Polymers in Action

Sustainable polymers

At Distrupol, we recognise the importance of acting responsibly, safely and with integrity, in order to contribute to a sustainable future.

In our industry, we all need polymer solutions that are sustainable and safe. This means reduced emissions, a reduced impact on the environment (including oceans), reduced polymer waste and improved recyclability and reusability.

Making plastics a part of a sustainable future is a collaborative effort. As leaders and experts in our industry, we recognise the responsibility we have to continue to drive sustainability efforts and work with suppliers, customers and other organisations to support the safe and responsible use of plastics in 2020 and beyond.

Distrupol is proud to partner with a range of supply partners who develop and incorporate recycled, renewably-sourced and sustainable polymer materials into their portfolios. These include, but are not limited to, DuPont™, Chi Mei, INEOS, Hexpol, Biffa® Polymers and H. J. Enthoven.

Terminology

What it all means

Recycled polymers are not all part of the same group and are classified differently depending on the feedstock used to generate them. The waste used to produce recycled polymers could have started life as a plastic item collected from the household waste bin, industrial sources or something in between. Here are a just a few of the terms used for the recycled feedstock:

For full details on classifications, please refer to ISO 15270:2008.

Post-Consumer Recyclate

In some respects, this is the perfect waste stream as it is usually the main contributor for littering and ocean waste. Consumer waste could be a piece of plastic packaging that has been purchased, used and discarded into the household bin.

Post-Industrial Recyclate

Industrial waste can be based on sprues and runners that are re-chipped, or new polymer that is produced and considered ‘out of specification’. This waste stream has not been touched by the consumer and is generated by industrial environments.

Pre-Consumer Recyclate

This can be generated in an industrial environment, but unlike a sprue and runner, the waste cannot be used again in its original application due to risks of contamination. This waste stream is often generated by medical or food manufacturers.

Terminology

What it all means

Biodegradable

A polymer that is designed to break down from natural elements; sunlight, water or living organisms in soil. Note that this on its own does not mean that what remains at the end of the process is ‘good’ for the planet.

Degradable

Not as common as biodegradable, but degradable describes a breakdown process that relies on a chemical reaction to kick off the process, rather than a natural element starting degradation. The final end product may be toxic.

Home Compostable

Usually combined with biodegradable and, together, the two provide the ultimate solution. The end product after biodegradation can be used as compost, proving the end product is not toxic. Note that home composting needs a specific environment in order to occur.

Renewably Sourced

A polymer where the chemistry is normally based on chemicals that sourced from plants rather than crude oil. Plants are renewable, where as crude oil resources are depleting. Note that not all renewable polymers are biodegradable.

Industrial Compostable

Completely different to home composting, industrial composting requires the manual input of heat and air to encourage degradation to take place.

What's your concern?

Tell us your plastic / eco concern and we'll find a solution.

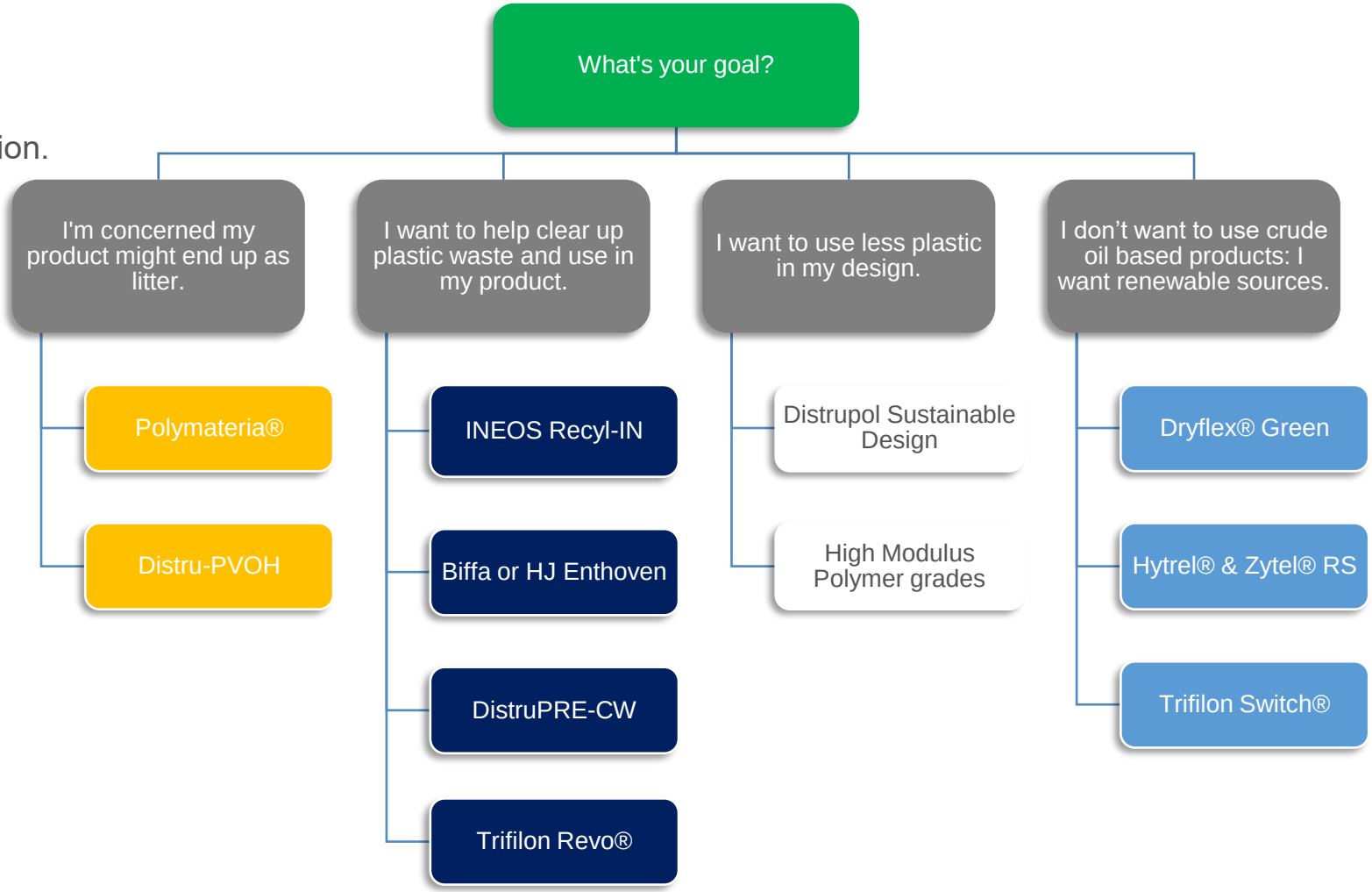
It is important to understand your sustainable target and what you really want to achieve. This can be based on many factors, including:

- What your customers are demanding
- Where the product could end up at end-of-life
- Taxes you need to avoid on single-use plastics
- Your company's mission statement on sustainability

It can be very difficult to navigate a project whilst prioritising sustainability in an efficient and effective way. It is important to avoid making choices (for example material choices) without fully understanding the effects this may have on manufacturing, packaging, labelling, recycling or commercialisation.

An example is to move away from a perfectly recyclable polypropylene to a new renewable technology that cannot be recycled due to its unique chemistry.

Here at Distrupol, we can advise you on the best approach.



Ineos Recycl-IN®

Post- and pre-consumer waste polyolefins

INEOS Polyolefins is a leading manufacturer of polypropylene and polyethylene based products across the world. In recent times, and understanding their sustainable responsibilities, INEOS - in partnership with Viridor™ - has launched a new range of post and pre-consumer waste polypropylene and polyethylene products. These two leading brands coming together ensure that the quality levels of such products are assured.

- Injection, blow moulding and extrusion grades available
- Natural grades also available (which is unique)
- Tight tolerances on flow rates
- Polypropylene homo- and copolymer grades
- HDPE, LDPE and hybrid polyethylene grades available
- Suitable for many applications (not food)

By using post- and pre-consumer waste feedstock, INEOS is helping reduce waste going to landfill and potential littering scenarios.

Ineos Recycl-IN ®

Post- and pre-consumer waste polyolefins

Please note that Ineos Recycl-IN is extremely new with a constantly expanding portfolio of recycled products. The grades to the right are just a snapshot of the products available at the time of publishing this document.

Please contact Distrupol for other grade options.

Grade	Chemistry	MFR:190°C / 2.16kg (g/10min)	MFR: 230°C / 2.16kg (g/10min)	Density (kg/m²)	PCR Content (%)	Colour
rHD5402	rHDPE	0.2	-	954	50	Natural
rHD5620BK	rHDPE	1.8	-	956	50	Black
rHD5402GY1	rHDPE	0.25	-	970	50	Dark Grey
rLL9110	rLLDPE	1.3	-	914	60	Natural
rPP4015GY2	rPP	-	15	-	65	Light Grey
rPP1015GY1	rPP	-	15	-	50	Dark Grey

INEOS High Modulus

High modulus grades = less plastic

INEOS Polyolefins, a world class manufacturer of polypropylene and polyethylene thermoplastics, has introduced a new series of polypropylene grades which can help to reduce the amount of plastic designed into your injection moulded product.

Utilising a specialised catalyst developed by INEOS, a selection of grades have been put together which offer a 30% increase in rigidity. This means you can make your part 30% thinner and gain the advantage of less plastic per part.

But that is not the only advantage: INEOS has also considered the negative sides of thinner wall sections which could result in filling issues during injection moulding. Therefore, INEOS has created high fluidity solutions with melt flows of up to 100 grams/ 10 minutes.

