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Summary

Senior level mechanical design engineer with 30+ years' experience in consulting and contract engineering, material processing equipment, medical device equipment, semiconductor equipment, automotive service equipment and machine tool industries. Most recent experience in 3D modeling contract services, the development and modification of equipment used to process semiconductor materials and equipment used for investment casting. Strong conceptual design skills emphasizing product and process development, automation, flexible manufacturing systems and systems integration. Proficiency in CAD/CAM/CAE especially SolidWorks, PTC (ProENGINEER, Wildfire, Creo) and Autodesk Inventor, finite element analysis and all Microsoft Office applications. Project management and small business management skills with emphasis on cost reduction, efficient utilization of limited resources and the generation and funding of project teams.

Areas of Expertise

Conceptual mechanical design engineering, analysis, engineering and project management.

- Ten years' experience operating as an independent small business as a mechanical design and analysis engineering consultant and contractor.
- Ten years' experience developing multiple and simultaneous equipment concepts and assemblies in minimal time for improving the production and throughput of silicon crystal growth.
- Twenty-five years' experience using PTC ProENGINEER/Wildfire/Creo (since ProENGINEER Version 8) and three years' experience using Pro/Intralink to develop, document and release for manufacture a broad spectrum of parts, assemblies and drawings.
- Extensive experience in general machine design and mechanical analysis, project management, supervision, technical communication, and expediting the manufacture of complex mechanical systems.
- Five years' experience managing 10 employees designing and manufacturing large scale machine tools and flexible manufacturing systems.
- Awarded eleven U. S. patents in machine tools, tooling, flexible manufacturing systems and equipment improvements for growing silicon crystals.
- Ten years' experience using SolidWorks to develop and document parts, assemblies and drawings.
- Ten years' experience networking with engineering and business community resources to create project teams and fund engineering and manufacturing projects with a current network with thousands of contacts.

Experience

C. F. Cherko Technical Services, St. Charles (St. Louis), Missouri 2005 to Present

Owner / Consulting and Contract Engineer

Started home-based technical services company providing computer-aided 3D solid modeling, drafting, engineering and finite-element analysis achieving over 12,500 billable hours in delivered sales.

- Provide computer-aided mechanical design services using personal software installations and licenses of PTC ProE Version 2001 through Creo 3.0, and SolidWorks Version 2004 through 2015.
- Provide extensive marketing and networking efforts with engineering and business resources in multiple states to organize and fund new engineering and manufacturing projects in cooperation with Reserve Air.
- Generated 3D part and assembly models, 2D drawings and design revisions using SolidWorks 2014 for electronic test equipment for military contractor Stauder Technologies.
- Generated 3D part and assembly models, 2D drawings and concepts using SolidWorks 2013 for a sapphire recycling facility for Advanced Process Systems.
- Generated 3D part and assembly models for component parts and tooling fixtures used for investment casting of jet engine turbine blades for Flowcastings.
- Generated 3D assembly models and concepts using PTC/Creo 2.0 for a coax cable container for Boundary Systems.
- Generated 3D assembly models and concepts using SolidWorks 2010 through 2012 for a coal processing facility for Carbonxt and ACITEC.

- Generated 3D assembly models and FEA Simulation using SolidWorks 2012 and 2013 for large weldments used in the steel industry for Superior Machine Company.
- Generated 3D assembly models and concepts using SolidWorks 2011 through 2015 for hand held testing devices and agricultural electric fence hardware for AgraTronix.
- Generated 3D part models and 2D drawings using SolidWorks 2010 through 2014 for several families of specialized fasteners for IBM, Dell Computer and Supply Technologies.
- Generated sales and marketing 3D assembly models and 2D rendering views and production 3D models and 2D drawings using SolidWorks 2010 through 2014 for several product concepts for rollover systems, static pour systems and melt box and coil assemblies for Alecto Systems.
- Generated 3D assembly models, 2D drawings and FEA analysis using SolidWorks 2010 for a towing bracket assembly for APES, Inc. to be used for towing and moving helicopters for the United States Coast Guard.
- Generated 3D part and assembly models and 2D drawings using SolidWorks 2010 through 2013 and performed kinematic and dynamic analysis of cycloidal roller gear speed reducers for Polaris Industries, Triumph Group and Gearing Solutions.
- Generated conceptual designs and part models using SolidWorks 2007 for injected molded housing components used in premium consumer fishing reel assemblies for Ardent Outdoors.
- Generated conceptual designs, part models, assembly models and drawings using SolidWorks 2007 for machined and sheet metal components used in medical equipment and truck transport equipment for Stereotaxis, Craftsmen Industries and Innoventor.
- Generated conceptual designs, part models, assembly models and drawings using ProEngineer Wildfire 2.0 for sheet metal and packaged electronic components used in lubrication system control enclosures for Lincoln Industries and Innoventor.
- Generated part models, assembly models and drawings using SolidWorks 2006 for retractable handrail assemblies for Burns and McDonnell and for Innoventor.
- Generated overlay injected-molded part models and assembly models using SolidWorks 2006 for a NASCAR floor mat promotional item for Solutia and Innoventor.
- Generated part models, assembly models and drawings using PTC/Wildfire 2.0 for injected-molded plastic parts and electronic packaging components for a hand-held heart monitoring device for BioMedical Systems and Innoventor.
- Generated trial design configuration, part models, and assembly models using SolidWorks 2006 and assisted in fabrication of prototype parts for machined, injected-molded plastic and sheet metal components used in a hand-held medical research sampling tool for Pro Group and Innoventor.
- Generated part models, assembly models and drawings using SolidWorks 2005 for machined, injected-molded plastic and sheet metal components used in cataract surgery equipment for Bausch and Lomb Surgical and for Innoventor.

