



# HIGH PERFORMANCE POLYMERS

BIEGLO GROUP





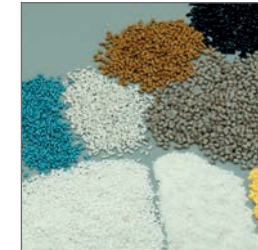
# CONTENT



BIEGLO GROUP

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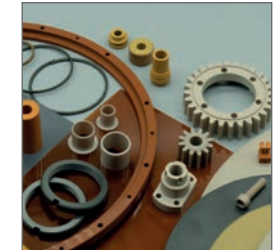
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# BIEGLO GROUP



## PRODUCT PORTFOLIO

### High Performance Polymers

High Performance Plastics are positioned in the upper part of the polymer temperature pyramid under the names High Performance Polymers and Ultra Polymers. They differ from standard plastics and engineering plastics primarily by their temperature stability, but furthermore by their chemical resistance and great mechanical properties.

The distribution companies BIEGLO and BARplast are specialized in High Performance Polymers and sustainable thermoplastics, such as Polyimide and PEEK material.



### We offer

#### GRANULES & POWDERS

- PEEK granules, powders and compounds
- Thermosetting and Thermoplastic Polyimide granules, powders and compounds
- PBI & PEI compounds
- R-HPP's sprues, regrinds, shavings
- R-PEEK granules, R-PEEK compound
- R-PI-s powders & R-PEI regrind

#### SHAPES & FINISHED PARTS

- PEEK rods, tubes, sheets and films
- Polyimide rods, tubes, sheets and films
- PAI rods, tubes and sheets
- PBI rods, tubes and sheets
- PEI rods and sheets
- Injection & compression molded parts
- Direct formed parts
- Machined parts
- Micro molded parts





medical technology, composite production, 3D-printing, metal coating to name only a few. Most of BIEGLO's new developments are technology-driven and often metal is replaced.

BIEGLO works with a global network of polymer producers, converters and end-users.

We communicate openly and offer tailored services to suppliers and customers alike. We build trust towards our partners and we add value to the products we distribute: technical marketing, logistics, financing and risk management are only some parts of our daily work.



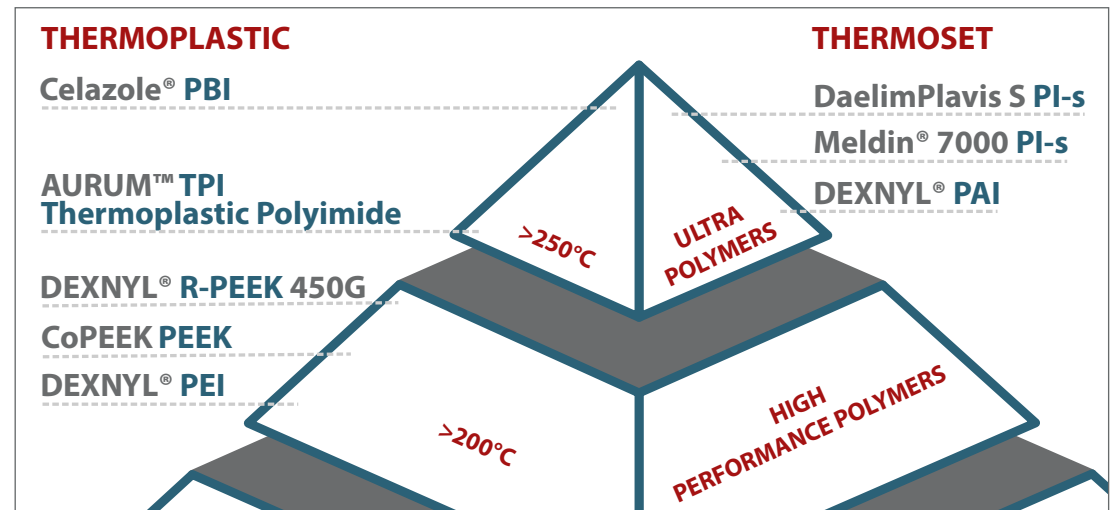
## HPPs MARKET - OUR VIEW

At BIEGLO we see the HPP-environment as a supplier driven market with few specialized distributors.

As polymers and equipment are still evolving there is growth in many areas. New products are developed and better conversion technology allows a growing number of companies to use HPPs. HPPs are a small niche in the large market of polymers.

General trends foster growth: The increased usage of mass-produced electric- and electronic parts is coupled with a constantly increasing output and miniaturisation of engines and other devices (mechanical or electronic). More energy in a small space requires higher temperature resistance of components. Last but not least there are trends towards the usage of HPPs in

