

HUNTSMAN

Enriching lives through innovation

TECNOELASTOMERI

Engineering Urethane Elastomers

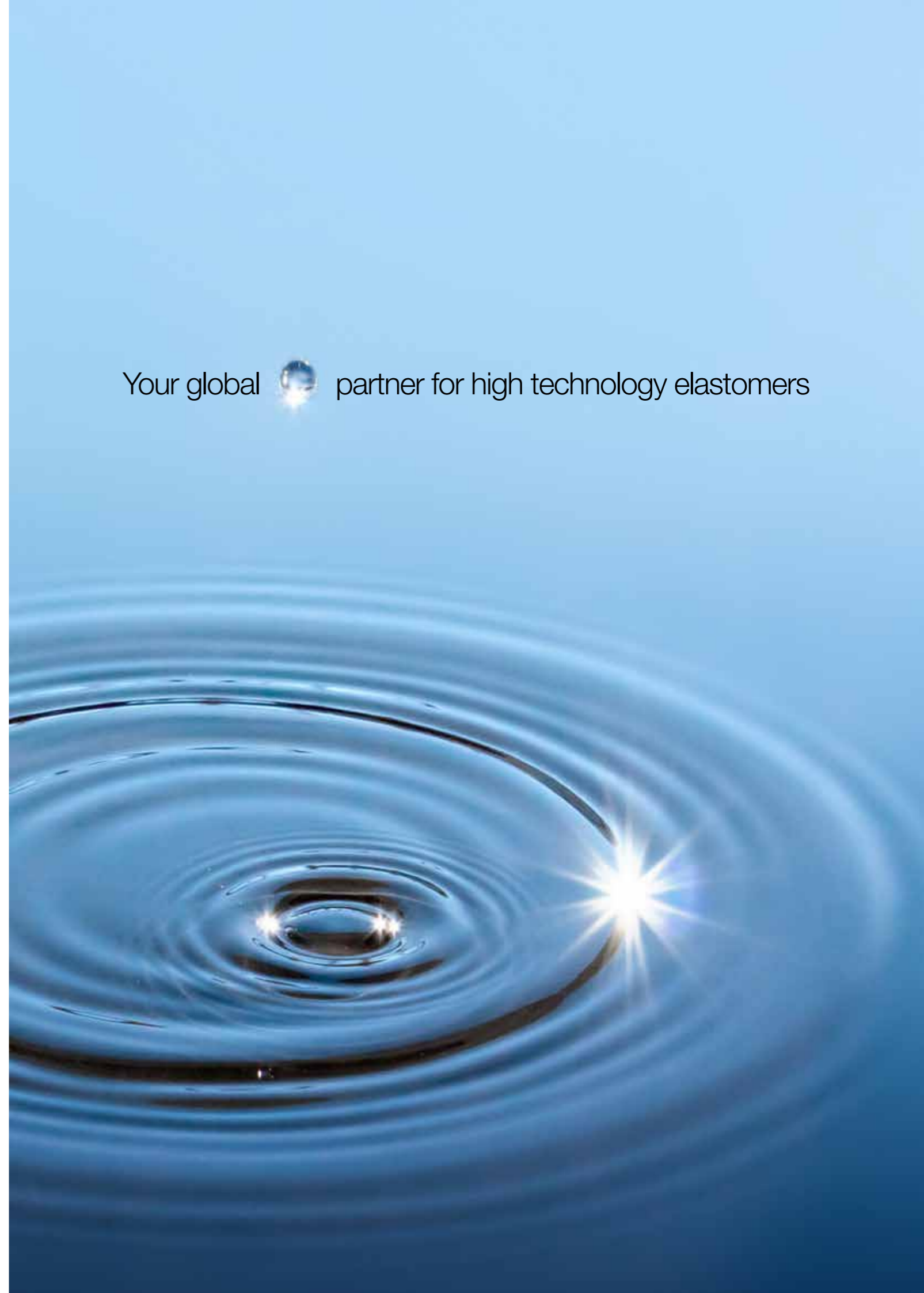
COPERTINA
FONDO ARGENTO
METALLIZZATO

Huntsman - Tecnoelastomeri (HTE)

Your global  partner for high technology elastomers

PATTELLA
FONDO ARGENTO

RIGA DI TESTO IN NERO





Dear customer

Tecnoelastomeri has been present in the MDI high technology elastomer market since 1985.

