Materials Services
Engineered Plastics

Food Processing and Material Handling

Materials for the Food Processing Industry

Engineered Plastics Solutions

thyssenkrupp

Material Selection

Finding just the right material for food processing applications is a process. A good way to begin is by answering:

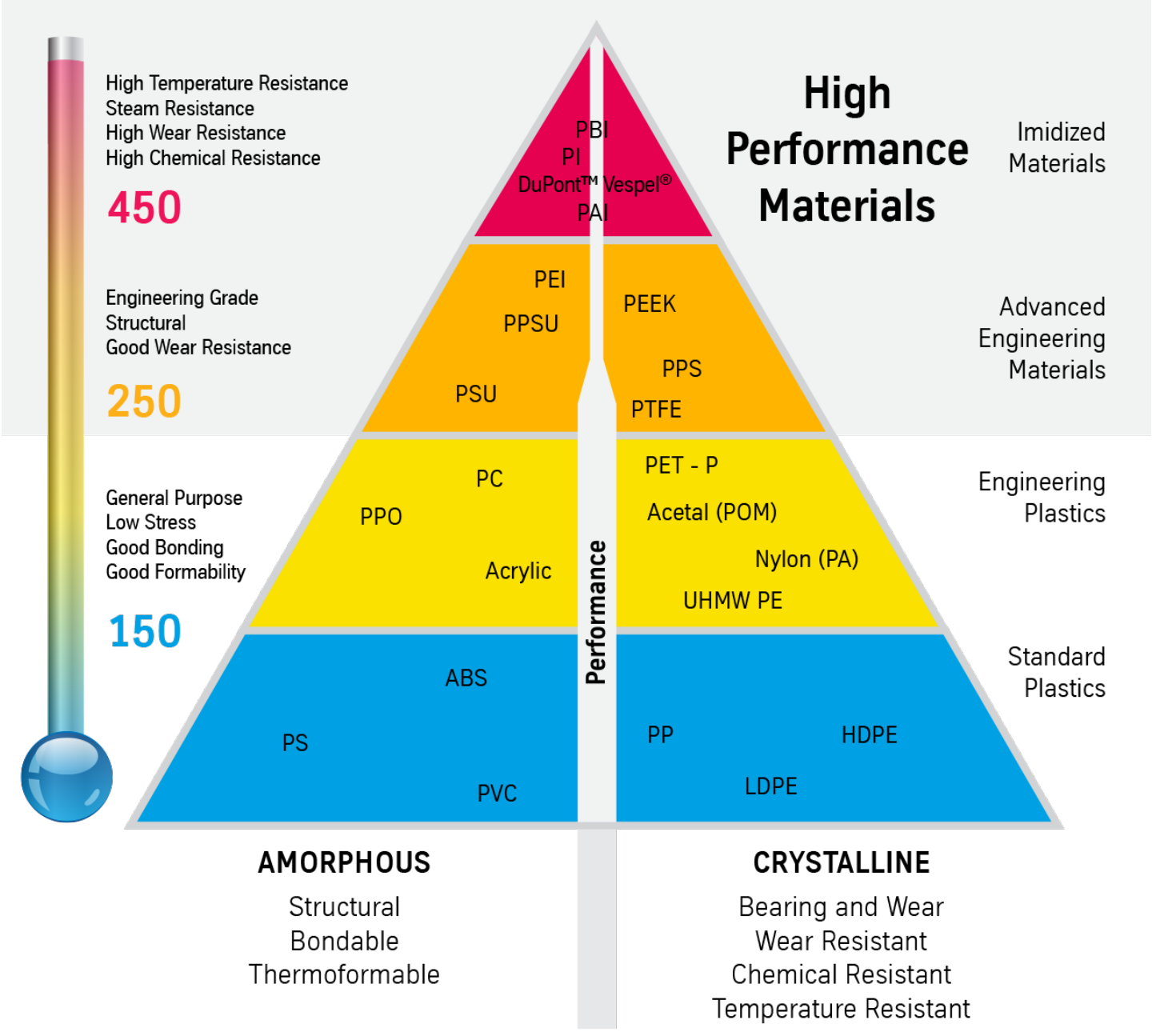
What would you like to achieve?

- Noise reduction
- Longer time between maintenance downtime
- Reduce risk of food recalls
- Longer part life

What conditions will the part be exposed to:

- Wet or dry conditions, hot steam
- Extreme cold or heat
- UV light
- Caustic chemicals or harsh washdowns

By answering these crucial questions we can assist you in finding a material that is the right balance of performance and value. We work directly with manufacturers and we have hands on experience with engineering plastic and parts made from them so we can help you work through what can feel like a daunting list of materials quickly and efficiently.



Access our full range of materials 24/7 and request a quote at our online catalog: OnlinePlastics.com

Faster, Better, Stronger...

Does this sound like the demands at your food processing facility? As process speeds and production costs increase, the last thing you need is unexpected downtime due to part failure or high maintenance time.