## POSITIONING IN THE MARKET





# GRANULES & POWDERS



**AURUM<sup>®</sup>** T<sub>g</sub>: 245°C

## AURUM<sup>®</sup> TPI THERMOPLASTIC POLYIMIDE

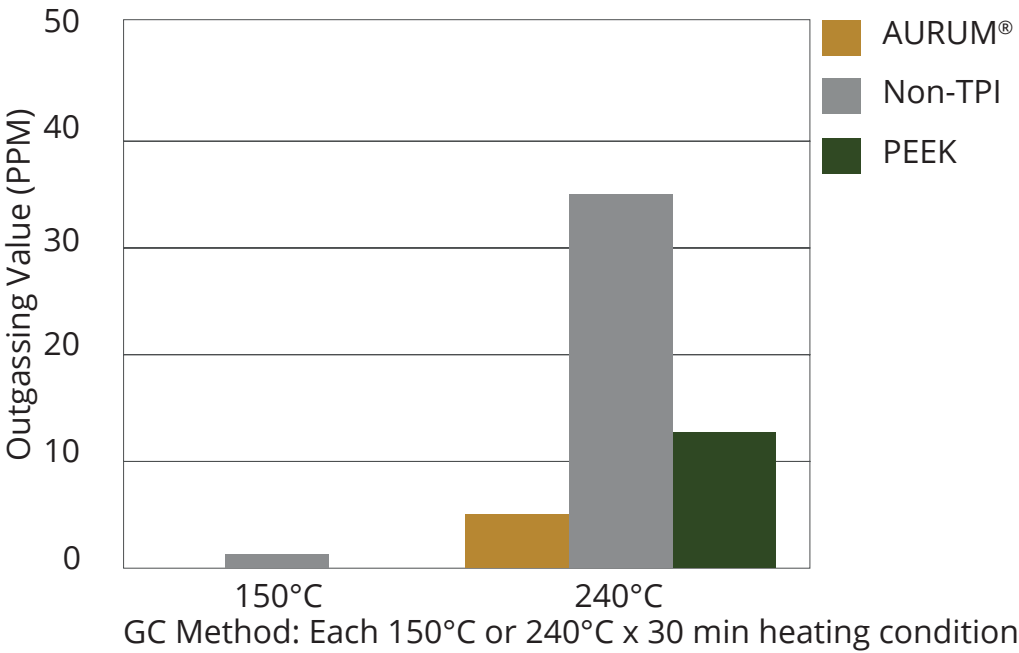
- Melt-processable
- Super-high heat resistance (T<sub>g</sub> 245 °C)
- Great sliding properties
- Outstanding dimensional stability
- Exceptional clean (trace amount of outgas and metallic impurities)



**Mitsui Chemicals**

Outgassing data

The amount of outgas from AURUM® at high temperatures is small. AURUM® is usable for clean applications such as semiconductors.



Wear resistance grades

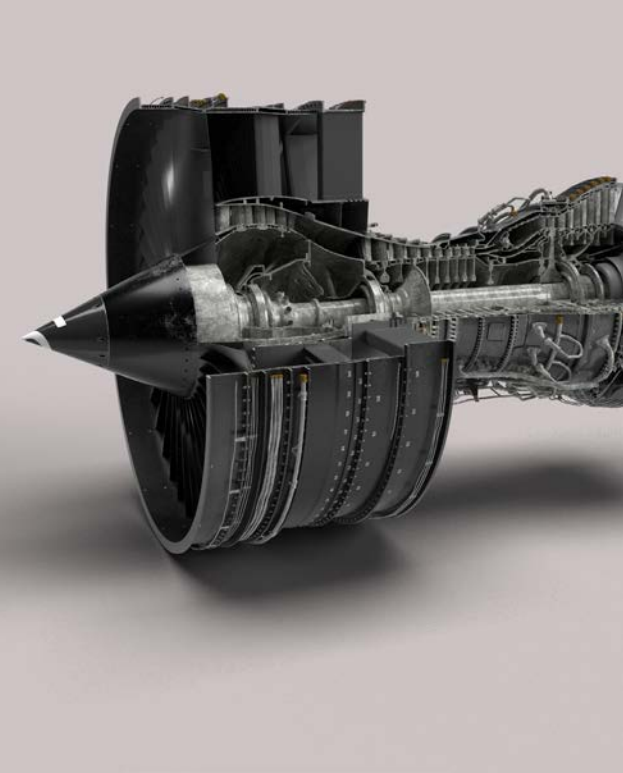
Grade	Composition	Feature	Application
JNF3020	PTFE	Good friction on aluminum	Plane bearing
JCF3030	CF, PTFE	Good friction on steel at high velocity	AT seal ring
JCL3030	CF, Lubricant	Good friction on steel at high PV	AT thrust washer
JRF3012	Graphite, PTFE	Replacement of phenolic cotton	Wear ring
JQF3030	Graphite, PTFE	Similar CLTE to aluminum	Abradable seal

High strength grades

Grade	Composition
JGN3030	GF
JCN3030	CF
JGN6230	PEEK, GF
JCN6230	PEEK, CF

AURUM® is a high-heat resistance super engineering plastic that enables high efficiency production through injection molding, challenging the conventional thinking that polyimides have outstanding performance but are difficult to process. AURUM® is the only polyimide resin that is thermoplastic. A low

coefficient of thermal expansion, similar to that of metal, can be maintained at ultra-high temperature ranges by adding fibers. As its glass transition temperature is 245°C, AURUM® exhibits high temperature stiffness properties that far exceed PEEK resin.