See the following page for product details.

Take a simple plastic paint pot - rather than design the wall section at 1.5mm, make it ~30% thinner and use 30% less plastic per item using the INEOS high modulus grades

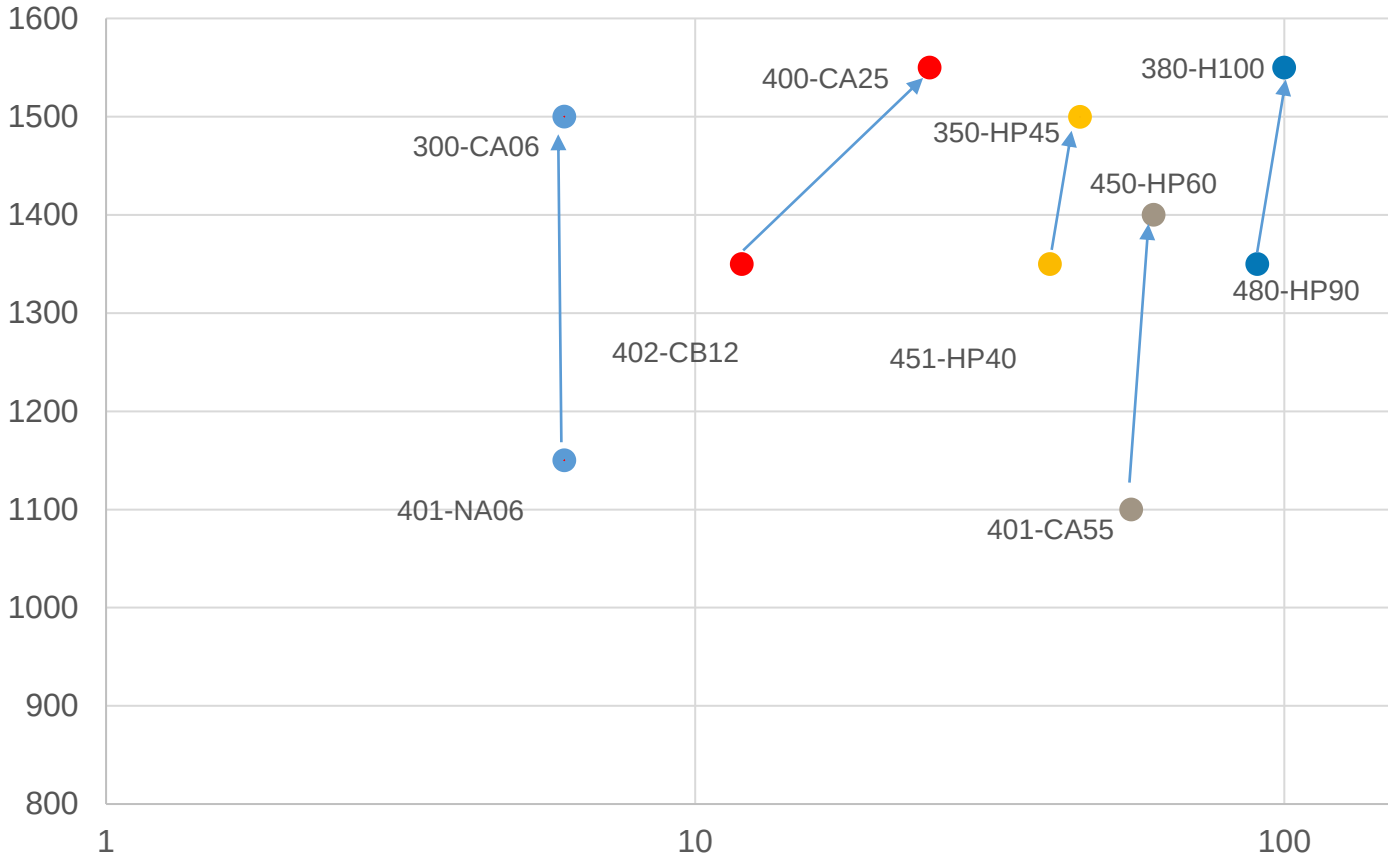
INEOS High Modulus

High modulus grades = less plastic

The chart to the right compares the legacy INEOS grade to the new high modulus and high flow offering. These significant increases allow the designer to optimise their design without compromising the processing window at the same time.

- Higher modulus
- Higher flow
- Some grades feature phthalate-free catalyst technology
- Organoleptic in some cases

Contact Distrupol for more details.



INEOS High Modulus

High modulus grades = less plastic

INEOS offer a wide range of high modulus grades and we are certain we can assist you to find the perfect product.

Contact Distrupol for grade selection advice.

