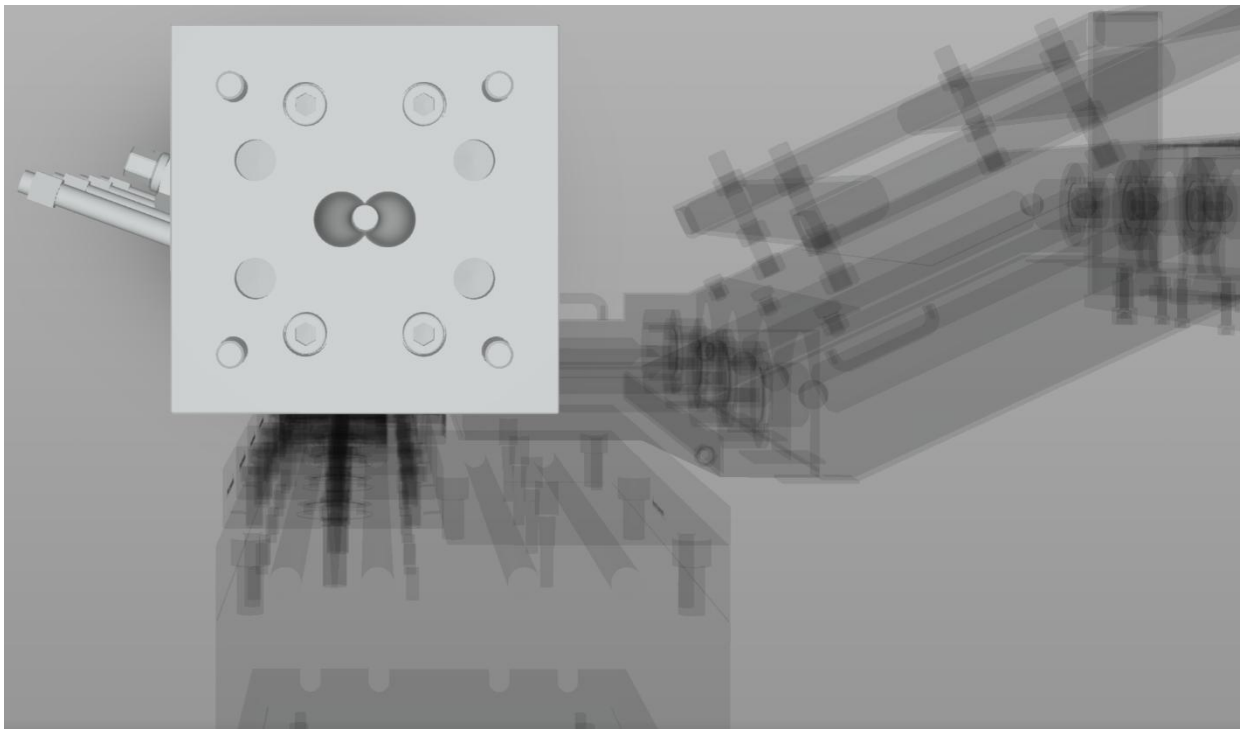
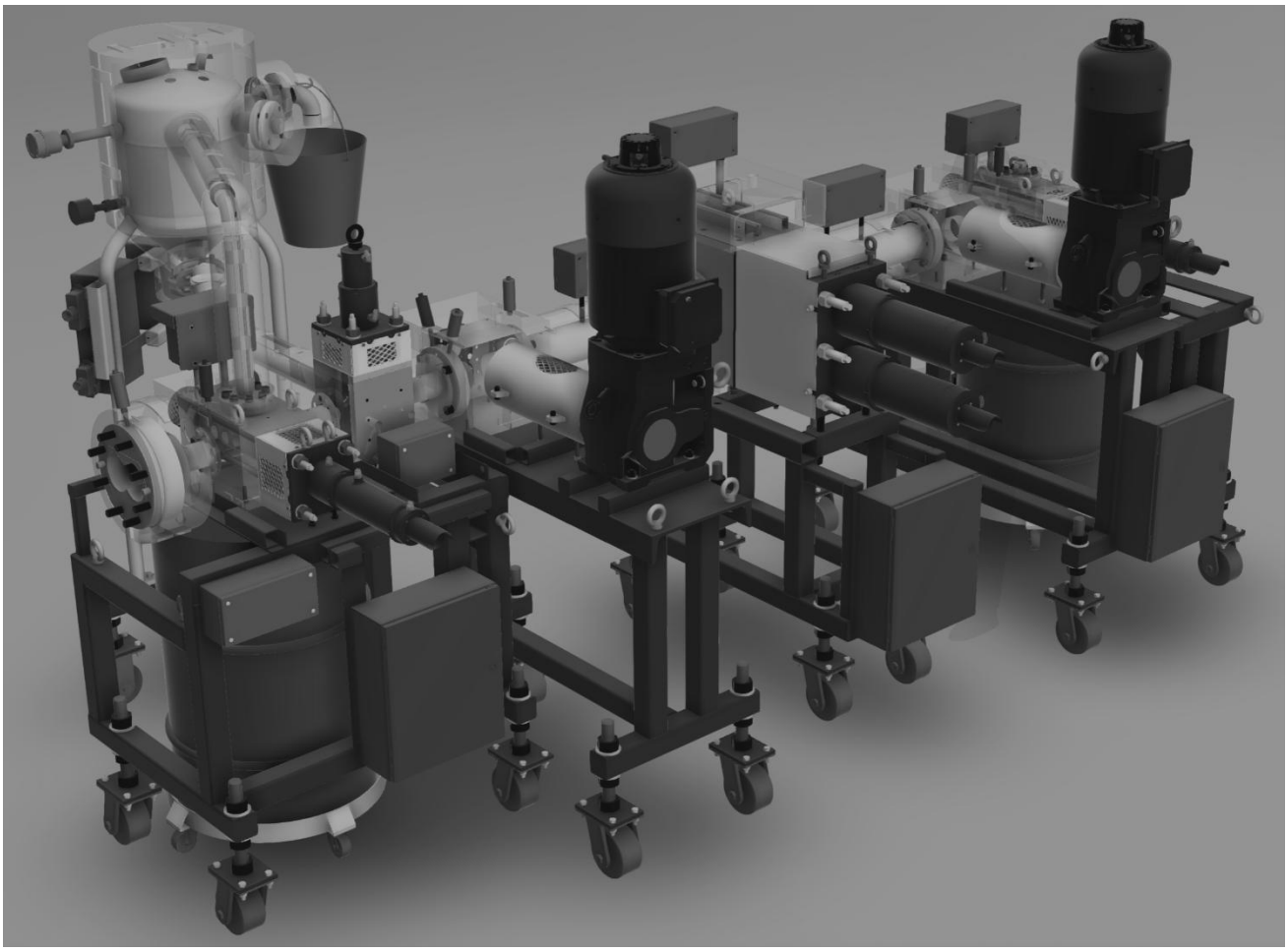
Introduction