### R-PEEK

- DEXNYL R-PEEK 450G
- R-PEEK natural granules based on different grades
- R-PEEK compounded granules
- Regrind PEEK natural and compound
- Shavings
- BIEGLO buys PEEK residues

### Compounds

- PEEK mod 10-10-10
- PEEK CF
- PEEK GF
- PEEK PTFE
- PEEK colors
- PEEK Masterbatch black



## PEEK (POLYETHERETHERKETONE)

### CoPEEK

- From Panjin Zhongrun HPP
- High ductility
- Additive-free
- Excellent chemical resistance
- High purity natural grades



- Dedicated production plant
- 1.000 mt annual capacity
- 4 viscosities
- Injection molding
- Compression molding
- Extrusion

- Coating
- Coarse powder
- High filtered



### PEEK powders

- Coarse powder – uneven distribution of particle size average 300 $\mu$  - offered in different viscosities of virgin PEEK
- Fine PEEK powder of different viscosities (size average 50 $\mu$ )
- Ultra fine PEEK powder of different viscosities (size average 10 $\mu$ -20 $\mu$ )





# SPECIAL HPPs AND HPP COMPOUNDS

Over the years BIEGLO build up a large network of polymer producers, compounders and recycling-specialists. On demand we can pick the most suitable supplier for specific raw-material enquiries of HPPs in form of powders and granules.

## Thermoplastic Polyimide

Dexnyl® 185 TPI (Tg 185°C)

- Melt-processable with good melt flow (crystalline)
- Higher mechanical strength than PEEK above 120°C
- Good sliding properties
- Low outgassing

## Thermoset Polyimide powder

Dexnyl® Thermoset Powder

- Ultra-high heat resistance (HDT 330°C)
- Non-toxic flame retardant material
- Self-lubricant and wear resistant

## R-Thermoset Polyimide powder

Dexnyl® rPI-s (30µ or 50µ)

- Reprocessed
- Heat resistance additive/modifier (up to 300°C)
- Excellent oil, acid and solvent resistance
- High wear resistance
- Low thermal conductivity
- Sustainability-aspect as 100% recycled



# Celazole®

## PBI-compounds

Celazole® T-Series

products are PBI compounds designed for injection molding and extrusion. Combining the superior mechanical properties and thermal resistance of PBI with the melt processability of PEEK or PEKK. Celazole® T-Series granules offer: cost-effective high performance and HDT's that can be raised up to 330°C.



## Pure PBI (Polybenzimidazole)

- Tg 427 °C
- Chemical resistance
- High strength
- Wear resistance

## PEI compounds & r-PEI Recycled

Dexnyl® PEI compounds

- Functional and colors
- Service temperature of 170°C
- Good electrical properties

Dexnyl® r-PEI

- Regrind PEI natural
- Regrind PEI Compound

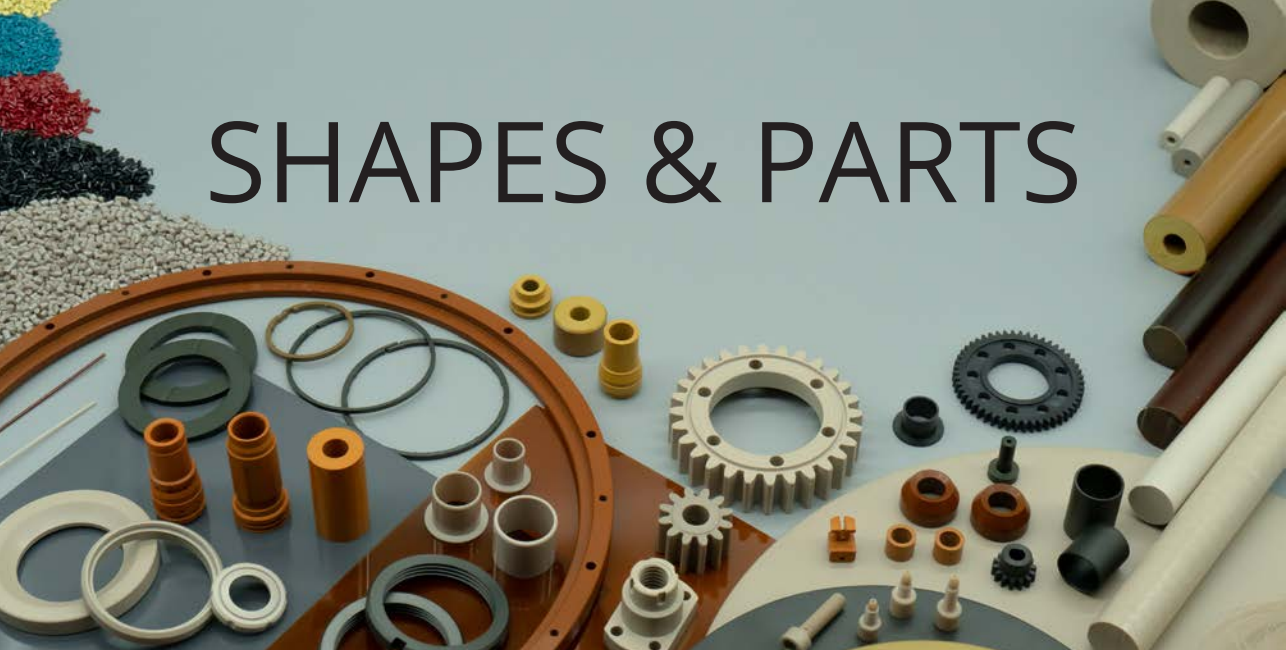
## PEEK Masterbatch Black

Dexnyl® PEEK Masterbatch Black

- Simplifying the production of black PEEK products
- Based on a super high-flow CoPEEK grade (125G)
- Can be blended with all common, natural or compounded PEEK grades
- Melting temperature above 340°C
- Food application approved (if dosage is < 8%)