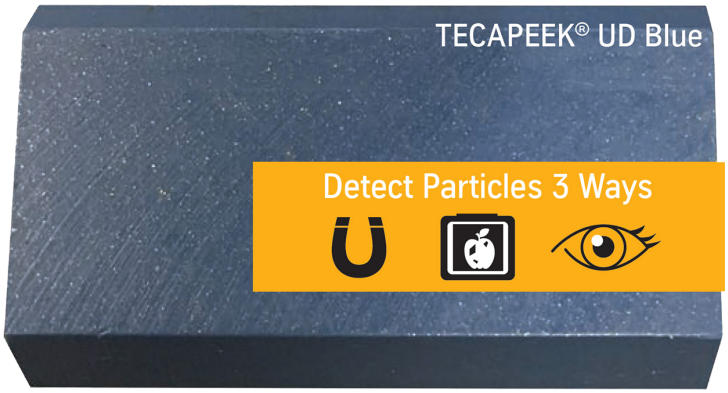
The team at thyssenkrupp Engineered Plastics is dedicated to helping you improve your efficiency with select materials that focus on the specific requirements of the food industry.

In addition to plastic shapes we are a TYGON® Elite distributor with a well rounded inventory of tubing for food handling.

call
877.246.7700

Content

Reducing incidents of food recalls can be aided by selecting materials that aid in the prevention of incidents in the first place. Detectable plastics provide a range of options from blue color for visual detection to metal detectable and X-Ray detectable. The options allow for finding a material that fits your equipment and application needs and to find the best value for your particular use.



Ultra Detectable Plastics

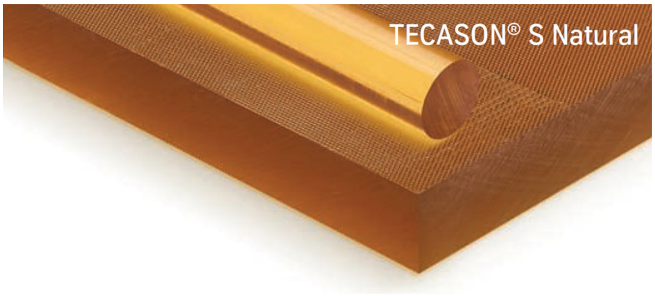
	Features and Benefits	Common Applications
TECAFORM® AH UD	Maintains mechanical properties at higher temperatures Excellent impact strength and fatigue resistance	Bearings Wheels, gears, sheaves, sprockets
HYDEX® 4101 UD	Internally lubricated Excellent impact and chemical resistance, Very low moisture absorption, Excellent wear, Easy to machine	Cams, Bearings, Gears, Food pistons, Wear strips, Scraper blades, Valve bodies, Conveyor components
TECAPEEK® UD PEEK	Low surface friction High dimensional stability High heat resistance	Bearing and wear applications Scraper blades Gears, bearings, sheaves, sprockets

Metal Detectable Plastics

	Features and Benefits	Common Applications
TIVAR® MD UHMW-PE	Excellent release properties High impact resistance High coefficient of linear thermal expansion (CLTE)	Chain guide elements Funnels Rolls and bushings Cryogenic applications
Nylatron® MD Nylon	High wear and fatigue resistance Lower moisture absorption than PA6 High continuous use temperature	Thrust washers Seals Rolls
Acetron® MD POM Acetal	Good balance of stiffness and impact strength High continuous use temperature	Scrapers, funnels, guides, grippers, gears
Ketron® MD PEEK Dark Grey	Good wear resistance in high operating temperatures Good mechanical strength, stiffness and impact strength Withstands continuous exposure to hot steam or water	High speed conveyor components Filling pistons, valves Scrapers in high temperature mixers Hot oil applications in fryers / ovens

Notes on use of detectable materials: When testing detectable materials know your equipment and what it is calibrated for. Sensitivity level, sphere size setting, and how much product is needed for accurate testing are all important factors when selecting a detectable plastic for machined parts. Ask us for test samples you can run on your equipment.

Cryogenic to extremely hot temperatures, high pressure, steam, harsh chemical exposure, what is your challenge? When you have applications that must stand up to these tough environmental stresses, advanced materials can provide an excellent value in terms of performance and part life versus material, downtime costs and other costs.