Grade	Chemistry	MFR: 230 °C / 2.16kg (g/10min)	Flexural Modulus (MPa)	Izod Notched Impact Strength, -20 °C (kJ/m²)
INEOS PP 300-CA06	PP Impact Copolymer	6.0	1500	5.0
INEOS PP 400-CA25	PP Impact Copolymer	25	1550	4.5
Rigidex P 350-HP45	PP Impact Copolymer	45	1500	4.0
Rigidex P 450-HP60	PP Impact Copolymer	60	1400	4.2
Rigidex P 380-H100	PP Impact Copolymer	100	1550	4.2
Rigidex P 480-HP90	PP Impact Copolymer	90	1350	4.2

Biffa Polymers

Post-consumer waste polyolefins

Biffa is the UK's leading sustainable waste management company, collecting waste and recycling from millions of homes and businesses across the country. The waste is then taken to sorting centres where materials of value are identified and sorted for recycling.

Biffa offer back to the polymer market extremely high quality, true post consumer waste granulates ready for moulding again into suitable products

- Injection mouldable polypropylene in black
- Blow mouldable HDPE food grade in natural
- Blow mouldable HDPE non-food grade in black
- High purity levels

In the UK, Biffa are one of the most well known household waste collection companies.

Biffa Polymers

Post-consumer waste polyolefins

Recycling a wide range of plastics in PP and PE, Biffa Polymers is able to produce highly-specified recycled compounds.

The grades to the right are just some of the products available to you.

Please contact Distrupol for further grade options.

Grade	Chemistry	MFR: 190 °C / 2.16kg (g/10min)	MFR: 230 °C / 2.16kg (g/10min)	Density (g/cm³)	Colour
r-HDPE Food Grade	HDPE	0.50 to 0.70	-	0.950 to 0.964	Natural
r-HDPE Injection Grade	HDPE	5.0 to 7.0	-	0.950	Black
r-HDPE Tech Grade	HDPE	0.50 to 0.70	-	0.950 to 0.964	Natural
r-PP Black Hi Melt	PP	-	10 to 15	0.900	Black
r-PP Natural	PP	-	8.0	0.940	Natural

DISTRUPOL℠

Sustainable Polymers

Polymers in Action

HJ Enthoven & Sons

Post consumer waste polypropylene

The HJ Enthoven & Sons business is built around the recycling of old car batteries. The business has recycled 80,000 tonnes of lead captured from the redundant cells. In addition, HJ Enthoven & Sons also recycles the polypropylene plastic case which guarantees quality due to the single source of post-consumer waste polypropylene.

- Injection mouldable polypropylene in black
- Best-in-class tolerances on melt flow rates
- ISO 14001 accredited company
- Uses include industrial products, industrial plastic pallets, building products and much more

Rest assured, HJ Enthoven are ensuring your redundant car battery doesn't go to waste.

Find us on LinkedIn

Contact us today for further information.
info@distrupol.com | www.distrupol.com

DESIGN DEVELOP DELIVER

HJ Enthoven & Sons

Post-consumer waste polypropylene

With three core recycled polypropylene products to offer, we are sure we can help you find the perfect product.

Contact Distrupol for expert guidance regarding grade selection.

Grade	Chemistry	MFR (g/10min)	Density (g/cm³)	Tensile Stress – Yield (MPa)	Izod Notched Impact Strength (kJ/m²)	Colour
Enthoven Recycled PPC HM/A Black 4260	PP Copolymer	14 to 19	0.90 to 0.91	20 to 25	> 5.0	Black
Enthoven Recycled PPC M Black 4250	PP Copolymer	5.0 to 14	0.90 to 0.91	20 to 25	> 5.0	Black
Enthoven Recycled PPC PPXX/HMA 4290	PP Copolymer	30 to 38	0.90 to 0.91	20 to 25	> 5.0	Black

DistPre-CW® GT6535

Pre-consumer waste polypropylene

Pre-CW is an innovative product from Distrupol. Tapping into pre-consumer waste sources across Europe, Distrupol has been working with providers of the waste generated from contact lens production.

This process relies on injection moulding a polypropylene mould (better known as a former) that has a concave inner shape to it. To produce a lens, a drop of silica hydrogel liquid is dropped into the former, which then cures, is released and packaged ready for the market. The mould is now unusable in its original format due to potential contamination. *See the image to the right which gives provides a graphical demonstration.*

It is this waste that is enhanced and converted back into granules, ready for moulding into the next product.

- Extremely high purity and cleanliness – best-in-class
- Traceable back to manufacturers' data sheets
- Classified as 'Pre-Consumer Waste'
- Injection moulding grades

Dryflex® Sustainable

Recycled or renewable elastomers

Hexpol TPE is a global player in TPE compound technologies, with elastomers based mainly on SEBS and SBS chemistries (commonly known as TPE). Dryflex® is one of the most versatile products in the Distrupol portfolio with a variety of shore hardnesses, colours and custom grade options.

In addition, Hexpol TPE offers a large range of sustainable solutions with renewable, post-consumer and industrial waste product streams.