# SHAPES & PARTS



## RODS, TUBES, SHEETS

### PEEK DEXNYL®

- Permanent temperature resistance up to 240°C
- Extruded, injection molded, hot compression molded, spin-cast
- Tubes with a wide range of dimensions OD: 15 – 2500 mm
- Natural and Compounds (Carbon Fiber, Glass Fiber, PTFE, graphite, etc.)
- Tribologically modified PEEK PVX/HPV



- FDA/REACH/ROHS/EU Food Contact 10/2011 Compliant PEEK

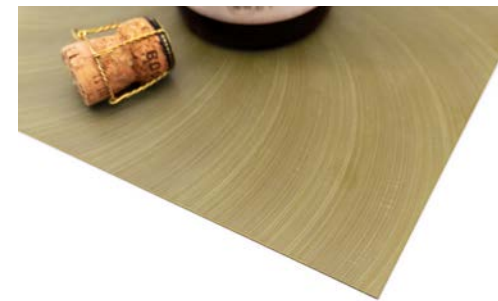
### MELDIN® 7000 Thermosetting Polyimide

- Permanent temperature resistance up to 315°C
- Modified/Reinforced Grades with Short-term resistance up to 500°C



### DAELIMPLAVIS S Thermosetting Polyimide

- Permanent temperature resistance above 350°C
- Short-term temperature resistance up to 500°C



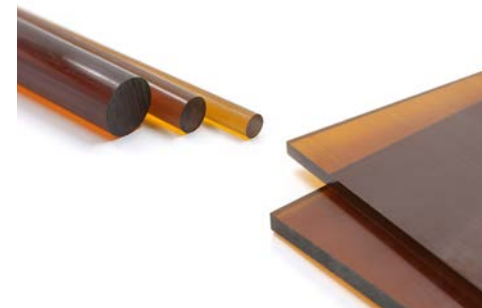
### DEXNYL® PAI (POLYAMIDE-IMIDE)

- Permanent temperature resistance up to 270°C
- Excellent abrasion resistance at temperatures up to 200°C
- Modified/Reinforced Grades



### DEXNYL® PEI (POLYETHERIMIDE)

- Permanent temperature resistance up to 170°C
- Stable electrical properties over wide range of frequencies
- Natural and Compounded Grades



## FILAMENTS & SMALL TUBES



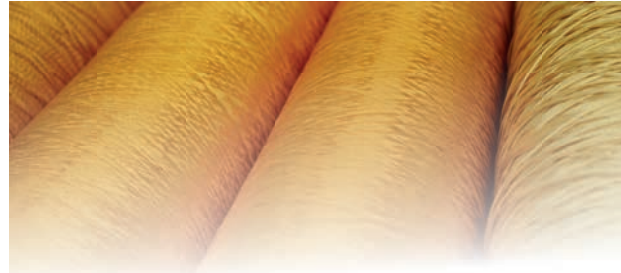
### PEEK Dexnyl® (Polyetheretherketone)

- Monofilament, 3D printing Filaments
- Multifilament Yarns
- Capillary Tubes
- PEEK shrink-tubes



### Dexnyl® Thermoplastic Polyimide

- Multifilament Yarns
- Monofilaments
- Chopped Fibers
- AURUM® TPI Capillary Tubes

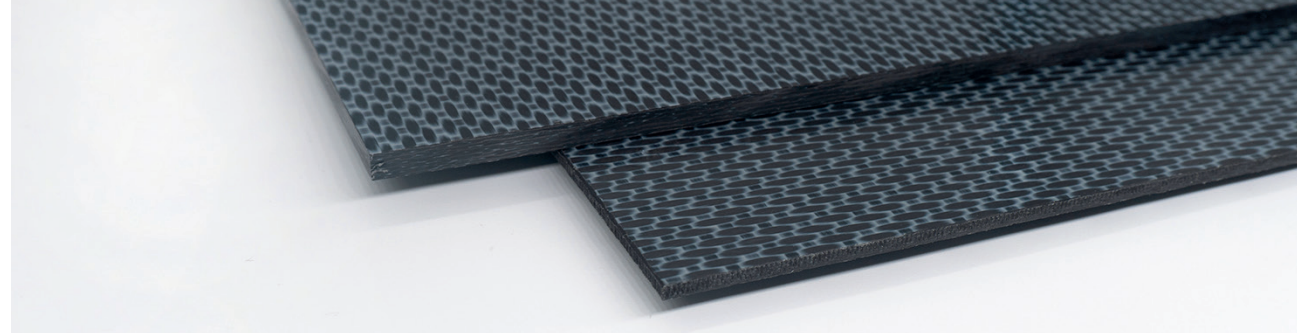


### Dexnyl® Thermosetting Polyimide

- Multifilament Yarns, threads 75 – 3000 dtex
- Monofilaments
- Chopped & Staple Fibers 0.7 -6 dtex with cut lengths from 3mm up to 76 mm
- PI-s Capillary Tubes/Glides with ID as low as 0.125mm

### Chopped Glass fibers

- Uniques group of glass-fibers developed for HPP compounds
- special seizing for HPPs
- Thinner diameter for improved surface
- Improved impact and toughness