High Performance Materials

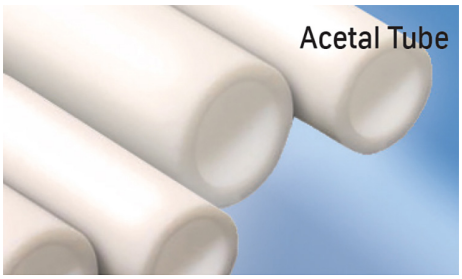
	Features and Benefits	Common Applications	Trade Names
PSU (Polysulfone)	Amber semi-transparent Heat and chemical resistance Hydrolysis resistant Radiation stable	Good alternative to polycarbonate Steam cleaning equipment inserts Dairy connectors	TECASON® S Sustason PSU Thermalux®
PEI	Similar to PSU High thermal and mechanical capacity High dielectric strength UL 94-VO	High temperature wet environments Pump and valve components Fluid handling equipment Manifolds Replacement for stainless steel	Duratron® TECAPEI® ULTEM® SUSTAPEI®
PEEK	Unfilled. Filled HPV grades available Excellent temperature resistance Excellent chemical resistance V-O flame resistance rating Moisture resistant	Pistons, valves for powder dosing Linings Guides Weighing and filling components Conveyor components	Ketron® TECAPEEK®
Fluorosint®	Excellent dimensional stability Excellent replacement for PTFE	Seals and bearings Thrust washers and valve seats	
Fluorosint® 207	Proprietary process that binds Mica to PTFE Excellent combination of low friction and dimensional stability	Seals and bearings Mixers Pumps Valve seats	
Fluorosint® HPV	Mica Filled PTFE Wear enhancing additive technology Good dimensional stability	Bearings Wear guides Thrust washers	
PAI	Excellent heat resistance Low coefficient of linear expansion Excellent wear resistance	Excellent heat resistance Low coefficient of linear expansion Excellent wear resistance	Duratron® Torlon® TECATOR®
PPSU	Withstand multiple sterilizations Good chemical resistance Excellent impact resistance Gamma and X-Ray Resistant	Fluid handling Couplings and fittings	TECASON Radel®
PTFE	Extremely low coefficient of friction Good temperature resistance Excellent chemical resistance High impact resistance	Seals O-Rings Gaskets Custom components	Fluorosint® Rulon® Teflon®

Chemical Resistant, High Purity Materials

Many engineering plastics have some level of chemical resistance. However, the materials listed below are above average in their ability to withstand common issues in the food processing industry including exposure to fruit juices and high acid foods, harsh wash downs and, in some cases wet environments.

	Features and Benefits	Common Applications	Trade Names
PVDF	High purity and low extractables Good chemical resistance Excellent abrasion resistance High tensile strength Fungi growth resistant Excellent creep resistant	High purity fluid handling equipment Pump and valve components Components for wet process stations Pipe flanges and spacers Chemical storage	Kynar® TECAFLON®
ECTFE	High purity Good mechanical properties Machines easily Thermoform or melt weld Good chemical and thermal properties	High purity fluid handling equipment Chemical storage Pump and valve components Flanges and fittings Valve seats and seals	Halar® Symalit®
PPO / PPE	Long-term dimensional stability Good impact strength at low temperatures UL Flammability Ratings (UL94 HB to UL94 V-1) Low moisture absorption	High temperature wet environments Pump and valve components Fluid handling equipment Electrical components	Noryl® TECANYL® SustaPPO®

Engineering Plastics



Tough, resilient, easy to work with. These materials are known for all of these features and more. Engineering plastics are replacing metals every day because the parts made from them are reliable and long lasting. In fact, plastic parts can often outlast traditional metals like aluminum, brass and steel. Many times these materials can be machined using the same equipment used to make metal parts too.

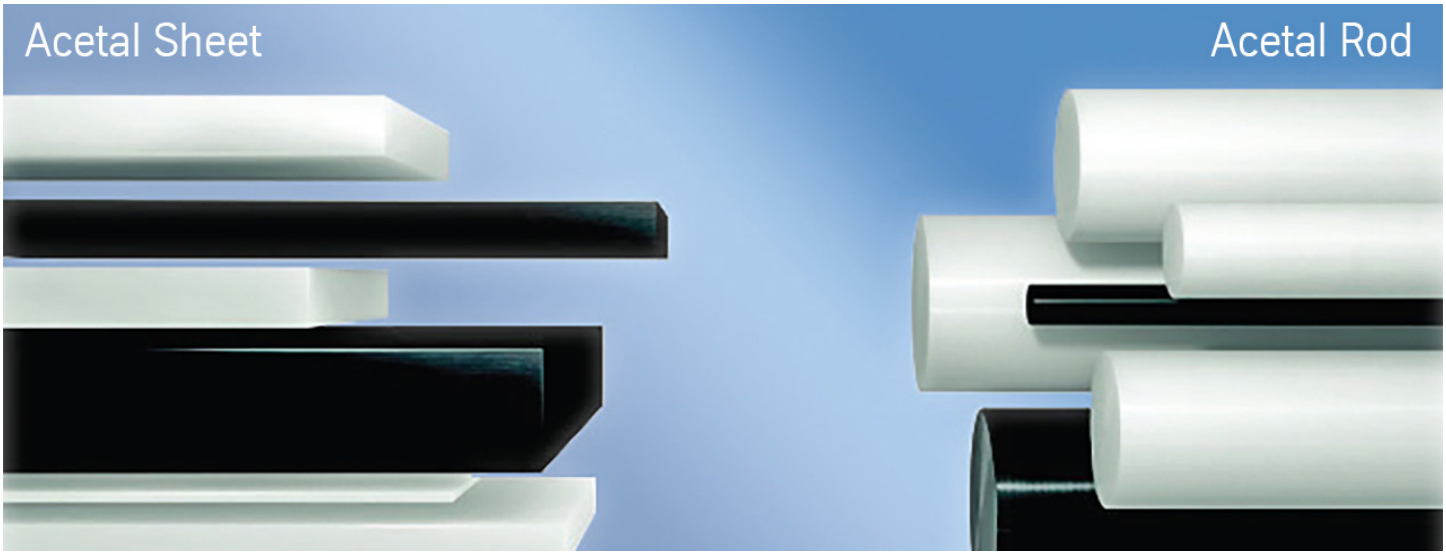
In addition to their overall benefits engineering plastics are available in an amazing variety of shapes, sizes, and characteristics that allows us to target your specific application needs giving you both the high performance and cost benefits to keep your food processing economical.