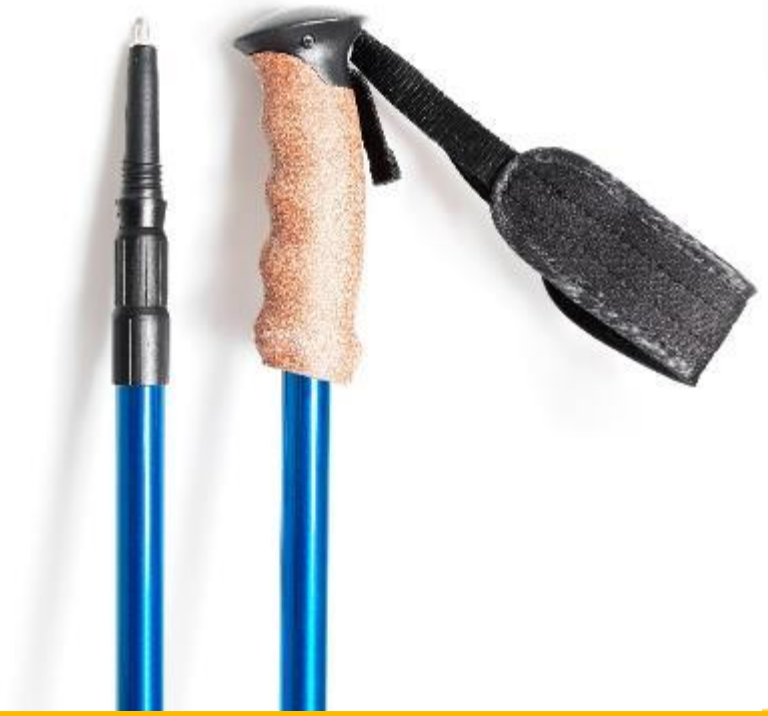
- Dryflex Green – renewably sourced
- Lifocork® - highly unique, cork-filled TPE
- Dryflex Circular - based on pre-consumer waste and post-industrial waste ingredients
- Variety of shore hardnesses

People who enjoy outdoor activities don't want their products to impact the areas they enjoy.

Grips on mountain walking poles can be 'green' by using recycled elastomers.

Lifocork®

Lifocork, with its renewable cork content, is often used for hand grips on Nordic walking poles due to its natural look and comfortable feel.



Dryflex® Circular

Screwdrivers and other hand tools with comfortable grips can benefit from Dryflex PCR or PIR. A simple polymer grade decision can make a product sustainable.

Dryflex® Green

Dryflex Green, based on renewable feedstock, provides many natural colour options and can be used as the comfortable grip feature on over-moulded items like toothbrushes.

Dryflex® Sustainable

Lifocork®, PCR/PIR and green products

Dryflex® Circular is a portfolio of TPE materials featuring recycled content. This range is split into PCR and PIR.

Dryflex Green is a family of biobased thermoplastic elastomer (TPE) compounds containing raw materials from renewable resources.

Lifocork® combines natural cork with thermoplastic raw materials.

The grades to the right are just an outline of what Distrupol can offer from all three Dryflex series.

Grade	Chemistry	Shore Hardness (Shore A)	Compression Set (23°C, 22hr) (%)	Recycled Content (%)	Bio-based Content (%)
Dryflex PCR 50A141B U	PCR	50	17	14	-
Dryflex PIR 93A621N U	PIR	93	-	62	-
Dryflex SE 80A28G1N A	Bio Based	80	51	-	28
Dryflex SC70A63G1N A	Bio Based	70	66	-	63
Dryflex SC 60A82G1N A	Bio Based	60	42	-	82
Lifocork TV 751014	Cork Based	75	-	-	-
Lifocork TO 951000	Cork Based	95	-	-	-

Polymateria®

Land based biodegradation additive

Unfortunately, littering, fly-tipping and irresponsible waste disposal are common in today's society. Whether this is due to human behaviours or waste escaping our collection systems (fugitive plastic), the problem is serious and there is not yet a complete solution.

However, Polymateria provides a solution for certain plastic litter with its patented biotransformation process. Polymateria is an additive that you can add to polypropylene and certain polyethylene based products. Using a specialised time delay system, it lies dormant in the plastic product until it becomes litter and is exposed to sunshine, microbes and enzymes found in soil. In this specific environment, biotransformation will take place, breaking the product down into a wax, and then into water, biomass and CO^2. No microplastics are created during this unique process, unlike other oxo-degradation systems.

The following page explains the process in more detail.

Polymateria®

The land based litter solution

Polymateria® is a revolutionary time delayed additive that can be added to Polypropylene and most polyethylene material groups, that can trigger biodegradation in a land and sunlight exposed environment. The product is also tuneable, in terms of the time delay to any reaction potentially happening

Start
A plastic item (this cup for example) is in the shop, waiting to be purchased. The additive is completely dormant and does not compromise the product performance.