### Dexnyl® Composite PEEK-CF (Polyetheretherketone – Carbon fibre)

- Permanent Temperature Resistance up to 260°C
- Superior mechanical property composite from several layers of CF fabric (55-60%) in a PEEK matrix.
- Thickness: 1.8 mm – 80 mm



## COMPOSITES

### Dexnyl® Polyimide Composite SF

- Permanent Temperature Resistance up to 320°C
- Glass Fiber & Carbon Fiber Polyimide Composite Sheets and Films
- Finished Parts





## MELDIN® 7000 SERIES

Produced by Saint-Gobain (USA)

Thermosetting Polyimide

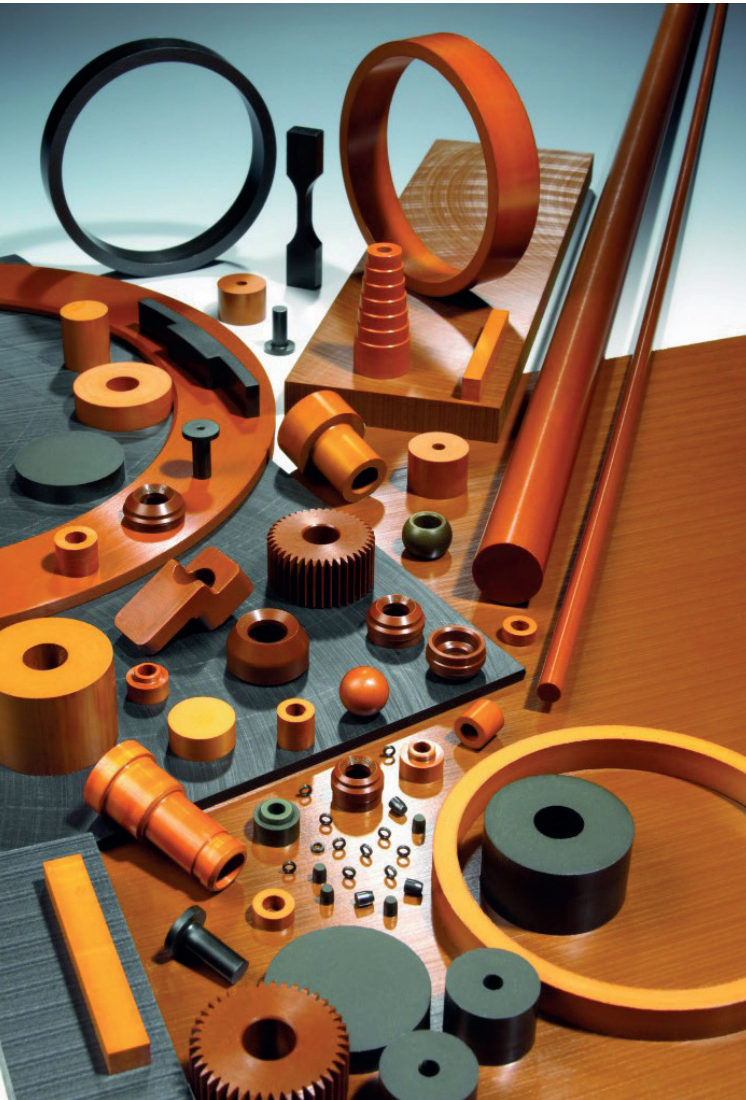
Continuous use temperature up to 315°C

Intermittently up to 482°C

Self-lubricating properties

High plasma resistance

Thermal and electrical insulation properties



### Product Availability

- Rods, Sheets, Tubes
- Finished parts, Direct Formed

### Manufacturing Processes

- Compression Molding
- Direct Forming
- Isostatic Forming
- Machined Parts

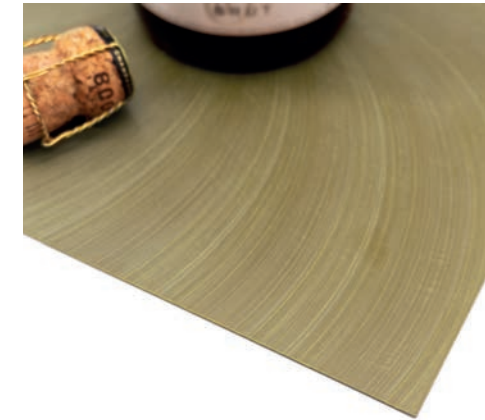
## DAELIMPLAVIS S SERIES

Produced by Daelim Co., Ltd. (Korea)

High Temperature Resistant Thermosetting Polyimide

Continuous use temperature up to 350°C

Natural and Compounded Grades for enhanced Wear and Plasma resistance



### Product Availability

- Rods, Sheets, Tubes
- Finished parts, Direct Formed

## POLYMERS ABOVE 500 °C

### Dexnyl® Thermosetting

#### Polyimide

- Super Heat Resistant Polyimides with Heat Distortion Temperature of 500°C
- High Tensile strength for challenging applications
- Natural and Reinforced materials
- Basic Shapes & Finished Parts



### Dexnyl® Polybenzimidazole PBI

- Ultra High Performance Polymer with Temperature Resistance over 500°C
- Highest Tensile and Compressive Strength in Thermoplastics
- Natural and Reinforced materials for Semiconductor and aerospace applications
- NASA and AFML Certified
- Also available as PBI-PEEK Thermoplastic alloys