Acetal

Acetal, also known as POM is available in homopolymer and copolymer. Chemically, copolymer and homopolymer versions are approximately 90% identical but key differences in properties do affect their overall characteristics. Copolymer acetal offers more flexibility and impact resistance while the homopolymer version is more rigid with a higher flexural modulus at elevated temperatures.

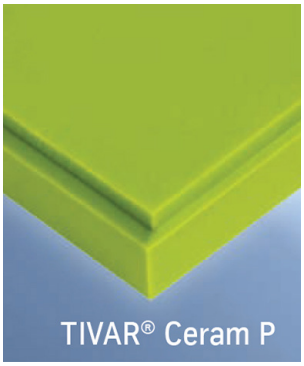
In addition thyssenkrupp Engineered Plastics also offers numerous filled versions and grades that each provide unique characteristics such as improved heat resistance to meet specific application requirements.

	Features and Benefits	Common Applications	Trade Names
Homopolymer - Unfilled	Good dimensional stability Machines to tight tolerances High strength and stiffness Low moisture absorption Good chemical resistance	Gears, bearings, rollers, bushings Electrical insulator parts and fittings Conveyor components High endurance applications	Delrin® Pomalux® TECAFORM® SUSTARIN®
Copolymer - Unfilled	No center line porosity High strength and stiffness Low moisture absorption	Electrical components Guide rollers and gears Excellent metal replacement	ACETRON® TECAFORM® ERTACETAL® C



UHMW-PE

Ultra-high molecular weight polyethylene, commonly known as UHMW or UHMW-PE, is a lightweight and longwearing engineering plastic material. Many variations of UHMW are available including FDA compliant, Static Dissipative and UV resistant to name a few. Due to its overall good mechanical properties it is a popular choice for replacing metal parts.



Ask us about UHMW profiles for your application.

	Features and Benefits	Common Applications	Trade Names
UHMW	Unfilled, virgin, reprocessed grades	Conveyor components	TIVAR®
	Abrasion and impact resistant	Wear strips and guides	GAR-DUR
	Good chemical and corrosion resistance	Chute liners	Polystone®
TIVAR® H.O.T.	Heat stabilized for long part life	Spiral ovens	
	Good wear and abrasion resistance	Warming equipment	
	Very good electrical insulation	Load bearing applications	
	Excellent machinability		
TIVAR® Dryslide	Static dissipative	Dry dusty applications	
	Corrosion resistant	Belt scrapers	
	Self-lubricating	Chute, hopper, silo liners	
	Lowest coefficient of friction TIVAR®	Wear strips	
	No moisture absorption	Pugmill paddles	
TIVAR® HPV	Very low wear with built-in dry lubricant	Conveyor components	
		Chain guides	
	Reduces noise	Rollers and slide strips	
	Extremely low friction	Corner wear bends	
TIVAR® Clean Stat	Static dissipative	Guides for filling and weighing items	
	Excellent wear resistance	like pie filings and puddings	
		Linings for dry dusty foods	
		Conveyor components	
TIVAR® Ceram P®	Self-lubricating	Excellent alternative to ceramics	
	Noise reduction	Conveyor components	
	Excellent wear and corrosion resistance	CAMS for pitting machines	
	No moisture absorption		
TIVAR® MD	Excellent release properties	Chain guide elements	
	High impact resistance	Funnels	
	High coefficient of linear thermal expansion (CLTE)	Rolls and bushings	
		Cryogenic applications	

PET-P

PET-P (Polyethylene terephthalate) is a widely used engineering plastic. It is easy to machine and comes in a variety of customized versions like PTFE for improved slide. It is generally very stain resistant making it a good choice for use in areas where tomatoes and other staining foods will come into contact with it.

	Features and Benefits	Common Applications
Ertalyte® (Self lubricating)	Excellent stain resistance High strength and stiffness Good wear resistance Excellent dimensional stability Better resistance to acids than nylon or acetal	Manifolds and equipment components Carousels and filter tracks Locating discs and rings Close tolerance parts
Ertalyte® TX (Self Lubricating)	Enhanced wear resistance over standard Ertalyte Low wear rate and low coefficient of friction Excellent choice for HPV applications	Ideal for surfaces where soft metals mate with plastic surfaces Wear and slide pads Dynamic seals Scraper blades
Hydex 4101L	Internally lubricated for low maintenance Excellent impact resistance, excellent wear Excellent chemical resistance Very low moisture absorption Easy to machine	Food piston pumps Valves and valve bodies Feeder blocks Timing screws Gears, cams, bushings, bearings
TECAPET®	TF is PTFE modified for excellent slide White adds toughness and enhanced machinability Easy to machine Resists staining Withstands cleaners and chemicals	Food processing equipment components Wear and slide pads Bearings

Ertalyte® part completed using 5 Axis Machining.