My father, Ermes, originally founded the business.

Initially our focus was on the development of tailor-made TECNOTHANE MDI systems but over the years our portfolio grew to include a range of MDI-based solutions. Then, in 2002, we branched out with the development of CASTECH machines – which can be used to cast and mold polyurethane parts from any MDI high technology elastomer solutions.

Today, worldwide, across various industries, there are thousands of wheels, rolls, automotive elastomer parts, seals, mining equipment and technical parts in use that are based on our technologies.

As we enter a new phase in our company's history – as part of Huntsman Corporation – exciting opportunities lie ahead. Combining Tecnoelastomeri's experience with Huntsman's global reach and expertise in polyurethane chemistry, our aim is to introduce more decision makers worldwide to the benefits of high quality engineering urethane elastomers.

If you are an existing customer, we'd like to thank you for being a partner. Our passion for your business remains unchanged and we look forward to working with you in the future. If you are a new contact, interested to find out more about our offering, then we look forward to getting to know you and discovering how Huntsman - Tecnoelastomeri (HTE) could benefit your business.

Yours sincerely

Alessandro Gramellini



Since 1985 we have stayed true to our founding principles:

- High quality, personalized technologies and services
- Respect for people and the world around us
- Only MDI polyurethane and only safe materials.

Our mission has also remained the same; to work in partnership with our customers, turning their ideas into a reality, using polyurethane elastomers.

Through our fully integrated departments, we study the science behind our customers' concepts. We research polymer options, prepare formulations and test performance properties. We can also help design molds, create prototypes, assess production set up and make machinery recommendations to ensure quality results every time.

In the past this approach formed a firm foundation for our business. In the future – as part of Huntsman – this model will continue. Incorporated into a truly global business we will be able to offer our customers the same high level of service but with access to a wider network of polyurethane experts and manufacturing assets in all regions of the world.