We specialize in machine and component design across the Polymer, Medical, and Food industries, bringing a deep-rooted expertise in plastic extrusion processes. With experience spanning early-stage concept development through CAD modeling and into finalized production-ready components, we approach each project with a careful balance of precision, practical application, and creative problem-solving. Our focus is on delivering real-world, efficient solutions that not only meet performance standards but also support long-term operational reliability and manufacturability.



Project Designs



Hot Melt Train for Twin Screw Extrusion

Services Used:

Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

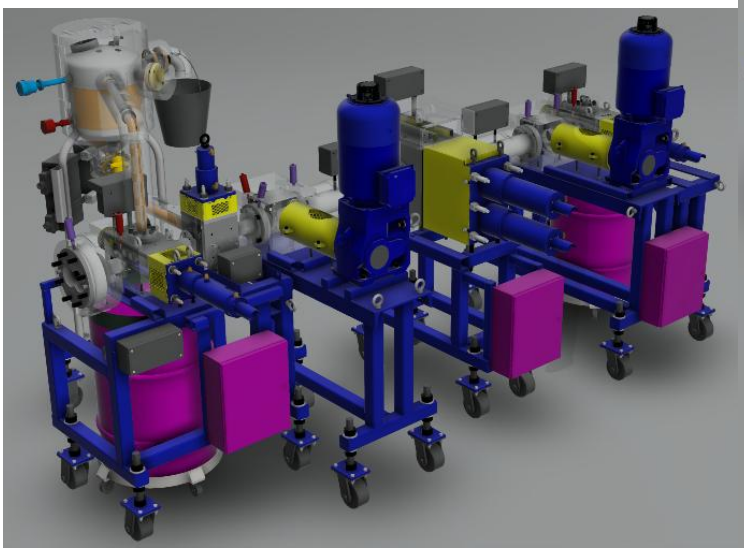
This system optimizes a hot melt adhesive twin screw extrusion line by integrating a highly efficient setup that delivers product to one or both coating dies. It also provides the flexibility to purge material either before or after the storage tank, or to bypass the tank entirely when necessary. Designed specifically for a client seeking to improve operational efficiency, the system redesign led to a reduction in processing line length by more than 50 feet, which directly resulted in significant energy savings, a reduction in scrap material, and minimized maintenance intervention. The streamlined flow path, coupled with the reduction in residence time, contributed to notable improvements in process performance, ultimately lowering both degradation and product abuse during production.

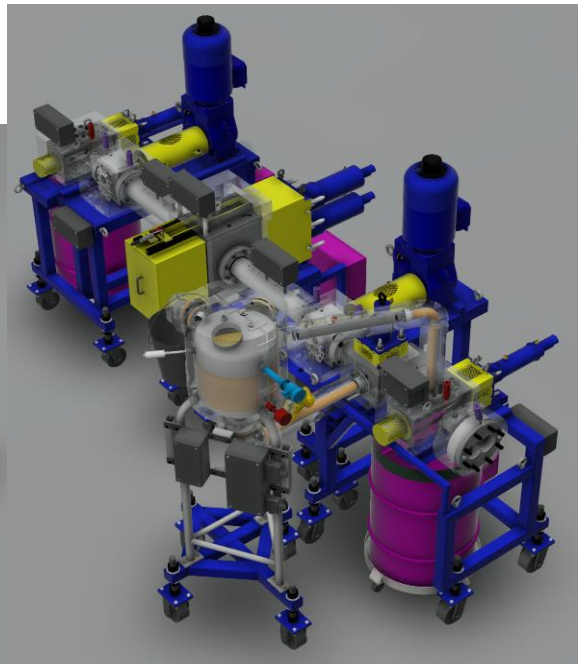
Process:

- *Configured custom 3-way and 2-way valves with purging capability for flow optimization*
- *Designed custom shaft seals for melt pump gears, valve stems and filter carriers (refer to U.S. Patents US9309974B1 & US11821421B2)*
- *Modeled full system assembly from legacy 2D prints and client measurements*
- *Consulted with client for scope development and streamline design for performance*
- *Created 100+ production drawings and documents including:*
    - *Bill of Materials (BOMs) for accurate part sourcing and inventory management*
    - *Assembly instructions & exploded views for manuals and maintenance guides*
    - *Technical documentation & fabrication-ready drawings (including GD&T for precision machining) to support vendors and manufacturers*