## FILMS

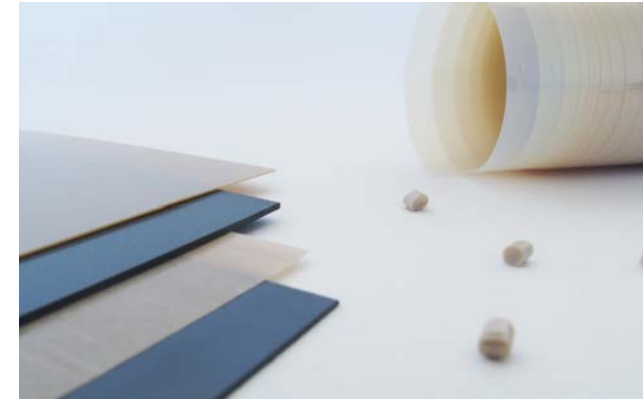
### Dexnyl® PEEK Films

- Very High Melt temp. of 345°C
- Wide range of thickness from 6 microns up to 1.500 microns
- Natural, Amorphous or compounded PTFE and Carbon Fiber Films
- Colored PEEK, Black PEEK and PVX Modified PEEK



### Dexnyl® PAI Polyamideimide Films & PEI Polyetherimide Films

- Natural and Adhesive Films
- Widely used for 3D Print bed surfaces



### Dexnyl® Polyimide Films

#### (Thermosetting/Thermoplastic)

- Natural, Adhesive and Colored Polyimide Films
- Carbon nano Reinforced Films
- Polyimide Fibreglass Composite Films
- Thermoplastic TPI AURUM® Films

Used in thermoforming or cut as seals, frames and membranes. Speakers/voice coils, telecommunication, etc.







## FINISHED PARTS

### AURUM® TPI Thermoplastic Polyimide

- Washers, dry bearings, distancing-rings, seals, piston rings



### PEEK Dexnyl® (Polyetheretherketone)

- Sealings, Back-up rings, Gears, Isolators

### MELDIN® Thermoset Polyimide

- Hot-runner nozzles, Plasma-cutting, diffusors, washers



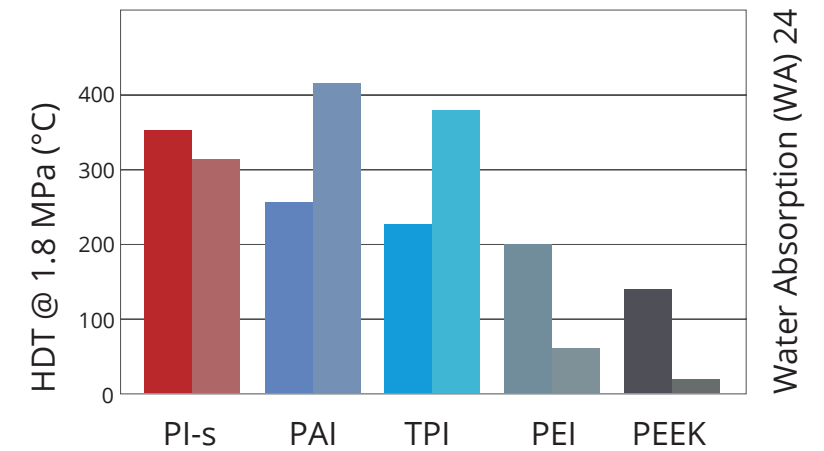
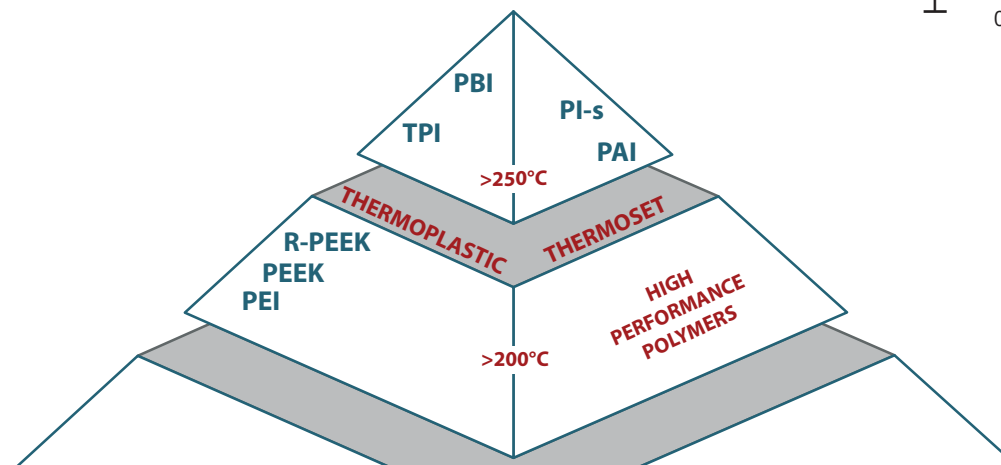
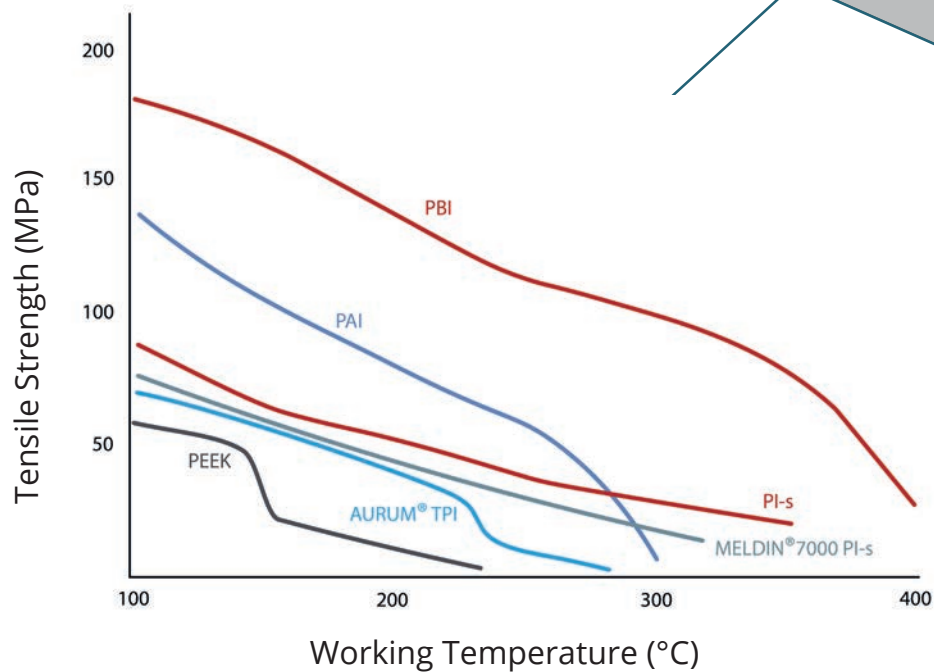
### Dexnyl® PAI (Polyamide-imide)