TECNOELASTOMERI
ENGINEERING URETHANE ELASTOMERS

TECNOTHANE
POLYURETHANE SYSTEMS

CASTECH
POLYURETHANE MACHINES

LINTHANE
SPECIAL TPU



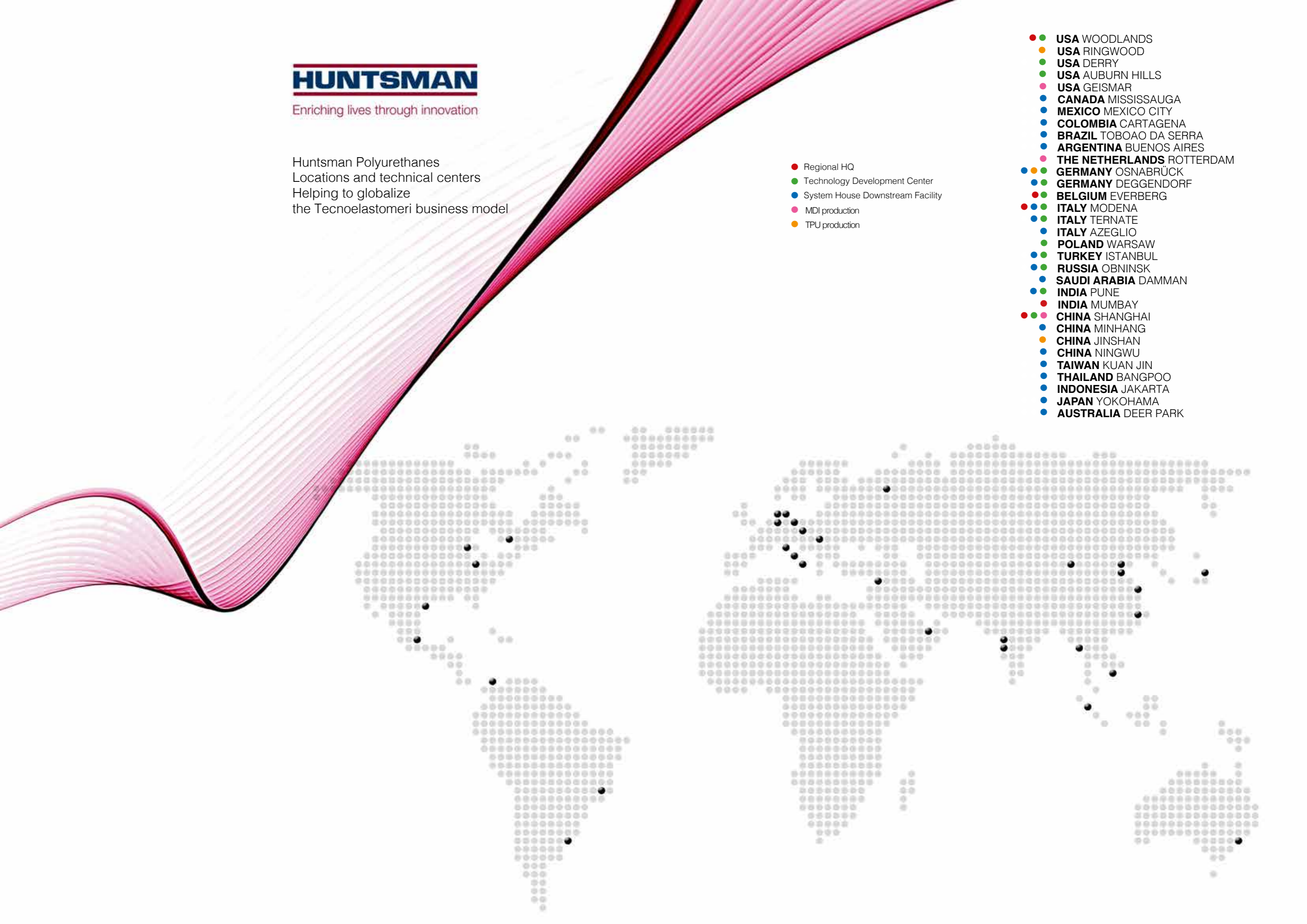
HUNTSMAN

Enriching lives through innovation

Huntsman Polyurethanes
Locations and technical centers
Helping to globalize
the Tecnoelastomeri business model

- Regional HQ
- Technology Development Center
- System House Downstream Facility
- MDI production
- TPU production

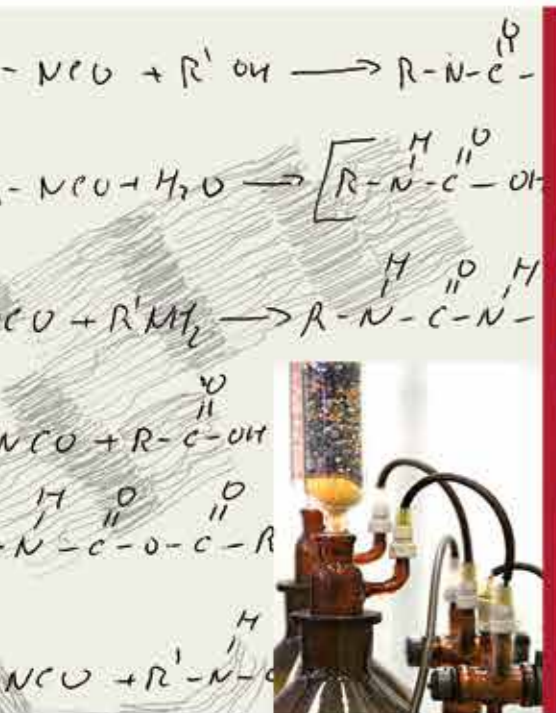
- USA WOODLANDS
- USA RINGWOOD
- USA DERRY
- USA AUBURN HILLS
- USA GEISMAR
- CANADA MISSISSAUGA
- MEXICO MEXICO CITY
- COLOMBIA CARTAGENA
- BRAZIL TOBOAO DA SERRA
- ARGENTINA BUENOS AIRES
- THE NETHERLANDS ROTTERDAM
- GERMANY OSNABRÜCK
- GERMANY DEGGENDORF
- BELGIUM EVERBERG
- ITALY MODENA
- ITALY TERNATE
- ITALY AZEGLIO
- POLAND WARSAW
- TURKEY ISTANBUL
- RUSSIA OBNINSK
- SAUDI ARABIA DAMMAN
- INDIA PUNE
- INDIA MUMBAY
- CHINA SHANGHAI
- CHINA MINHANG
- CHINA JINSHAN
- CHINA NINGWU
- TAIWAN KUAN JIN
- THAILAND BANGPOO
- INDONESIA JAKARTA
- JAPAN YOKOHAMA
- AUSTRALIA DEER PARK