Nylon

Tough, resilient and versatile, nylon has been a standard choice for machined parts for many decades. thyssenkrupp Engineered Plastics stocks standard shapes and sizes in many grades as well as near net shapes.

	Features and Benefits	Common Applications	Trade Names
Cast Nylon PA6 (Filled and unfilled)	Good mechanical Good electrical properties Heat stabilized	Bearings, bushing, rollers, gears Electrical and structural components High wear components	Nylatron® SUSTAMID® TECAMID®
Heat stabilized blue	Good temperature resistance Excellent impact strength Good fatigue resistance	Bearings Structural applications Wheels, gears, sheaves, sprockets	Nycast® XHA Blue TECAMID® HI 6/6 Nylatron® MC901
Filled Nylon (1 Molybdenum Disulfide)	Low surface friction High dimensional stability High heat resistance Noise dampening	Bearing and wear applications Gears, bearings, sheaves, sprockets Replaces metal parts	Nylatron® GS / GSM
Oil filled (Food grade)	High wear and bearing resistance Excellent abrasion resistance Low maintenance	Lightweight replaces metal parts Excellent for parts where maintenance is difficult	Nycast® Nyloil TECACAST® 6PAL
Metal Detectable	High wear and fatigue resistance Lower moisture absorption than PA6 High continuous use temperature	Thrust washers Seals, Rolls	Nylatron® MD
Internal lubricant filled	Excellent wear resistance Easy to machine, economical, Corrosion resistant, Low maintenance	Lightweight, replaces metal parts Bearings, gears, wear pads, rollers High wear components Noise reduction	Nylatron® NSM

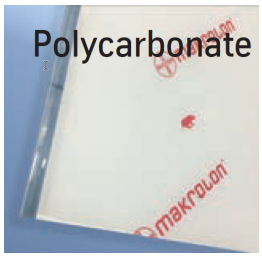
Standard Plastics

Standard plastics are used for a broad range of items from plastic utility trays to conveyor components. They often replace metal parts and benefits include reduced noise, weight, and maintenance downtimes.

	Features and Benefits	Common Applications	Trade Names
ABS	High Impact strength at low temperatures Rigid Machines easily	Utility Trays Refrigerator Panels Storage Bins Belt Guards	Royalite® Polystone® TECARAN™
Polypropylene	High stiffness homopolymer or more flexible copolymer FDA compliant Forms easily	Cutting boards Piston parts Fluid handling tanks Storage Bins	Proteus® Propylux® Sanatec®
High Density Polyethylene	Machines easily	Machined components See also - Cutting Board, next page	Sanatec®

Clear Materials

At approximately half the weight of glass, clear plastics provide an excellent alternative to glass. Acrylic (also called PMMA) and polycarbonate are available with special coatings to resist abrasion and dust. Mirrored versions are also available.



	Features and Benefits	Common Applications	Trade Names
Acrylic	Machines easily	Lenses	PMMA
Cast or Extruded	Thermoformable	Bubble traps	Perspex
	Low moisture absorption	Sight glasses	Acrylite®
	Stronger and lighter than glass	Lighting fixtures	Lucite®
	Impact resistant	Mirrors in production facilities	Plexiglas®
	Abrasion resistant		
PETG	Excellent Impact resistant	Food storage containers	Vivak®
	Thermoformable at lower temperatures	Displays	
	Easy to machine	Sneeze guards	
	Good chemical resistance		
Polycarbonate	Excellent impact resistance	Storage containers, bins, and molds	Makrolon®
	Dimensional stability	Displays	Lexan®
	Flame retardant	Mirrors for production facilities	

Cutting Board Materials

thyssenkrupp Engineered Plastics can fabricate to your size and specifications. HDPE is a high density material that resists staining. In addition HDPE does not absorb moisture and washes clean. In addition plastic cutting boards do not dull the sharp knives needed by professionals in the food processing industry.

	Features and Benefits	Common Applications	Trade Names
High Density	Durable Polyethylene	Cutting boards and surfaces as it does	King Cutting
Polyethylene	High whiteness	not dull knives	Board®
	NSF and FDA compliant	Places requiring sanitary work surfaces	Sanatec®
	Will not splinter or rot		
	Easy to clean		

Sign Materials

When it comes to plastics we have it all. Replace signs in your facility with long lasting multi-color engraveable durable plastic.