Design Tools:

Autodesk Inventor, AutoCAD





Melt Pump and Heat Exchanger for Specialty Chemical Process

Services Used:

Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

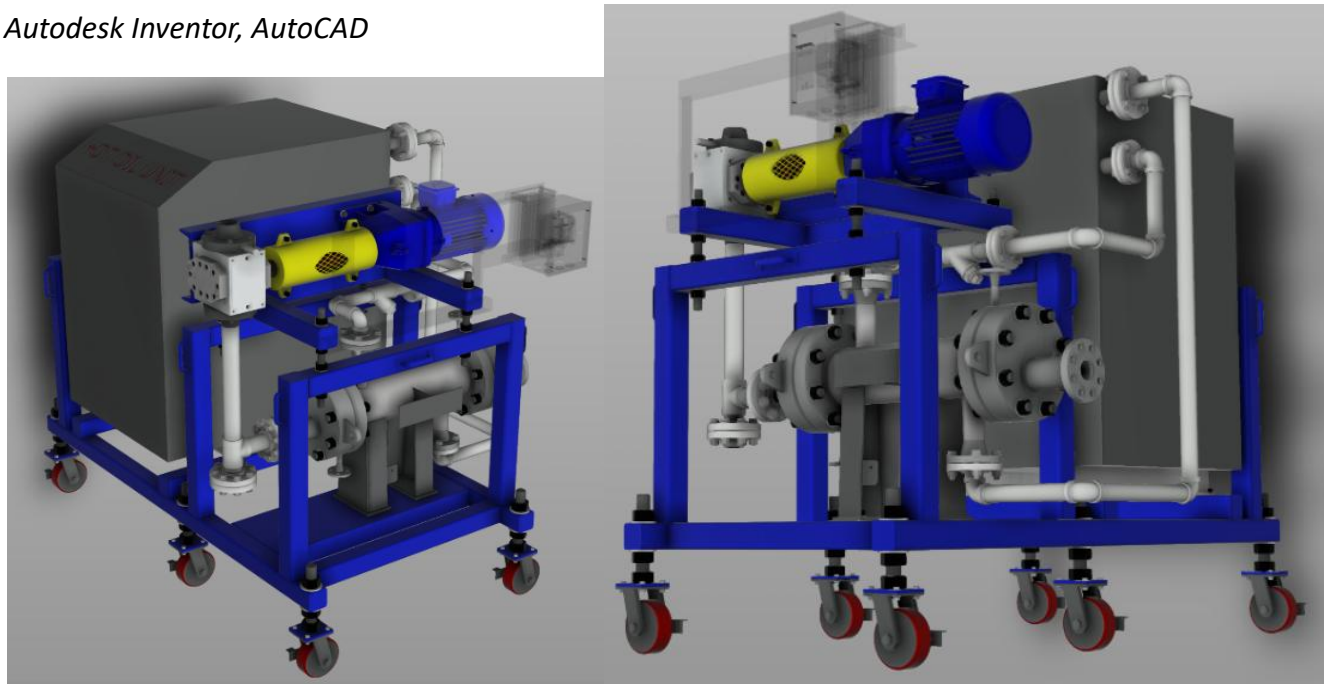
Integrated melt pump and heat exchanger that was developed for a specialty chemical process requiring highly precise flow (<1% variation) and temperature control (<1% variation) from vessel to extrusion die. Designed to fit within a compact footprint, the system ensured consistent product quality within tight process tolerances. The final assembly optimized flow characteristics and allowed for routine maintenance without compromising performance.

Process:

- *Implemented custom piping arrangement for melt pump and heat exchanger in perpendicular fashion*
- *Produced custom support for melt pump drive system above heat exchanger, incorporating hot oil barrier fluid system*
- *Modeled full system assembly from sub vendor drawings and site measurements*
- *Engaged with client to shape project direction and improve system output*
- *Created 30+ production drawings and documents including:*
    - *Bill of Materials (BOMs) for accurate part sourcing and inventory management*
    - *Assembly instructions & exploded views for manuals and maintenance guides*
    - *Technical documentation & fabrication-ready drawings (including GD&T for precision machining) to support vendors and manufacturers*

Design Tools:

Autodesk Inventor, AutoCAD



Quad-Pump Mount Feed Block with Stem Valves for Fiber Process

Services Used:

Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

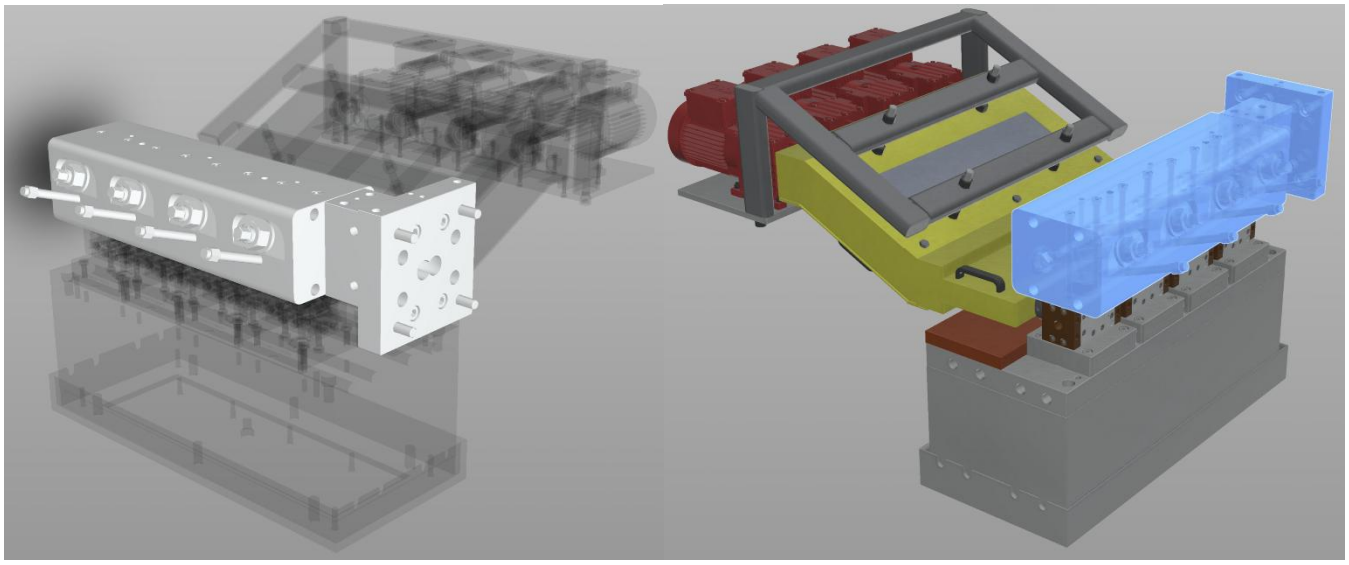
This quad-pump mount feed block was developed to significantly enhance both the efficiency and reliability of a fiber extrusion process. Designed specifically for a client who sought to reduce variation in coating strands, the system focused on optimizing pump integration while also supporting angled drive trains to achieve superior system performance. Although the available space for the system was tight, the careful incorporation of the pumps allowed for precise gauge control over each individual strand, ultimately ensuring consistent and uniform material application across the entire production process.

Process:

- *Constructed custom manifold block with four-pump and angled drive train mounting capability*
- *Produced custom shaft seals for melt pump gears to reduce radial loading from angled driveshafts*
- *Modeled full system assembly from client model and interface schematics*
- *Collaborated with client to define project scope and optimize design for functionality*
- *Created 20+ production drawings and documents including:*
    - *Bill of Materials (BOMs) for accurate part sourcing and inventory management*
    - *Assembly instructions & exploded views for manuals and maintenance guides*
    - *Technical documentation & fabrication-ready drawings (including GD&T for precision machining) to support vendors and manufacturers*

Design Tools:

Autodesk Inventor, AutoCAD



Dual-Valve Mount Y-Feed Block for Extrusion Coating Process

Services Used:

Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

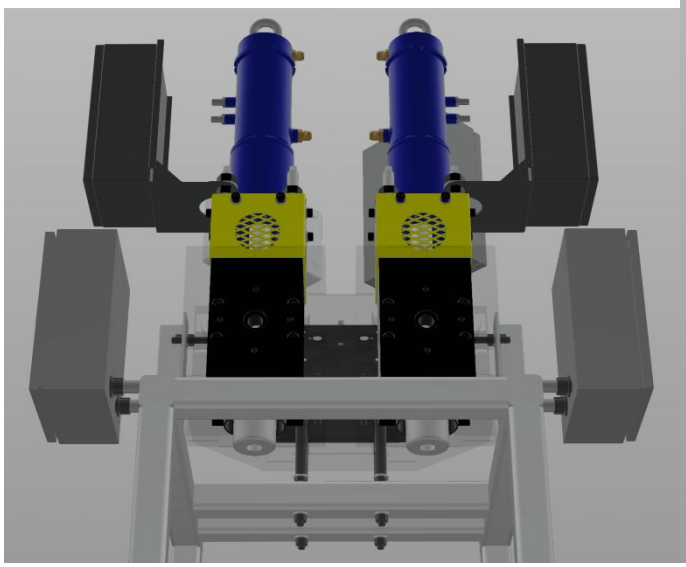
This Y-feed block was customized for optimum flow control in a high-precision extrusion coating process. Designed for a client in the polymer extrusion industry, the solution was aimed at enhancing process efficiency by managing flow distribution through dual 3-way valves with the integration of a purging system to minimize downtime and improve production throughput. As a result, the client experienced improved flow consistency, reduced system downtime, and enhanced overall production efficiency, leading to a more reliable and cost-effective extrusion coating process.

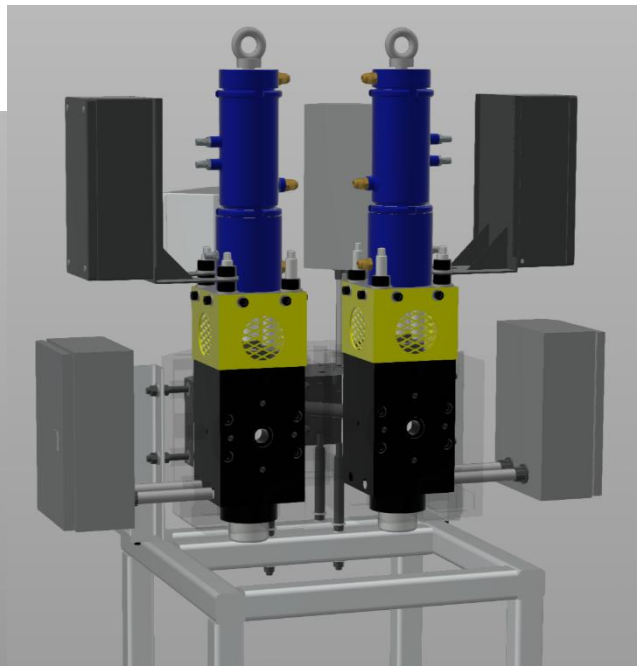
Process:

- *Designed Y-feed block featuring dual custom 3-way valves with integrated purge function for optimized flow control*
- *Incorporated custom shaft seals for valve stems (refer to U.S. Patent **US9309974B1**) and developed 3-way hydraulic cylinders with position readout capability*
- *Modeled full system assembly from client piping layout and streamlined flow requirements*
- *Worked closely with client to clarify objectives and enhance process operations*
- *Created 20+ production drawings and documents including:*
    - *Bill of Materials (BOMs) for accurate part sourcing and inventory management*
    - *Assembly instructions & exploded views for manuals and maintenance guides*
    - *Technical documentation & fabrication-ready drawings (including GD&T for precision machining) to support vendors and manufacturers*

Design Tools:

Autodesk Inventor, AutoCAD





Stationary Coil Mixer for Polymer Melt Flow

Services Used:

Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

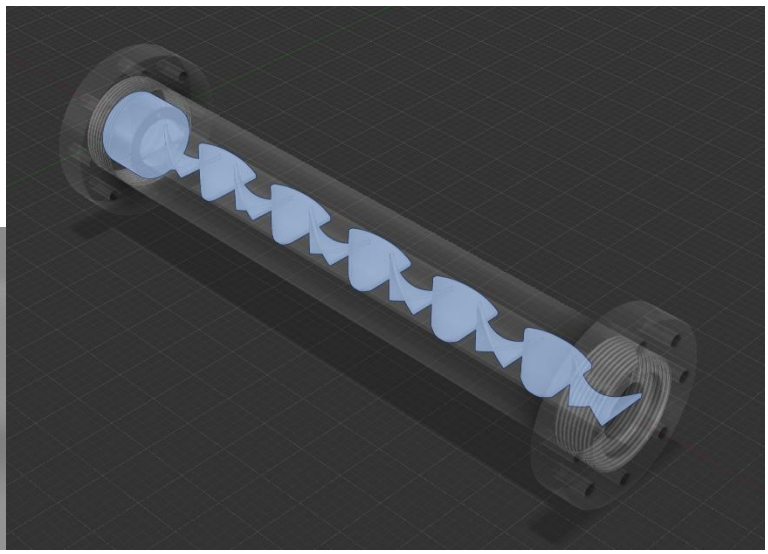
This custom-designed mixer was developed to improve polymer flow uniformity and thermal consistency in a high-performance extrusion-sheet processing line. Created for an industrial plastics processor aiming to maintain a consistent sheet profile to reduce material waste, the solution was tailored to meet specific flow diameter and mixing length requirements critical to downstream die performance. This solution equipped the client with an efficient solution that improved scrap rates and process consistency during production.

Process:

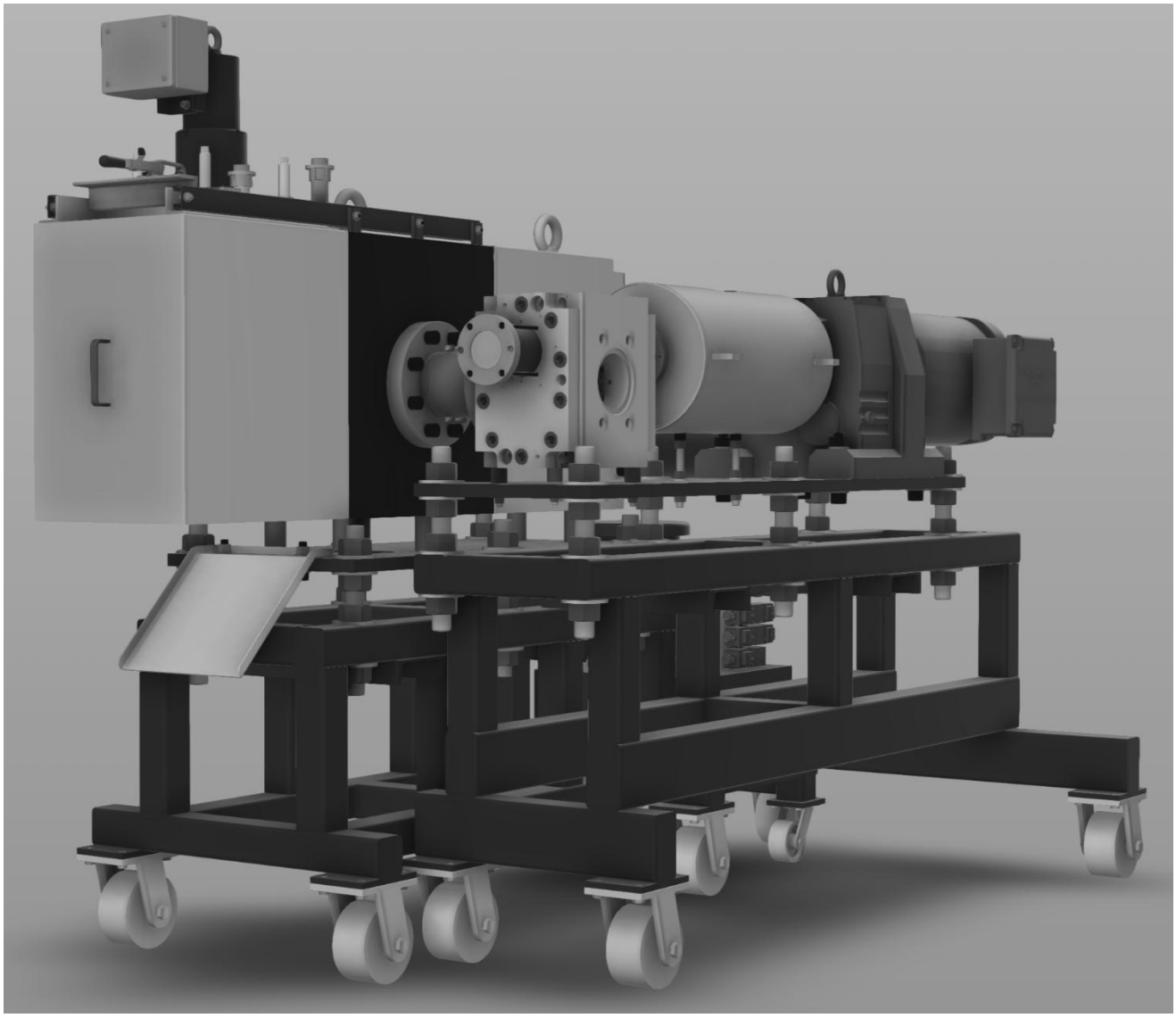
- *Developed custom casing with flanged connections to simplify installation and maintenance protocol*
- *Designed custom coil elements tailored to specified flow diameter and mixing length requirements*
- *Modeled full system assembly for die process requirements and interface measurements*
- *Partnered with client to establish scope and design for efficient flow characteristics*
- *Created supporting production drawings and documents including:*
    - *Bill of Materials (BOMs) for accurate part sourcing and inventory management*
    - *Assembly instructions & exploded view for manual and maintenance guide*
    - *Technical documentation & fabrication-ready drawings (including GD&T for precision machining) to support vendors and manufacturers*