Fact
Polymateria is a land and sun activated additive. It will not work if the littered item is in an ocean, river, other water source or in the dark (landfill).

Land Litter v Polymateria
Unfortunately, plastic items like this cup are discarded as litter. This is where our additive kicks into action, as the cup will be exposed to sunlight which triggers the biotransformation process.

Biotransformation
Over time, microbes and enzymes found in soil will begin to digest the plastic item, initially converting the cup to a wax-like substance. This product does not create microplastics.

Complete Biodegradation
Polymateria leaves zero microplastics, unlike oxo-degradation systems. The only outputs from the process are natural elements:

CO^2 Water Biomass

Trifilon®

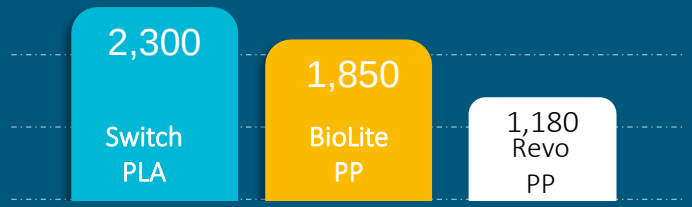
Hemp-filled PLA, PP or rPP

Trifilon® has a pioneering new portfolio of polymer grades filled with the fibre waste generated from medicinal cannabis cultivation. Grades can be based on virgin or recycled polypropylene, as well as PLA.

Trifilon therefore offers both renewably sourced and recycled content products. Depending on your sustainability goals, these grades can bring:

- Increased rigidity and a lower density through reinforcement
- Unique organic look with a unique texture
- High renewably sourced contents

Flexural Modulus (MPa) of the various Trifilon grade options



Trifilon offers a unique and spectacular organic look with the hemp fibres coming to the surface of the polymer.

Find us on LinkedIn

Contact us today for further information.
info@distrupol.com | www.distrupol.com

Trifilon®

Hemp-filled PLA, PP or rPP

The uses for Trifilon® are endless and designers look to this innovative polymer for its unique texture and instantly recognisable organic appearance.

When designing a new sustainable product, there is sometimes a requirement for the polymer itself to appear different and more 'natural looking'. Trifilon achieves this easily and can be used in many applications, including:

- Suitcases
- Chairs
- Mobile phone covers
- Cutlery and dinnerware
- Any injection moulded item

The organic look can also be complimented with colour, adding light shades of white or brown so the hemp filler is not hidden.

This product needs to be seen and felt to be truly appreciated. Contact Distrupol for your free sample.

Single Piece Chair
Trifilon hemp-filled
Polypropylene or PLA

Trifilon®

Bio-based products

Trifilon offers a wide range of products (suitable for extrusion or injection moulding) containing bio-composite materials including hemp fibres and starch, as well as post-industrial waste.

The grades to the right are just a preview of what we have to offer.

Please contact Distrupol for other grade options.

Grade	Family	MFR (g/10min)	Tensile Modulus (MPa)	Recycled Content	Compostable
Biolite 1	Standard	6-13	1550	-	-
Biolite 4	Impact	5-12	1060	-	-
Biolite 13	Stiff	8	2232	-	-
Biolite 17	Flow	20-27	1400	-	-
Revo38	Standard	16-23	1430	✓	-
Revo35	Impact	12-19	1180	✓	-
Switch 19	Stiff	32-39	3480	-	-
Switch 25	Impact	20-27	2300	-	-
Switch 10	Standard	0.5	3480	-	✓
Switch 11	Impact	0.6	2860	-	✓

Hytrel® RS

Renewably sourced elastomer

Hytrel® RS is a unique elastomer for injection moulding, extrusion and blow moulding. Most elastomers rely on plasticisers, which are oil-like substances, that provide softness and flexibility. The problem with plasticisers is that they can migrate out of the polymer over time, resulting in a loss of flexibility and part failure. Hytrel does not rely on plasticisers and instead relies on its unique chemistry to provide the flexibility and softness needed.

We sometimes think of sustainable polymers in more ‘basic’ applications, but Hytrel RS has been successfully used in some of the most demanding safety applications. To the right, we see a steering wheel air bag cover, which needs the appeal of a soft and tactile polymer when in standard use, but in the event of a collision, must not burst, tear or fragment under the extreme violence of an air bag deploying.

Hytrel RS can contain up to 60% renewably sourced monomer derived from non-food chain sourced starch (from biomass).

Hytrel® RS

Renewably sourced elastomer

With all the benefits of Hytrel®, DuPont™ offers four core products containing up to 60% renewably sourced materials from biomass, for applications demanding renewably sourced options.

Contact Distrupol for professional guidance on selecting the perfect grade.