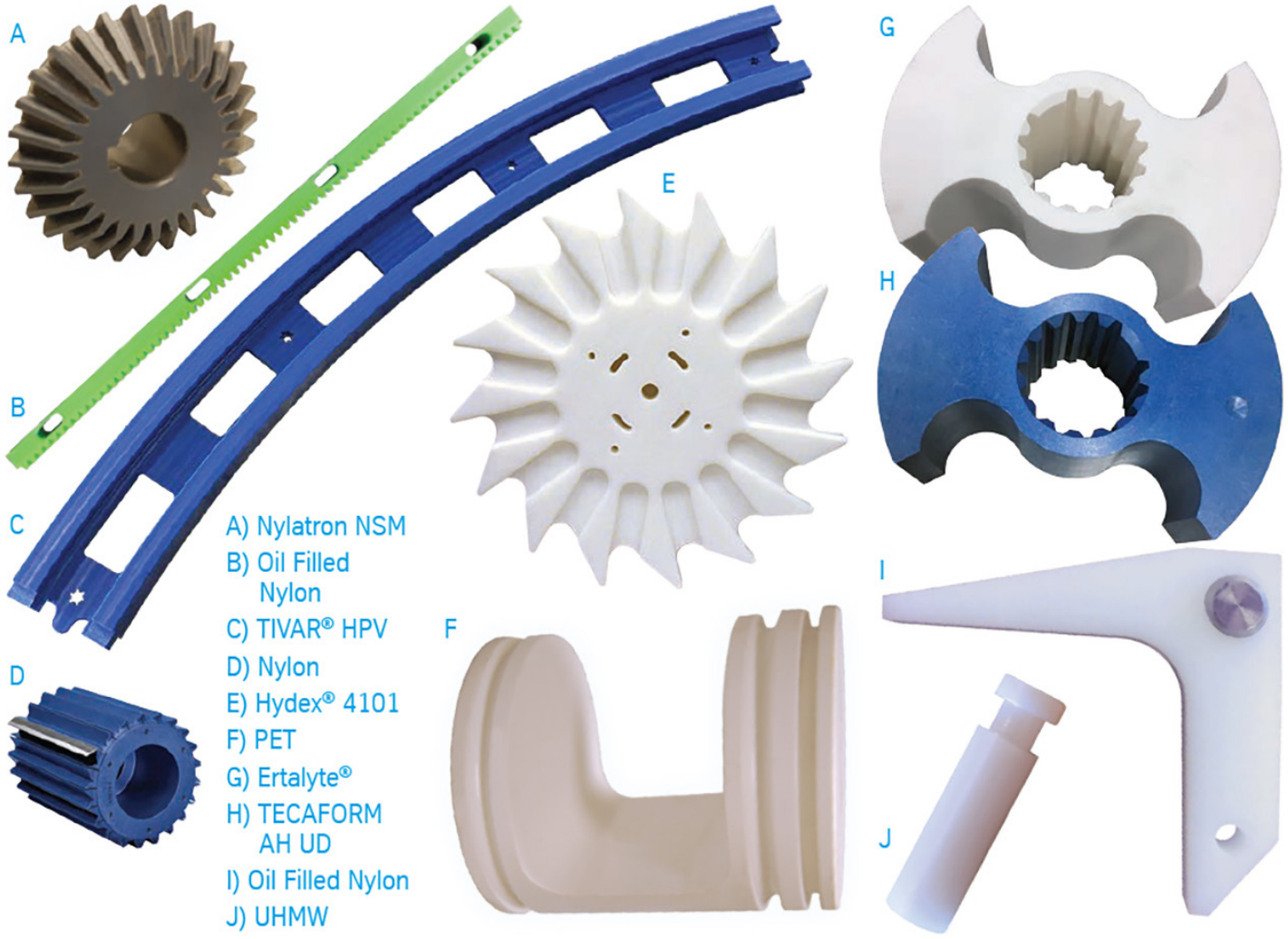
This material machines easily allowing for crisp clear engraving. It is lightweight and withstands outdoor conditions as well as indoor environments in production facilities. No painting needed and the plastic surfaces can be cleaned.

TYGON® Tubing

TYGON® by St. Gobain is a broad line of tubing for virtually any application. The TYGON® S3 line is bio-based and focuses on Smart Safe Sustainable solutions that are BPA and pthalate free, non-DEHP all in recycled packaging. The strength and flexibility and easy installation of TYGON® tubing makes it an excellent replacement for rigid metal and plastic pipe in many food processing applications.

Material	Highlights	Common Applications	Temperature
TYGON S3 B-44-3 B-44-4X I.B. B-44-4X	Non-DEHP Clear, flexible, lightweight Good to high chemical resistance Non-wetting for easy cleaning Very smooth nonporous bore	Beverage, dairy processing, food processing and dispensing Chemical transfer Connects easily to ReSeal® fittings Water purification coolant and air lines	-100 °F to 200 °F
TYGON® E Series E-3603	Outstanding Chemical Resistance Lot-to-lot consistency Non-oxidizing, non-contaminating Smooth polished inner wall Slips over fittings, grips securely	Ideal for condensers, incubators, desiccators, gas lines, drain lines General laboratory and instruments Food and beverage Peristaltic and vacuum pumps	-51 °F to 165°F
TYGON® E Series E-LFL	Longest flex life of all clear TYGON® Broad chemical resistance Can be autoclaved Extremely low particle spallation	Highly viscous fluid transfer Surfactant delivery Drum and tank drainage Shear-sensitive fluid transfer	-51 °F to 165°F
Norprene® A-60-F A-60-F I.B.	Exceptional chemical resistance Withstands repeat autoclaving Exceptional flexibility Ozone and UV resistant (I.B.)	Food and beverage dispensing Withstands frequent cleaning with harsh cleaners, steam or autoclave. Can be steam cleaned in place	-75 °F to 275 °F
TYGOPRENE® XL-60	Flexible to -40 °F Excellent chemical resistance	Pump Equipment	-40 °F to 250 °F
VERSILAC® SPX-50 SPX-50 I.B. Silicone	Highly Durable, resilient, and flexible Withstands repeated CIP and SIP cleaning and sterilization (I.B. Inner Braid) Taste and odor free	Food and beverage processing Food and beverage dispensing Excellent for extreme temperature ranges	Standard -75 °F to 305 °F I.B. 112 °F - 320 °F
Ultra Chemical Resistant 2375	Resistant to aggressive chemicals Plasticizer-free, taste and odor free Exceptionally smooth inner surface Low sorption maintains fluid integrity	Food and Beverage processing and dispensing Chemical transfer	-103 °F to 130 °F
Versilon™ 2001	Plasticizer-free and oil-free Good clarity for visual monitoring Excellent flexibility	Beverage dispensing, water purification lines, and chemical transfer Soap and detergent dispensing Condensers, incubators, desiccators	-108 °F to 135 °F
Silver	Silver based compound on I.D. reduces bacterial growth, Will not discolor	Food, beverage, dairy processing and dispensing and chemical transfer Ice machines and water purification	-31 °F to 165 °F