RESEARCH & INNOVATION DEPARTMENT (RID) POLYURETHANE SCIENCE

RID is the Research and Innovation Department of HTE. The department features a polyurethane laboratory equipped with advanced apparatus plus a refurbished library, which contains an extensive collection of books and technical papers about polyurethane chemistry that date back to 1985.

The RID team at HTE is dedicated to the advancement of polyurethane-based elastomers and their application. Working in close cooperation with scientists at Huntsman's R&D and technical centers in Everberg, Belgium; Auburn Hills, USA; and Shanghai, China, the HTE team can provide a complete polyurethane science service, optimized to help solve complex customer challenges.



RID
POLYURETHANE SCIENCE



At HTE we are proud to offer our customers and partners a 360° scientific support service. Our RID laboratory and Huntsman's R&D centers contain testing apparatus and industry standard equipment that can be used to assess the quality of polyurethane materials and the techniques used to manufacture elastomer products.

We are experts in:

- Rheology analysis
- Fourier Transform Infra-Red spectroscopy (FTIR)
- Differential scanning calorimetry (DSC)
- Size exclusion chromatography (SEC)
- Nuclear magnetic resonance (NMR)
- Thermogravimetric analysis (TGA)
- Plus many other disciplines.

TECNOTHANE

POLYURETHANE SYSTEMS



TECNOTHANE is an advanced portfolio of polyurethane systems that includes a full range of polyols and chain extenders based on MDI.

The TECNOTHANE family of polyurethane elastomers consists of the MPC, MDE, MPT, SWP, WRP, V-TER and V-TER Z series.

With more than 1,000 different formulations and products available, there is an option for almost every kind of polyurethane elastomer project from heavy-duty mining and offshore usage to energy control and robotic applications.

When it comes to producing TECNOTHANE, we operate production lines that are more than just reactors.

They are full technology systems, which encompass the whole industrial value chain from processing raw materials to creating products for customer applications.

We have a production capacity of over 10,000 tons and different batch size capabilities, meaning we can develop tailor-made elastomer solutions to fit customer requirements.

We also follow 'just in time' production principles – responding to customer needs quickly and efficiently.

Customer ideas are the starting place for our formulation work and the development of polymer systems built to transform the world around us.

Speak to our experts for more information and together we can find you the best solution.