Grade	Shore Hardness	Tensile Modulus (MPa)	Renewable Content (%)
Hytrel RS 40F3 NC010	40 D	45	50
Hytrel RS 40F5 NC010	40 D	45	-
Hytrel RS 63F5 NC010	63 D	280	22
Hytrel RS R8847 BK210	70 A	-	-

Hytrel® RS

How it is made

So what is the source of Hytrel® RS? Waste biproducts from the corn industry. With this waste, we can obtain starch, which is then synthesised into Hytrel RS via the following conversion process:

Corn Starch → Glucose → Glycerol → Propylene Glycol → **Hytrel RS**

As you would expect from a world-leading polymer manufacturer, DuPont™ has analysed the full CO^2 foot print to manufacture Hytrel RS and it is proven to be far less than the footprint associated with the petrochemical version of standard Hytrel.

Renewable

Oil supplies are reducing all the time. Plants can be grown again and again and that's why this product is sustainable.

CO^2 Footprint

Via close analysis, our CO^2 footprint has been confirmed to be less than using petrochemicals.

Waste Biomass

Food supplies are not jeopardised. Only the waste from the plant is utilised.

Properties

Even though it's based on plant sourced chemicals, properties remain the same as standard Hytrel.

Zytel® RS

Long chain polyamide solutions

Zytel® RS is another leading renewable and sustainable solution from DuPont™. Zytel is the first and leading brand of nylon; with RS (Renewably Sourced) being the latest addition to the DuPont family with unique PA10-10 and 6-10 chemistries. The properties are similar to other polyamide solutions like PA11 and PA12, providing innovative sustainable options when selecting your next polymer grade.

The starting point of our PA10-10 and 6-10 grades is the castor bean plant, which provides castor oil.

- Injection, extrusion and blow moulding grades
- Alternatives to PA11 and PA12
- Used in applications from automotive, oil & gas and much more
- Traditional applications like truck pneumatic hoses can use Zytel RS (main picture)
- Up to 100% renewable content depending on the grade

The spiral pneumatic hoses on trucks traditionally use PA12, but have been successfully replaced with Zytel RS.

Zytel® RS

How it is made

So what is the source of Zytel® RS? Waste biproducts from the corn industry. With this waste, we can obtain starch, which is then synthesised into Zytel RS via the following conversion process:

Castor Oil → Sebacic Acid → Diamin-odecane → **Zytel RS**

As you would expect from a world-leading polymer manufacturer, DuPont™ has analysed the full CO^2 foot print to manufacture Zytel RS and it is proven to be far less than the footprint associated with the petrochemical version of standard Zytel.

Renewable

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Properties

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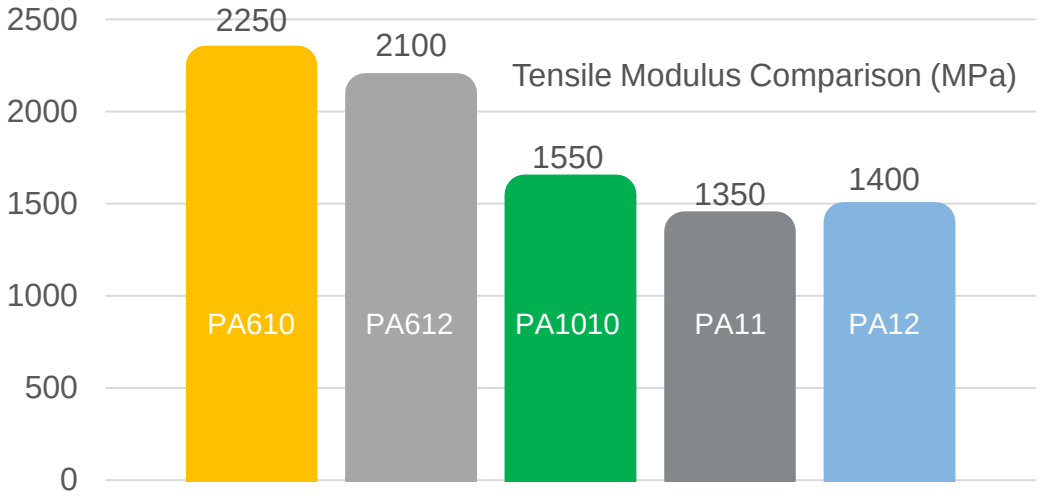
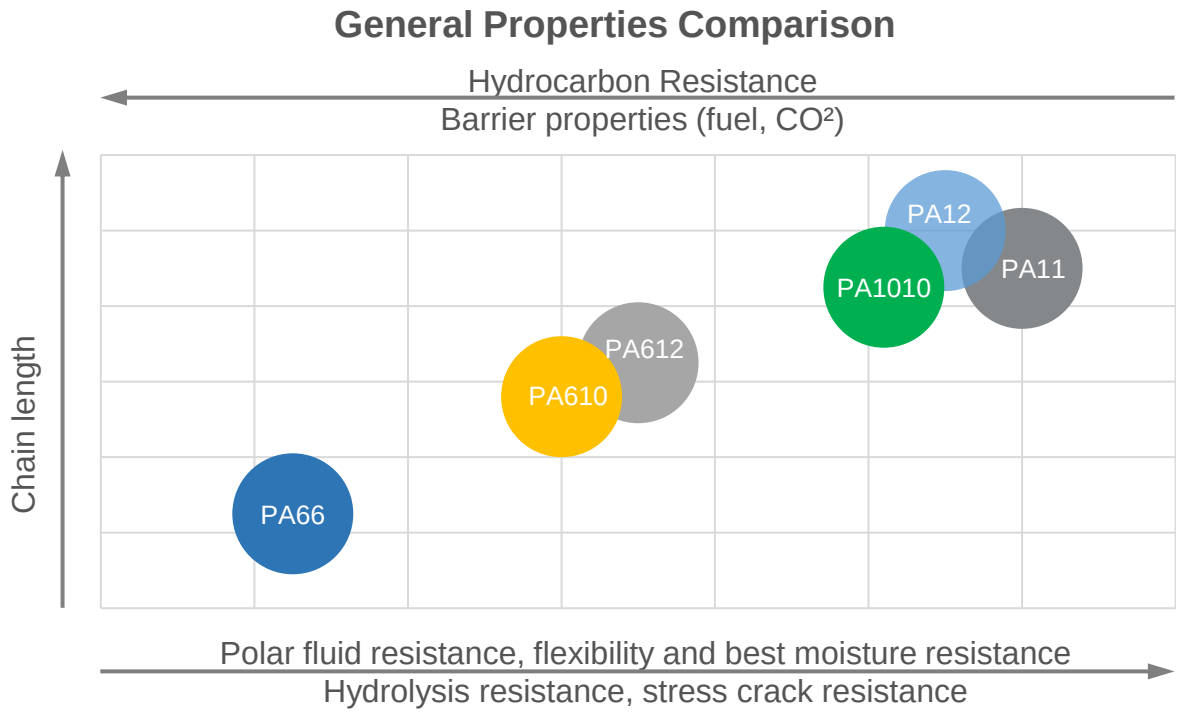
Zytel® RS