Notes on TYGON®: Temperature ranges and information are for general reference and may vary based on the particular material version within a product family. In general the selection listed above is FDA, USDA, 3A Dairy REACH and more.



Value Added Processing Capabilities

Bring us your drawing or your idea for a machined part, we can help.

thyssenkrupp Engineered Plastics has over 40 years of experience in the plastics industry, not only selling plastics but machining and fabricating them as well. Our experts will work with you to create the parts you need. We can also provide scheduling and delivery so you get the right number of parts as you need them. Plus our experts will give material selection support to ensure your parts are made from the best material for quality and value.

Our full service machine shops provide state of the art 5 axis machining and these services...

- Milling
- CNC Routers
- Turning
- Cutting
- Fabrication
- Machining
- Secondary Annealing

We love questions!

877.246.7700

Bring us your design and our professionals will help you determine the optimal material solutions and how to best achieve high quality and economical value. We can set up a schedule and provide a customized inventory solution for your parts so you get what you need when you need it. If you aren't ready to make the change to plastics yet. No problem. We also machine metals including aluminum and stainless steel.

General Temperature Guidelines and Standards

Product Type	High Temperature / Temperature Range (°F)	Intermittent High Temperature (°F)	Sheet	Rod	Tube	FDA	USDA	3A Dairy
Ultra Detectable								
TECAFORM® AH UD	Up to 212°	285°	■	■		■	■	■
HYDEX® 4101 UD	Up to 221°	-	■	■		■	■	■
TECAPEEK® UD	Up to 500°	572°	■	■		■	■	
Metal Detectable								
TIVAR® MD* 248°	-238° to 176°	248°	■	■		■	■	■
Nylatron® MD	Up to 185°	-	■	■				
Acetron® MD	-22° to 221°	284°	■	■				
Ketron® MD	Up to 482°	590°	■	■				
High Performance Materials								
PSU (Polysulfone)	-150° to 300°	356°	■	■		■	■	■
PEI (ULTEM®)	Up to 338°	392°	■	■				
PEEK	Up to 480°	572°	■	■	■	■		
Fluorosint® 207	Up to 500°	-	■	■		■		
Fluorosint® HPV	Up to 500°	-	■	■		■		
PAI	Up to 500°	572°	■	■	■			
PPSU	-328° to 356°	374°	■	■				
PTFE	Up to 500°	500°	■	■	■	■		
Chemical Resistant, High Purity Materials								
Kynar® (PVDF)	Up to 302°	302°	■	■	■	■	■	■
ECTFE	Up to 180°	-		■		■		
Noryl®	Up to 220°	230°	■	■		■		

All data and temperature information provided is based on current manufacturer information. Information may vary based on material variations such as fillers etc. This information is for general reference only. All materials should be tested to ensure they will perform as needed under the combination of conditions for your application.