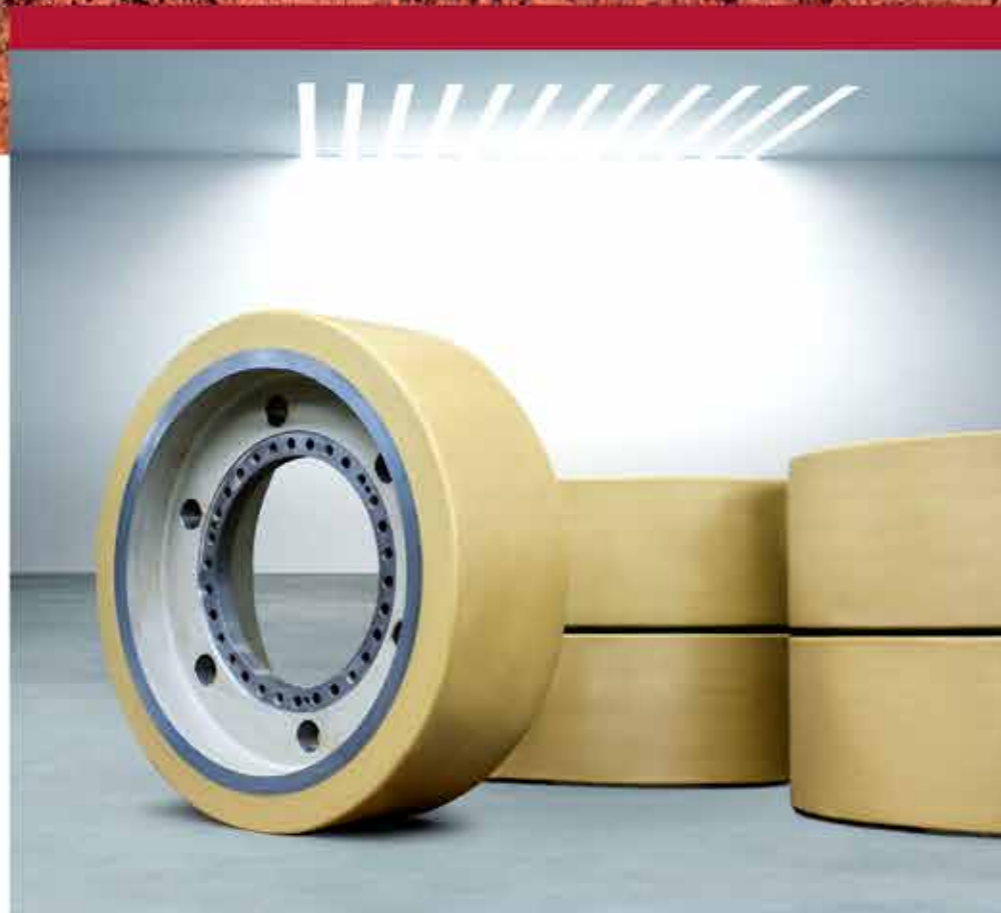




TECNOTHANE WHEELS



TECNOTHANE MDI polyurethane systems that offer a low compression set and high rebound resilience for **wheel** applications.



TYPICAL PHYSICAL PROPERTIES	Unit	Test method	TDI - MBOCA	MDI MPC	MDI VTER-Z
Hardness	ShA	DIN 53505	90	90	90
Modulus 100%	MPa	DIN 53504	6,8	7,0	8,5
Modulus 300%	MPa		11,6	13,5	18,0
Tensile strength	MPa		45,2	54,0	48,0
Elongation	%		520	460	510
Tear resistance	DIE B/a, KN/m	DIN ISO 34-1	67	90	95
Tear resistance	DIE C, KN/m		57	95	96
Compression set	23h/70°C,%	DIN ISO 815	22	20	12
Rebound resilience	%	ISO 4662	45	60	65
Abrasion resistance	mg	DIN ISO 4649	78	35	30
Dynamic performance	Average n° wheel revolution	Internal procedure*	37000 rev. At increasing load from 400 Kg up to 900 Kg	48000 Rev. At increasing load from 400 Kg up to 1000 Kg	52000 Rev. At increasing load from 400 Kg up to 1100 Kg
				+30%	+40%

* Test on wheel 85x70mm PU Layering. Disclaimer about data and materials, see back cover.

TECNOTHANE TECHNICAL PARTS

TECNOTHANE MDI polyurethane systems for **technical parts** that need to offer very good abrasion resistance as well as high dynamic performance.