MEMC Electronic Materials, Inc., St. Peters (St. Louis), Missouri 1994 to 2005

Senior Level Staff Engineer

Performed engineering design, analysis and design optimization for the silicon wafer manufacturing industry using Pro/ENGINEER, Pro/Intralink, MARC and FIDAP software for a variety of projects developing and optimizing equipment for growing silicon crystals for processing into silicon wafers.

- Designed both an initial concept and a final manufactured version of a large scale lift assembly for a liquid feed melter vessel using Pro/ENGINEER in less than six weeks while expediting other project tasks. This project was expedited with extensive interaction and cooperation with equipment vendors Lectrotherm (later Alecto Systems, Flowcastings and Advanced Process Systems) and Willerding Metal Fabrication.
- Designed and implemented all hardware for calibrating and mounting a dual camera monitoring system on a silicon crystal grower for controlling silicon melt level and crystal diameter during the silicon crystal growing process. Equipment allowed calibrating camera equipment on an independent calibration stand then transferring the calibrated camera assembly to a silicon crystal grower.
- Developed and implemented in manufacturing all hardware for both single and dual zone upper heater assemblies on a silicon crystal grower to allow production of very low defect silicon crystals known as "Perfect Silicon" or "Optia". Components and assemblies designed made extensive use of welded non-magnetic stainless steel fabrication techniques and their effect on process quality.
- Designed and installed the initial concept versions of water-cooled throat shields on silicon crystal grower equipment increasing throughput of equipment by allowing silicon crystal growth at fast pull rates. Invented

fail-safe techniques for introducing cooling water within a water-cooled shield within a silicon crystal grower such that seal failure cannot disrupt the silicon crystal growing process.
- Developed and implemented several patented versions of pull cables, silicon seeds, seed holders and seed recycling that allowed existing 200mm diameter silicon crystal growing equipment to grow larger 300mm diameter crystals extending the life of existing equipment and eliminating the immediate need to purchase additional crystal growing equipment to meet 300mm wafer production targets.

Compression Engineering, Town and Country (St. Louis), Missouri 1993 to 1994
Consulting Engineer
Performed engineering design, analysis and design optimization using ProENGINEER, AutoCAD and RASNA (later Pro/Mechanica) software for a variety of client companies.
- Generated and processed Pro/ENGINEER solid models of parts and assemblies for rapid prototyping of injected-molded and cast parts using the selective laser sintering (SLS) process.
- Developed solid models and drawings using Pro/ENGINEER for an extensive part family of electric motor components for Emerson Electric resulting in cost reduction and optimization of these components.
- Developed solid models using Pro/ENGINEER for prototyping SLS patterns for investment casting of aluminum water pump housings and other automotive components for Airtex and Chrysler.
- Developed injected-molded plastic part solid models using Pro/ENGINEER for consumer hand-held spray bottles for Continental Sprayer.

Hunter Engineering Company, Bridgeton (St. Louis), Missouri 1990 to 1993
Senior Project Engineer
Designed, developed and released for manufacture brake rotor and drum refinishing equipment for use in the automotive service industry starting with paper drafting methods then transitioning to ProENGINEER Rev. 8.
- Assumed sole responsibility for automotive service garage brake lathe product line and incorporated several advanced features to improve performance and user-friendliness.
- Improved brake lathe design to incorporate production machine tool and cutting tool technology adding robustness and productivity comparable to design features found in modern CNC-grade production equipment such as state-of-the-art tool holder and cutting tool technology.
- Developed and manufactured a unique and innovative dovetail-type way design in this brake lathe that improved slide stiffness and tool support greatly improving resistance to "chatter" while refinishing automotive brake drums and rotors.
- Conducted extensive metal-cutting research on automotive cast iron disk brake rotors and brake drums to develop improved cutting tool geometries that improved surface finish and cutting speeds attainable within the restrictive weight and stiffness available on an automotive service facility brake lathe.
- Interfaced with component suppliers, sub-contractors, and with Hunter's own manufacturing, marketing, purchasing and advertising personnel.