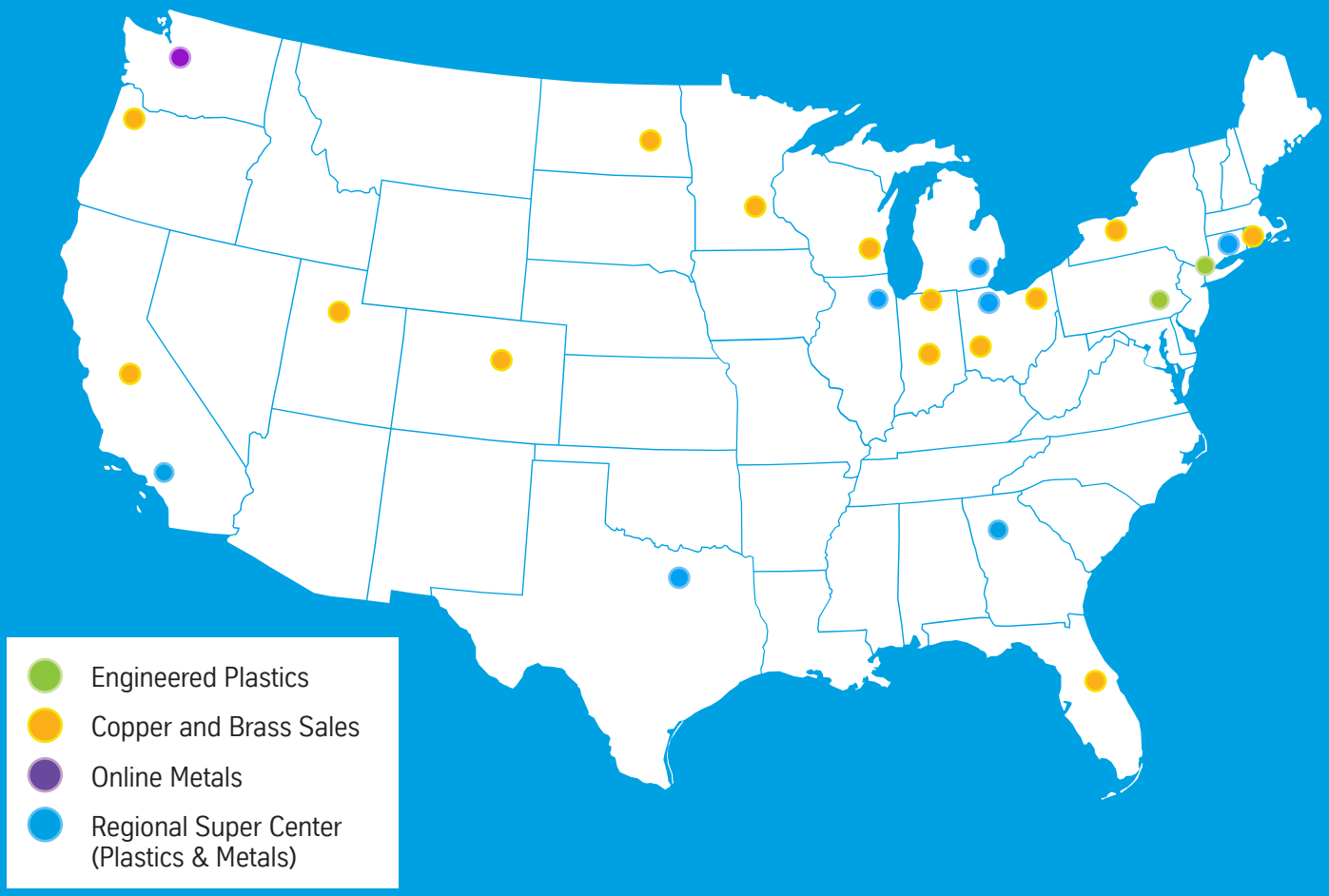
*Some materials may not be FDA, USDA, or 3A Dairy in all grades. Always let your sales person know whether or not you require a certain compliance such as food grade.

General Temperature Guidelines and Standards

Product Type	High Temperature / Temperature Range (°F)	Intermittent High Temperature (°F)	Sheet	Rod	Tube	FDA	USDA	3A Dairy
Engineering Plastics								
Acetal Homopolymer	-58° to 185°	300°	■	■	■			
Copolymer - Unfilled	-58° to 212°	284°	■	■	■			
UHMW - Unfilled Virgin Grade	-240° to 180°	200°	■	■		■		
TIVAR® H.O.T.	-328° to 230°	275°	■	■		■	■	■
TIVAR® Dryslide	-238° to 176°	248°	■	■				
TIVAR® HPV	-328° to 180°	-	■	■		■	■	
TIVAR® Clean Stat*	-176° to 248°	328°	■	■		■	■	■
TIVAR® Ceram P®	-238° to 176°	248°	■	■				
TIVAR® MD	-238° to 176°	248°	■	■		■		
Ertalyte®	-4° to 210°	320°	■	■	■	■	■	■
Ertalyte® TX	-4° to 210°	320°	■	■		■	■	■
Hydex 4101L	Up to 221°	-	■	■		■	■	■
TECAPET®	Up to 230°	338°	■	■		■		
Nylon								
Cast Nylon / Nylatron® MC 907	Up to 200°	-	■	■	■	■	■	■
Heat stabilized Blue	Up to 260°	-	■	■	■			
1 Molybdenum Disulfide (MoS2)	Up to 220°	-	■	■	■			
Oil filled (Food grade)	Up to 230°	330°	■	■	■	■	■	■
Nylatron® MD	Up to 200°	-	■	■	■	■		■
Nylatron® NSM	Up to 200°	-	■	■	■	■		
Standard Plastics								
ABS	Up to 167 °F	212°	■	■		■		
Polypropylene	Up to 212 °F	284°	■	■		■		
High Density Polyethylene	-148° to 176°	248°	■	■		■	■	■

Call Us: 877.246.7700

thyssenkrupp Engineered Plastics has multiple strategically placed branch locations throughout the country that feature full inventory and processing capabilities.



thyssenkrupp Engineered Plastics Strategic Partners

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SAINT-GOBAIN
MITSUBISHI CHEMICAL ADVANCED MATERIALS
Ensinger
MBI MAR-BAL INCORPORATED
Röchling
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