RAILWAY PAD TYPICAL PHYSICAL PROPERTIES	Unit	Test method	RUBBER exemple 1	MDI exemple 1
Density	Kg/dm3		1,40	0,70
Tensile strength (after Aging)	MPa	GB/T10654	2,1 (1,4)	3,2 (2,6)
Elongation (after Aging)	%		160 (180)	320 (360)
Compression set (23h at 70°C)	%	GB/T10653	5,2	2,0
Swelling in mobile oil n°46 (72h at r.t.)	%	GB/T1690	1,2	3,2
Electrical resistance	Ω	IEC 60093	1,00E+12	3,00E+11
Ksta	kN/mm		28,7	23,8
Kdyn/Ksta	-	KKJ[2007]-207	1,33	1,20
Thickness var. (Fatigue test)	%		3,2	4,0
Ksta var. (Fatigue test)	%		12,1	14,4
Low temp resistance (Ksta Var. after 24h at - 40°C)	%	KKJ[2007]-207	20	20

★ Disclaimer about data and materials, see back cover.





TECNOTHANE ROLLS



TYPICAL PHYSICAL PROPERTIES	Unit	Test method	MDI MDE 795Z					
Hardness	ShA	DIN 53505	95±2	70±3	60±3	55±3	45±3	25±3
Modulus 50%	MPa	DIN 53504	10,4	2,2	1,4	1,4	0,7	0,4
Modulus 100%	MPa	Type S2	12,6	3,3	2,1	2,0	1,1	0,5
Modulus 300%	MPa		21,3	8,5	4,3	3,9	2,2	1,3
Tensile strength	MPa		56,0	45,0	32,0	26,0	11,0	4,0
Elongation	%		560	480	520	540	540	400
Tear resistance	DIE B/a, KN/m	DIN ISO 34-1	110	40	32	25	16	6
Tear resistance	DIE B/b, KN/m		95	16	10	7,5	6	3,5
Compression set	23h/70°C,%	DIN ISO 815	16	8	3,5	3	4	2
Abrasion resistance	mg mm ³	DIN 53516	38	30	34	35	135	>300
Electrical resistance	Ω	IEC 60093	30	26	27	28	110	>250

★ Disclaimer about data and materials, see back cover.



TECNOTHANE MDI polyurethane systems for **rolls** applications offer a low compression set and very good solvent resistance – making them easy to clean.





TECNOTHANE AUTOMOTIVE ELASTOMER PARTS



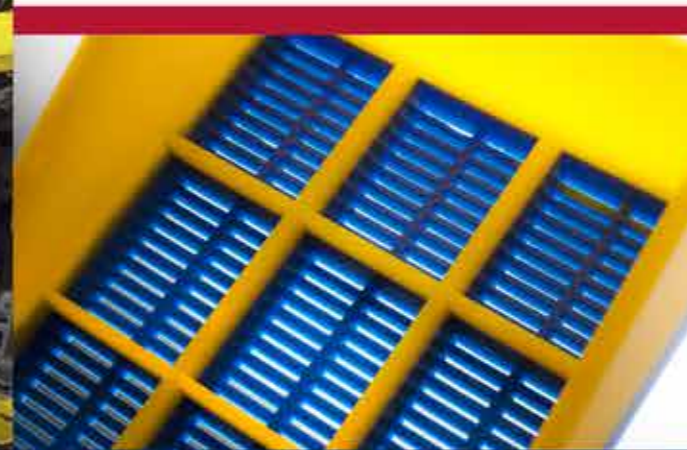
TECNOTHANE MDI polyurethane systems for the manufacture of **automotive elastomer parts** offer a very low compression set alongside very good elongation.

TYPICAL PHYSICAL PROPERTIES	Unit	Test method	Rubber	MDI MDE-PU				NDI foam	MDI foam
Hardness	ShA	DIN 53505	65	75	Density	Kg/m3	ASTM D3574 A	600	590
Modulus 100%	MPa	Type S2	2,5	6,0	Tensile strength	MPa	ASTM D3574 E	6,5	4,0
Modulus 300%	MPa		11,0	16,0					
Tensile strength	MPa		17,0	50,0	Elongation	%	ASTM D3574 E	400	550
Elongation	%		400	590					
Tear resistance	DIE B/a, KN/m	DIN ISO 34-1	30	65	Tear resistance	KN/m %	ASTM D3574 F	18,0	21,0
Tear resistance	DIE B/b, KN/m		40	55					
Compression set	23h/70°C,%	DIN ISO 815	25	16	Compres. set	%	ASTM D3574 D	5,5	7,5
Rebound resilience	%	ISO 4662	50	52	WORD WIDE BEST REF.				
Abrasion resistance	mg mm3	DIN ISO 4649	125 112	28 22					

★ Disclaimer about data and materials, see back cover.