- Gears, bearings, washer



# HIGH PERFORMANCE POLYMERS

Tensile strength of HPPs at elevated temperatures is the key material selection factor to be considered for high temperature load bearing applications.



HDT values are key in HPP-selection, but in humid environments only a low level of water absorption guarantees sufficient dimensional stability.





# COMPANIES

COMPANIES

## BIEGLO GMBH

Distribution Company based in Germany, Hamburg



John Biesterfeld  
General Manager

Administration

Logistics

IT & Web

Controller

Tax Editor

Sales & Marketing

Powder & Granules  
Virgin, r-HPP, Compound



granules@bieglo.com

Shapes & Parts  
Rod, Tube, Sheet, Film, Parts



shapes@bieglo.com

ASP  
PLASTICS

Local Sales Agents

### Products and Suppliers

- Mitsui Chemicals - AURUM® TPI
- Panjin Zhongrun HPP - CoPEEK
- Saint-Gobain - Meldin® 7000 Series PI-s
- Daelim - DaelimPlavis S-series
- PBI Performance Products - Celazole®

PEEK, PI-s, PEI, PBI and PAI granules and semi-finished products under own brand DEXNYL®



DaelimPlavis

Mitsui Chemicals

Celazole®





## Sales and Marketing of High Performance Polymers (HPPs)

### Online Shops



### Social Media



### Online Sales Platform

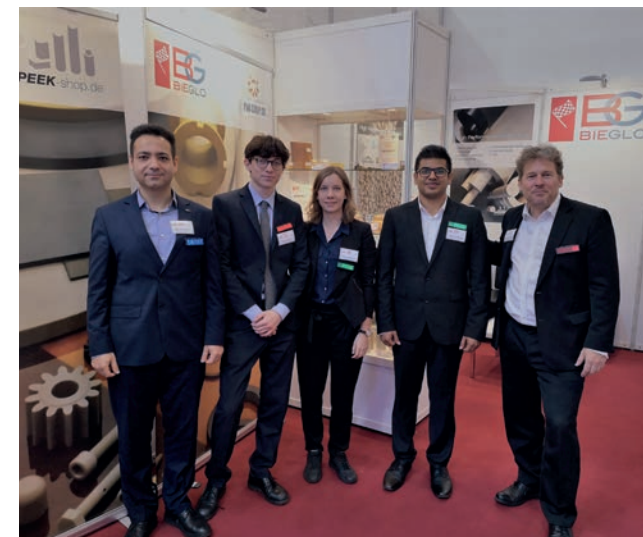


Besides sales and marketing BIEGLO GmbH also offers support in material choices and processing methods. BIEGLO GmbH is committed to long term developments of technical products.

BIEGLO is the distribution-partner of polymer-producers that trust in its ability to provide services in areas ranging from technical advice to financing, logistics and product development.

