• Founded 1962 by Walt and Helen Klingel
• 3rd Gen Family Owned & Operated
• EcoVadis Certified Sustainable Supplier
• ISO 9001-Certified Since 1998
• 225 Employees
• 7 Operating Locations
• Annual Sales: $75MM
Our Locations

TSE 1
TSE Industries, Inc.
5260 113th Ave North
Clearwater, FL 33760 USA
727-573-7676
800-237-7634
www.tse-industries.com

TSE 2
TSE Industries, Inc.
4370 112th Terrace North
Clearwater, FL 33762 USA
727-573-7676
800-237-7634
www.tse-industries.com

TSE-OK
TSE-OK, LLC
4421 110th Ave North
Clearwater, FL 33762 USA
727-456-2890
866-652-2557
www.tse-ok.com

WHK BioSystems
WHK BioSystems, LLC
11345 53rd Street North
Clearwater, FL 33760 USA
727-209-8412
855-WHK-BIO1
(855-945-2461)
www.whkbio.com
Executive Leadership

Chief Executive Officer
Robert R. Klingel, Sr.

President
Richard “Rick” Klingel

President, TSE-OK
Louis “Brad” Klingel

President, EPD & WHK BioSystems
Robert R. Klingel, Jr.

President, C.A.S.E.
Richard “Rick” Klingel

Board of Advisors
ISO 9001 Certified since 1998
• Incoming goods, in-process and final product validation
• Advanced analytical and automated clinical chemistry analyses
• Statistical Process Control and Statistical Quality Assurance for all products
Engineered Polymers Division

Custom Rubber Molding & Extrusion

Cast Urethane Parts
Engineered Polymers Division

Processing Capabilities

• Injection, Compression & Transfer Molding
• Extrusion
  - Cold Feed and Hot Feed
• Autoclaves, Steam and Hot Air
• Rubber Mills (60” and 48”)
• Casting Liquid Polyurethanes
  - MAX Casting Machines
  - Full Vacuum and Curing Ovens
• Cryogenic Deflashing
• Rapid Prototyping – 3D Printing
• Tooling Design and Modification
• UV Curing Tunnel/Chamber
Engineered Polymers Division

Custom Plastic Fabrication & CNC Machining
Processing Capabilities

- Custom fabrication of parts from the highest quality industrial plastics:
  - Acetals: Delrin® - Celcon®
  - Nylons
  - PTFE: Teflon®
  - UHMW-PE: Duro Glide®

- Design engineers working with the latest CAD/CAM programs

- Full Machining Capabilities:
  - CNC Routers
  - Mills
  - Lathes
Engineered Polymers Division

Markets Served

- ATM Parts & Components
- Conveyor Systems
- Canning & Bottling
- Food Processing
- Medical
- Aerospace
- Materials Handling
- Building & Construction
- Label Machine Components
Contract Manufacturing of Specialty Chemicals, Reactive Hot Melt Adhesives
Additional Processing Technologies

- Urethane Prepolymers (MDI, TDI & Aliphatics)
- Pigmented or Filled Polyurethanes and Polyols
- Blocked Prepolymers
- Cast Urethanes & Prepolymers
- Thermoplastic Polyurethanes (TPU’s)

- Low Monomer Prepolymers
- Liquid Urethane Adhesives
C.A.S.E. Division

Production Manufacturing Equipment

- Stainless steel, full vacuum & pressure rated
- Operate under closed conditions
- Capable of charging from bulk, drum, tote, & bags
- In-line filtration (10-800 micron), jacketed draw off lines
- Reactor design allows for flawless scale up

One 4,800-Gallon  Four 3,750-Gallon
One 1,500-Gallon  One 750-Gallon
Two 500-Gallon  One 250-Gallon
Pilot Process Capabilities

5-Gal, 4-L, 2-L, 1- L lab reactors

- 5-Gallon reactor
- 15-Gallon reactor
- 25-Gallon reactor
- 250-Gallon reactor
- 500-Gallon reactor

All reactors are stainless steel, full vacuum, and pressure rated

Each lab reactor designed based on our 3,750-Gallon reactors
Manufacturer of Millathane® Millable Polyurethane and Thanecure® TDI Dimer & Cure Activator
Solid Polyurethanes:
Processed on standard rubber processing equipment