TECNOTHANE MINING EQUIPMENT



TYPICAL PHYSICAL PROPERTIES	Unit	Test method	TDI - MBOCA	MDI MPC PU	MDI SWP PU
Hardness	ShA	DIN 53505	85	85	85
Modulus 100%	MPa	DIN 53504	5,0	6,0	11,5
Modulus 300%	MPa		12,0	12,0	26,0
Tensile strength	MPa		48,0	52,0	41,0
Elongation	%		520	460	400
Tear resistance	DIE B/a, KN/m	DIN ISO 34-1	70	75	98
Tear resistance	DIE C, KN/m		65	80	93
Compression set	23h/70°C,%	DIN ISO 815	25	17	25
Rebound resilience	%	ISO 4662	60	65	40
Abrasion resistance	mg	DIN ISO 4649	50	30	20

★ Test on Wheel 85x70mm PU Layering. Disclaimer about data and materials, see back cover.

TECNOTHANE MDI polyurethane systems for **mining equipment** projects are a rugged solution that offers very good abrasion and tear resistance.

TYPICAL PHYSICAL PROPERTIES	Unit	Test method	TDI MBOCA	MDI MPC 2013G	TDI MBOCA	MDI MPC 2013G
Hardness	ShA	DIN 53505	80	80	95	95
Modulus 100%	MPa	DIN 53504	4,7	4,5	13,5	12
Modulus 300%	MPa		10	9,5	29,0	30
Tensile strength	MPa		45,2	51,0	51,0	55,0
Elongation	%		520	470	375	440
Tear resistance	DIE B/a, KN/m	DIN ISO 34-1	65	70	70	110
Tear resistance	DIE C, KN/m		55	75	75	100
Compression set	23h/70°C,%	DIN ISO 815	22	14	27	20
Rebound resilience	%	ISO 4662	50	60	50	60
Abrasion resistance	mg	DIN ISO 4649	50	32	75	35

CHEMICAL RESISTANCE	TDI MBOCA	MDI MPC 2013 G
Water	++	++
Steam	+	+
Weak acid	+	+
Strong acid	-	-
Bases	-	-
Oils	+	++
Solvents	+	+

★ Disclaimer about data and materials, see back cover.

TECNOTHANE SEALS



TECNOTHANE MDI polyurethane systems for **seals** offer a low compression set alongside very good tear, hydrolysis and oil resistance.

CASTECH

POLYURETHANE MACHINES



Technology and care are the watchwords with which we build our CASTECH polyurethane machines.

Offering the highest levels of accuracy and flexibility, our CASTECH machines are among the most advanced equipment options available for the efficient manufacture of elastomers.

- High output precision
- Mass flow meters on board
- Shot casting guaranteed
- Accurate mixing ratio
- A complete set of options
- 100% stainless steel finish
- A fully integrated software package for complete control.

Our CASTECH machines can work with all types of isocyanates and chain extenders. The mixing head, made from a special alloy, is engineered to mix polyurethane materials perfectly without damaging the polymer chain.

Our CASTECH series machines can be tailor-made to customers' needs. Multiple components and options for the injection of additives, catalysts, colors and plasticizers recirculation are included on separate auxiliaries circuits. There are also multiple pumps for each single component.

Your best choice
for any kind of
polyurethane solution

synergies

CASTECH MACHINE	●	TECNOTHANE SYSTEMS
High quality technology	●	High quality polyurethane system
Precision and flexibility	●	Strong focus on and experience of MDI
Tailor-made solutions.	●	Tailor-made solutions.