### Fairs

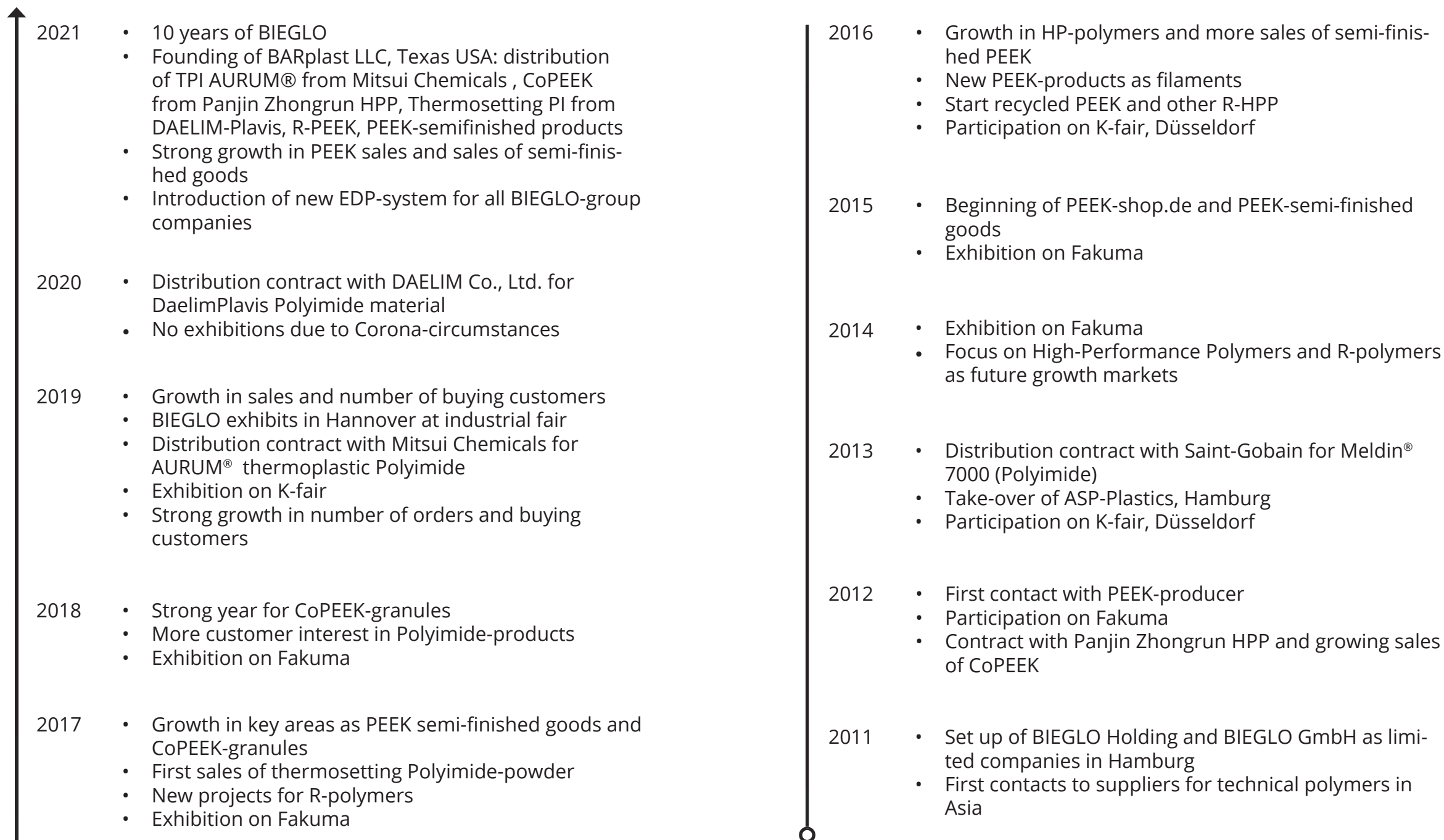
- Fakuma
- K-Fair
- Hannover Fair
- AIX







## Timeline



# BARplast

Distribution Company based in USA, Texas



## Products and Suppliers

- Mitsui Chemicals - AURUM® TPI
- Daelim - DaelimPlavis N and S-series
- Panjin Zhongrun HPP - CoPEEK
- DEXNYL® - R-PEEK 450G

PEEK, PI-s, PEI, PBI and PAI granules and semi-finished products under own brand DEXNYL®



## Sales and Marketing of High Performance Polymers

### Online Shops



### Social Media



### Online Sales Platform



Plastics News





# ASP-PLASTICS

## Core Business

Distribution, Sales and Marketing of flame retardant thermoformable sheets and specialty films

- Korad™ Weatherable Acrylic Films
- Acrylloy™ Acrylic Films
- Cellulose Acetate Films
- Calendered PVC Films
- SurfaceChoice™ Printed Films
- Optical Polymers – Laser protective sheet

ASP-Plastics offers BOPP Release film for HPL manufacturing and other specialty film solutions like i.e. PETG- APET films and more



## Suppliers

Spartech  
Optical Polymers  
DEXNYL®

## Fairs

Aircraft Expo  
Plastpol  
Composites  
Frontale  
K-Fair  
IWA



## We offer

### FILMS

Spartech

- Korad™ PMMA
- Calendered PVC Films
- SurfaceChoice™ Printed Films
- Cellulose Acetate
- APET
- UltraTuf™ PETG

DEXNYL®

- Polyimide
- PEEK

### SHEETS

Spartech

- Royalite® ABS
- Royalite® PVC
- Royalite® ABS/PVC
- Royalite® HG Holstergrade
- UltraTuf™ PETG
- Crylex™ PMMA
- Sungard PMMA
- TufGlas™ PMMA
- Polycast™ Acrylic

DEXNYL®

- Polyimide
- PEEK
- Composite PEEK-CF



















NOTES







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