Properties: Abrasion, oil and ozone resistance, cut/tear strength

Key Applications: Hi-performance and longevity, i.e. O-rings, gaskets, hoses, belts, bladders, rollers, vibration dampeners, footwear and medical devices
Thanecure® T9 is a polyfunctional isocyanate

Key Applications for T9:
• Crosslinking agent for industrial adhesives
• Adhesion promoter for rubber-to-fabric bonding
• Vulcanizing agent for isocyanate-cured polyurethane rubber

Key Applications for ZM:
• Cure activator for sulfur-cured Millathane polyurethane rubber
Development & Analytical Center (DAC)

Research & Development Labs

Two Locations:

• DAC 1 – 113th Avenue
• DAC 2 – 112th Avenue
Development & Analytical Center (DAC)

DAC Laboratory #1
Provides QA, Analytical, and R&D Services

Technical personnel include:
• PhD Chemists
• Chemical Engineers
• Laboratory Technicians

Instrumentation includes:
• Gas Chromatograph
• FTIR Spectrometer
• DSC
• 8 Brookfield Viscometers with computer interface
• Mettler-Toledo Automatic Titrators with computer interface
• Mettler Halogen Moisture Analyzers
• Particle Size Analyzer
• Melt-Flow Indexer
• Electrothermal Melting Point Apparatus
• Carl-Fisher moisture analyzers
• SPC & SQC for all products
• In-process and final product testing
• BET surface area analyzer
DAC Laboratory #2
Rubber and Plastic Testing Capabilities

• Abrasion Testing
• Coefficient of Friction Testing
• Compression Set Testing
• Tensile and Tear Testing
• Rheological Property Testing
• Electrical Properties Rubber, Plastics
• UV Resistance
• Impact Testing – Plastics
TSE has a highly diversified, yet synergistic, team of Professionals, Scientists, Engineers, and Manufacturing Personnel.

This dedicated group of employees come together as **One Team** allowing TSE to provide the highest level of Quality, Service, and Innovation.
TSE has expertise from the start of the supply chain all the way through to the end user

• Scientists, Engineers & Process Experts at all levels
• We develop & manufacture a wide range of polyurethane chemistries and systems
• All rubber types, including Nitrile, Neoprene, Silicone, EPDM, Natural Rubber & more
• All performance plastic types including UHMW, Acetyl, Nylon & more
The UHMW-PE Sheet Division of TSE Industries
Duro-Glide® UHMW-PE Sheets

- Proudly Made In America
- Compression molded UHMW-PE
- 4’ x 10’ standard sheet
- Larger on Request: 80’ x 160”, 80” x 240”
- Thicknesses ¼” up to 4”
- Colored Virgin Sheets
- Enhanced UHMW-PE with special additives for high performance
- Special high speed mixer for custom blends and colors
Markets Served

- Lining Industry
  - Truck, Ship, Rail Vehicles
- Paper and Logging Industries
  - Conveyor Systems
- Mining and Agro, Power Industries
  - Silos, Bunkers
- Marine Industry
  - Fender Systems, Docks, Hulls
- Custom Fabrication Shops
- Leisure / Sports Industry
  - Ski Ramps, Ice Rinks
- Food & Beverage Industry
  - Cutting Boards, Conveyors, Poultry
- Packaging Industry
WHK BioSystems, LLC

Contract Manufacturer for the Bio-Pharm & Medical Device Industries
Quality

- ISO 13485: 2003 Certified
- ISO Class 7 (Class 10,000) Clean Room – 2,400SF
- Microbial Validation
  - Microbial Enumeration & Top 5 Microorganism Identification
    - Manufacturing Environment
    - Critical Work Surfaces
WHK BioSystems, LLC

Services
- Product Design & Assembly
- Single Use Components & Assemblies
- Laser Cutting & Engraving
- Leak Detection, Testing & Sterilization
- RF Welding
- Vacuum Bag Sealing
- Inventory Management

Facility:
- 2,400SF Clean Room, (ISO Class 7)
- 3,200SF Offices
- 6,000SF Warehouse (Controlled Environment)

Products
- TubeCube™ Tubing Connector System
- TPE BioTubing
- Caps and Stoppers