Design Tools:

Fusion 360



Process Solutions



Equipment Implementation for Polymer, Medical and Food Industries

Services Available:

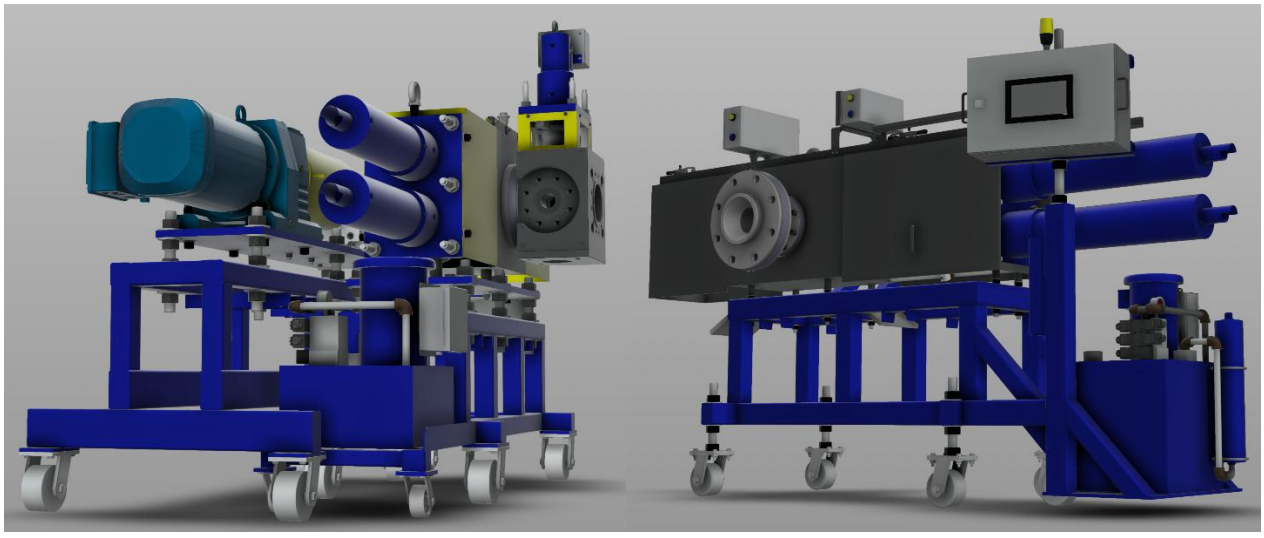
Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Reverse Design & Part Replication, Prototyping Assistance, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

***XtrudeWorks** provides equipment implementation services tailored to the polymer, medical, and food industries, focusing on efficiency, compliance, and performance. From concept to commissioning, I support clients with system integration, layout planning, and vendor coordination to ensure a smooth transition into production. My experience in custom equipment design and process optimization helps reduce downtime, improve product quality, and streamline efficient work flows. Each solution is adapted to meet industry-specific requirements and client objectives.*

Process Options:

- *Consultation & Scope Definition → Collaborate with client to define project goals, production requirements, and compliance standards*
- *System Layout & Integration Planning → Develop equipment layout to optimize floor space, material flow, and process efficiency*
- *Vendor Coordination & Equipment Specification → Assist in sourcing and specifying machinery, ensuring compatibility and regulatory alignment*
- *Custom Component Design → Derive and document custom solutions to interface with existing or new systems*
- *Installation Oversight & Interface Support → Provide guidance during equipment installation, ensuring correct alignment and connection of process lines*
- *Startup Assistance & Troubleshooting → Support initial startup with on-site or remote troubleshooting, system checks, and performance validation*
- *Documentation & Training → Deliver operational manuals, maintenance instructions, and conduct team training as needed*



Adaptor Transitions and Custom Mounting Solutions

Services Available:

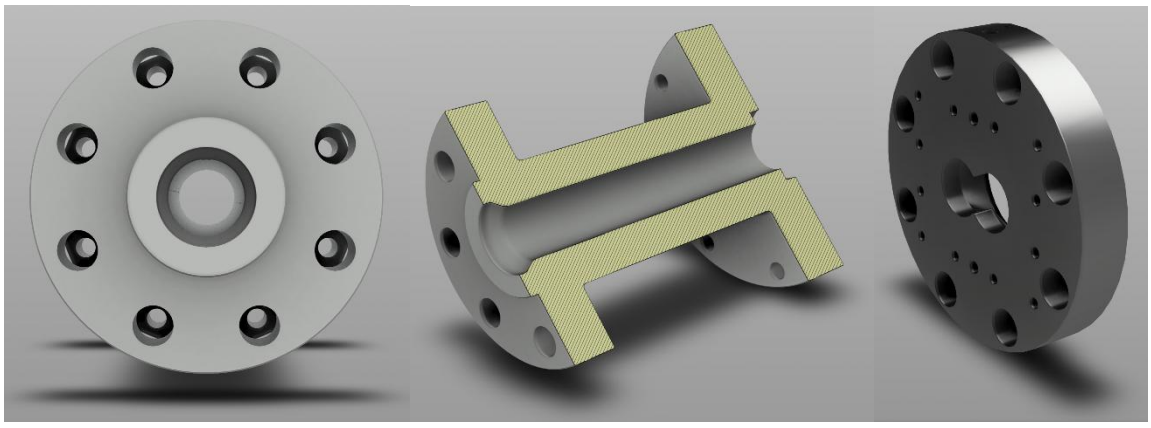
Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Reverse Design & Part Replication, Prototyping Assistance, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

XtrudeWorks *specializes in adaptor transitions designed for polymer processing applications requiring precise alignment, secure sealing, and smooth product flow. From high-pressure extrusion interfaces to intricate downstream transitions, we create solutions that ensure compatibility between dissimilar equipment, line configurations, or legacy tooling. Emphasis is placed on surface finishes, thermal compatibility, and all-metal, O-ring, gasket or process-specific seal mechanisms for seamless integration and performance reliability.*

Process Options:

- *Initial Consultation & Scope Definition → Collaborate with client to define requirements, materials processed, and process layout needs*
- *Interface Assessment & System Mapping → Evaluate upstream and downstream equipment to define critical alignment, flange, and bolt pattern or clamping details*
- *Adaptor Design & CAD Modeling → Develop production-ready adaptor designs by applying process-appropriate material selections, surface finishes and coatings to reduce shear, eliminate dead zones, and improve flow characteristics*
- *Reverse Design of Legacy Components → Reconstruct existing adaptors or design replacements to ensure system compatibility during upgrades or repair*
- *Manufacturing Documentation → Deliver drawings, tolerancing, and detailed assembly references for machining and production teams*
- *Vendor Coordination & Manufacturing → Support sourcing and qualification of machining and fabrication partners to ensure high-quality, specification-compliant manufacturing*
- *Installation Oversight & Interface Support → Provide guidance during equipment installation, ensuring correct alignment and interfacing*



Extrusion Feed and Die Transition Blocks

Services Available:

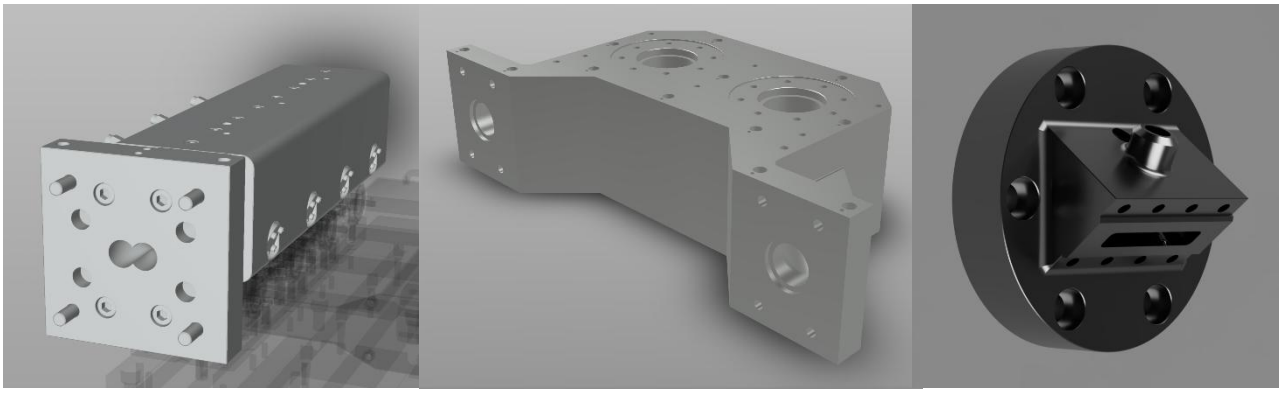
Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Reverse Design & Part Replication, Prototyping Assistance, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

XtrudeWorks *designs custom feed blocks and die transition blocks to optimize polymer flow distribution, layer uniformity, and process flexibility in flat film, sheet, and coextrusion systems. Our designs focus on achieving balanced flow through precision internal geometries, polished flow channels, and thermally stable configurations. Whether integrating into existing die systems or developing from concept, we ensure each block meets process demands for layer control, cleanout accessibility, and thermal uniformity across the profile.*

Process Options:

- *Initial Consultation & Scope Definition → Define film or sheet requirements, material combinations, and extrusion layout needs*
- *Flow Path Design & Analysis → Design flow geometries and channel splits to optimize layer balance, pressure drop, and transition control with polished flow surfaces and removable inserts or covers to support purging and maintenance*
- *CAD Modeling & Assembly Configuration → Develop detailed 3D models with alignment features, heater placements, and thermocouple ports as needed for uniform heating and isolation zones to reduce flow instabilities*
- *Reverse Design of Legacy Blocks → Reconstruct or enhance existing feed block designs for updated die systems or capacity expansion*
- *Manufacturing Documentation → Deliver drawings, tolerancing, and detailed assembly references for precise fabrication and production teams*
- *Vendor Coordination & Production Oversight → Assist in sourcing skilled block (CNC) fabricators and validating flow-critical features through inspection*
- *Installation Oversight & Interface Support → Provide guidance during equipment installation, ensuring correct alignment and interfacing*



Custom Frameworks & Mounting Solutions

Services Available:

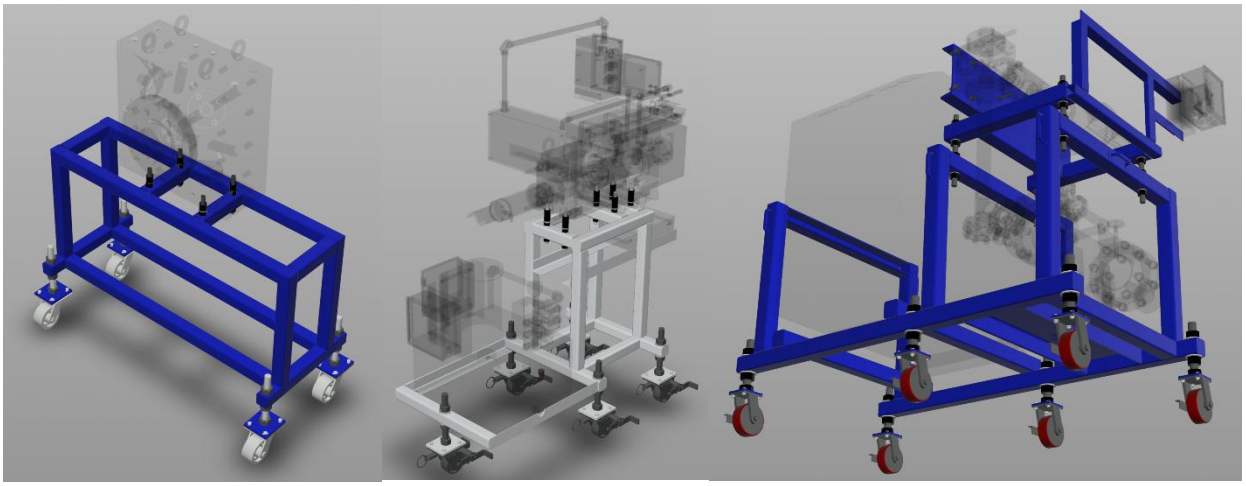
Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Reverse Design & Support Replication, Prototyping Assistance, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

***XtrudeWorks** designs structural frameworks and precision mounting solutions to support extrusion systems, dies, feeders, and auxiliary process equipment. Each structure is constructed for stability, load distribution, alignment accuracy, and ease of installation. Whether building a mobile die stand, a rigid feed throat support, or a cantilevered frame for limited space, we tailor solutions to match your plant layout, floor loads, and operational needs. Designs prioritize strength, adjustability, and integration with safety or guarding components.*

Process Options:

- *Initial Consultation & Scope Definition → Define support requirements based on equipment loads, access needs, installation constraints, and mobility options*
- *Structural Design and Modeling → Create 3D models and welded assemblies that include leveling systems, casters, lift points, or anchor bases as needed*
- *Surface Treatment & Material Selection → Recommend materials and finishes (e.g., paint code, powder coating, stainless, aluminum, etc.) to match process requirements*
- *Reverse Design of Legacy Structures → Replicate or improve existing support frames or guarding for upgraded systems or tighter tolerances*
- *Manufacturing Documentation → Provide production-ready drawings with weld symbols, layouts and BOMs for structural fabrication and field assembly*
- *Vendor Coordination & Fabrication Oversight → Identify qualified fabricators and oversee production to ensure dimensional accuracy and build quality*
- *Installation Oversight & Alignment Support → Provide guidance with rigging, positioning, and securing frames to ensure proper system support and functionality*



Auxiliary Systems Integration

Services Available:

Mechanical Design, CAD Design & 3D Modeling, 3D Rendering & Simulation, Prototyping Assistance, Manufacturing Process Consulting, Product Development Consulting, Product Support & Manufacturing Documentation

Overview:

***XtrudeWorks** supports the implementation of auxiliary systems critical to extrusion and manufacturing operations, including hydraulic power units (HPUs), control panels, electromechanical devices, and PLC-based automation. We ensure precise mounting for integration of power and control into both new and existing equipment platforms. Designs emphasize safety, serviceability, and seamless connectivity between mechanical structures and electrical or hydraulic systems—whether deploying standalone units or fully integrated frameworks with embedded functionality.*

Process Options:

- *Initial Consultation & Scope Definition → Define system requirements, interface points, and environmental conditions to guide layout and component selection*
- *Mounting & Routing Design → Develop CAD layouts for seamless integration of hydraulic lines, enclosures, conduit, and service access pathways*
- *Component Selection & Specification → Recommend valves, sensors, motor drives, HPUs, and PLCs suited to process demands and preferred controls architecture*
- *Manufacturing Documentation → Deliver schematics, mounting details, and BOMs to support fabrication, installation, and commissioning*
- *Vendor Coordination & Assembly Oversight → Assist with sourcing and qualifying control integrators or fluid power specialists; review assemblies for specification compliance*
- *Installation Oversight & Support → Provide guidance during positioning, connection, and verification of auxiliary systems to ensure operational readiness*