Motch Corporation (now part of Bourn and Koch), Euclid (Cleveland), Ohio 1985 to 1990
Chief Design Engineer and Product Development Engineer
Developed new machine tool concepts and product lines for vertical-spindle turning and grinding equipment and accessories for manufacturing systems integration. Later became immediate supervisor for ten mechanical design engineering and technical support personnel.
- Integrated the Springfield VGC-40 vertical grinding center with the Motch VTC-42/52 vertical turning center into a flexible manufacturing cell using a Volvo automatic-guided vehicle (AGV). This system was displayed at the 1986 International Machine Tool Show and was granted two U. S. patents.
- Solved quality control problems for a Motch automotive brake drum flexible manufacturing system for customer Motor Wheel resulting in a novel work holding arbor design that received a U. S. patent.
- Developed the Motch VTC-42/52 live-spindle ram vertical turning center adding drilling and milling capability to a large vertical spindle lathe.
- Developed initial prototype of the Springfield vertical grinding center (VGC) integrating automatic wheel changing, automatic pallet changing, FMS capability and vertical grinding.
- Planned and administered a mechanical engineering workload averaging 20,000 person-hours per year.
- Recruited both permanent engineering and temporary designer/drafting personnel.

Education

Case Western Reserve University, Cleveland, Ohio
B.S., Mechanical Engineering
Graduated 9th in class of 210 students with Highest Honors and 3.90 total accumulative grade point average.

Additional Skills

- Workstations: Dell, Hewlett Packard and Sun Microsystems (now run custom PC and Dell workstation).
- CAD Design Applications: PTC (ProENGINEER Version 8.0 through Creo 3.0), Pro/Intralink, SolidWorks (Version 2004 through 2015), AutoCAD, Autodesk Inventor, Computervision, Visio, NoLimits.
- Application of Geometric Dimensioning and Tolerancing (GDT) per ANSI Y14.5M.
- FEA Analysis Applications: SolidWorks Simulation, MARC, FIDAP, ANSYS, COSMOS/M, RASNA (Pro/Mechanica).
- General Engineering Applications: MathCad, Harvard Graphics, CurveExpert
- General Business Applications: Adobe Acrobat, Peachtree Accounting, Quicken, QuickBooks, Mozilla Firefox, Explorer, Trend Micro, McAfee, Norton, Malwarebytes and Microsoft Security Essentials
- General Office Applications: Microsoft Word, Excel, Access, PowerPoint and Project
- Silicon Engineering Skills: Czochralski Crystal Growth, Magnetic Field Melt Stabilization, Lite-polysilicon Feeding, Silicon Seed, Seed Chuck, Pull Cable and Pull Head Design, Graphite Resistance Heater Design, Quartz, Molybdenum and Tungsten Refractory Materials Design, Vacuum Systems, Water-cooled Stainless Steel Weldment Vacuum Vessel Design, High-current DC Power Supplies, RF Frequency Power Transmission, Cameras and Vision Systems.
- General Engineering Skills: Stress/Deflection Analysis, Solid Mechanics, Fatigue Analysis, High Temperature Creep Analysis, Vibrations, Heat Transfer, Thermodynamics, Fluid Mechanics, Materials Science, Metallurgy, Physics, Mathematics, Chemistry, Lasers, Optics, Sensors, Patent Law.
- Manufacturing Skills: Metalworking (Turning, Milling, Grinding), Metal Forming, Welding, Material Handling, Robotics, Assembly, Investment Casting, Rapid Prototyping.
- Machine Design Skills: Gearing, Power Transmission, Springs, Fasteners, Rivited Joints, Beams, Columns, Bearings (Dry Friction, Fluid and Rolling Element), Hydraulics, Pneumatics, Motors and Drives, Machine Jacks, Acme Screws and Ballscrews, Dovetail, Box Way and Linear Bearing Slides, Castings, Weldments.
- Business and Management Skills: Accounting (Accrual), Graphic Design, Marketing, Networking, Project and Workflow Scheduling, Legal, Contract Law, Licensing, Working with Local Economic Planning Officials, Supervision, Organizing Engineering and Manufacturing Project Teams and Funding over multiple resources and companies.
- Personal Traits: Inventive, Creative, Talented, Entrepreneurial, Team Player or Team Leader, Perseverant, Accurate, Dedicated, Cooperative, Diplomatic, Friendly, Academic, Organized, Fit, Energetic, Exceptional attention to detail and accuracy of work completed.

Patents

"Fluid Sealing System for a Crystal Puller." US 6,942,733. September 2005
"Crystal Puller and Method for Growing Monocrystalline Silicon Ingots." US 6,663,709. December 2003
"Crystal Puller for Growing Monocrystalline Silicon Ingots." US 6,554,898. April 2003
"Electrical Resistance Heater for Crystal Growing Apparatus." US 6,285,011. September 2001
"Electrode Assembly for Electrical Resistance Heater." US 6,287,382. September 2001
"Apparatus for Supporting a Semiconductor Ingot During Growth." US 6,238,483. May 2001
"Cable Assembly for Crystal Puller." US 6,203,614. March 2001
"Apparatus for Use in Crystal Pulling." US 5,935,328. August 1999
"Combination Machine Tool Apparatus (Divisional Patent)." US 4,915,569. April 1990
"Arbor Assembly." US 4,875,693. October 1989
"Combination Machine Tool Apparatus and Pallet Changing System." US 4,797,989. January 1989

Licenses

Professional Engineer, State of Ohio, since 1985. Ohio Society of Professional Engineers Award for scoring the highest grade in the state (98/100) on the mechanical examination given by the State Board, April 1985.