Head mechanic transmission

- Reliability and good sealing even at high temperatures
- No periodic maintenance
- Low machine stop
- Pumps are completely interchangeable

Output

- A full pump set produced by HTE enables a wide output range
- From 250 gr/min up to 40 kg/min.

Components

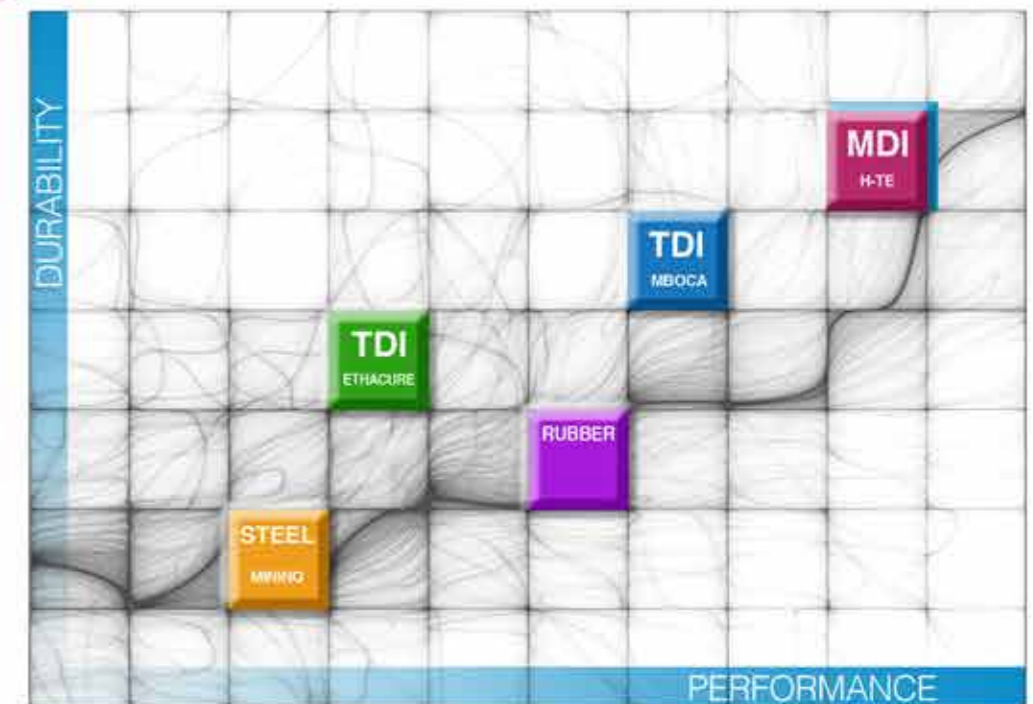
- From two to four with the possibility to add up to eight additives or colors.

Software

- Multiple set up possibilities for different materials to satisfy any needs.

Mixer

- A full mixer set can cover a wide speed (up to 8000/10000 rpm) and viscosity range.



The combination of CASTECH machines and TECNOTHANE MDI systems can result in high performance MDI high technology elastomers with long lasting durability.

CASTECH machines and TECNOTHANE MDI system are designed to work in harmony, enabling users to improve productivity and optimize costs.

With a global presence, HTE is able to supply a wide range of technical, high quality TECNOTHANE MDI systems and CASTECH machines to manufacturing locations worldwide.

LINTHANE

SPECIAL TPU

LINTHANE TPU is a high performance series of thermoplastic materials. The range is fully flexible and can be personalized to satisfy different processing parameters and meet specific performance characteristics

From seals and gears to technical parts, robotic components and high wear protection elements – think LINTHANE TPU.



HUNTSMAN

Enriching lives through innovation

TECNOELASTOMERI

Engineering Urethane Elastomers

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Products may be toxic and require special precautions in handling.

The user should obtain

Safety Data Sheets from Huntsman Polyurethanes containing detailed information on toxicity, together with proper shipping, handling and storage procedures, and should comply with all applicable safety and environmental standards. Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent on the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

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FONDO ARGENTO METALLIZZATO
SENZA TESTI