Comparison to PA11 and PA12



Comparing the tensile modulus, we can see that our Zytel RS10-10 is very close to the flexibility of traditional PA11 and PA12 products, but sustainable at the same time.



Comparing many features, we again see that Zytel RS PA10-10 bridges the gap between traditional polyamides and PA11 and 12 variants.

Zytel® RS

Long chain polyamide solutions

Another growing portfolio and here is just some of the grades we have to offer

Contact Distrupol for grade selection advice.

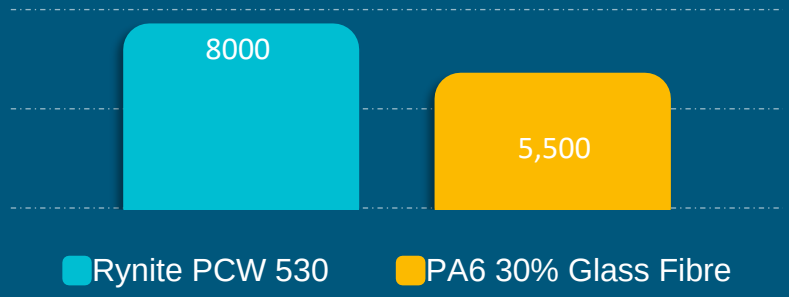
Grade	Chemistry	Tensile Modulus (MPa) Dry/ Conditioned	Description
Zytel RS LC1610 BK387	PA1010-HIP	790/570	Unreinforced, toughened, plasticised, and heat stabilised, biobased resin for extrusion.
Zytel RS LC3060 NC010	PA610	2000/1200	Unreinforced, medium viscosity, biobased resin developed for extrusion applications.
Zytel RS LC2600 BK043A	PA-IP	1150/660	Unreinforced, plasticised, high viscosity, biobased long chain polyamide resin developed for air brake tubes and fluid handling applications.
Zytel RS 78G33FHS BK083	PA610-GF33	10000/ -	33% glass reinforced, biobased, heat stabilised resin.
Zytel HTN59G55LWSF	PA*	~18000	55% glass reinforced, low warpage for IM.

Rynite® PCR530

PCR based PET 530 - 30% glass fibre

DuPont™ - a world-class, science driven company who pioneered many of the polymers we know today - now offer post-consumer waste products. Rynite® PCW530 is a new grade derived from plastic bottle waste that has been recycled and compounded with 30% glass fibre. In some cases, Rynite PCW 530 can replace traditional polyamide glass fibre filled components. The chart below shows the rigidity of Rynite versus PA6 30% GF (which is commonly used in such applications).

Rynite offers over 30% more rigidity vs. Polyamide 6 30% glass fibre grades



PVOH

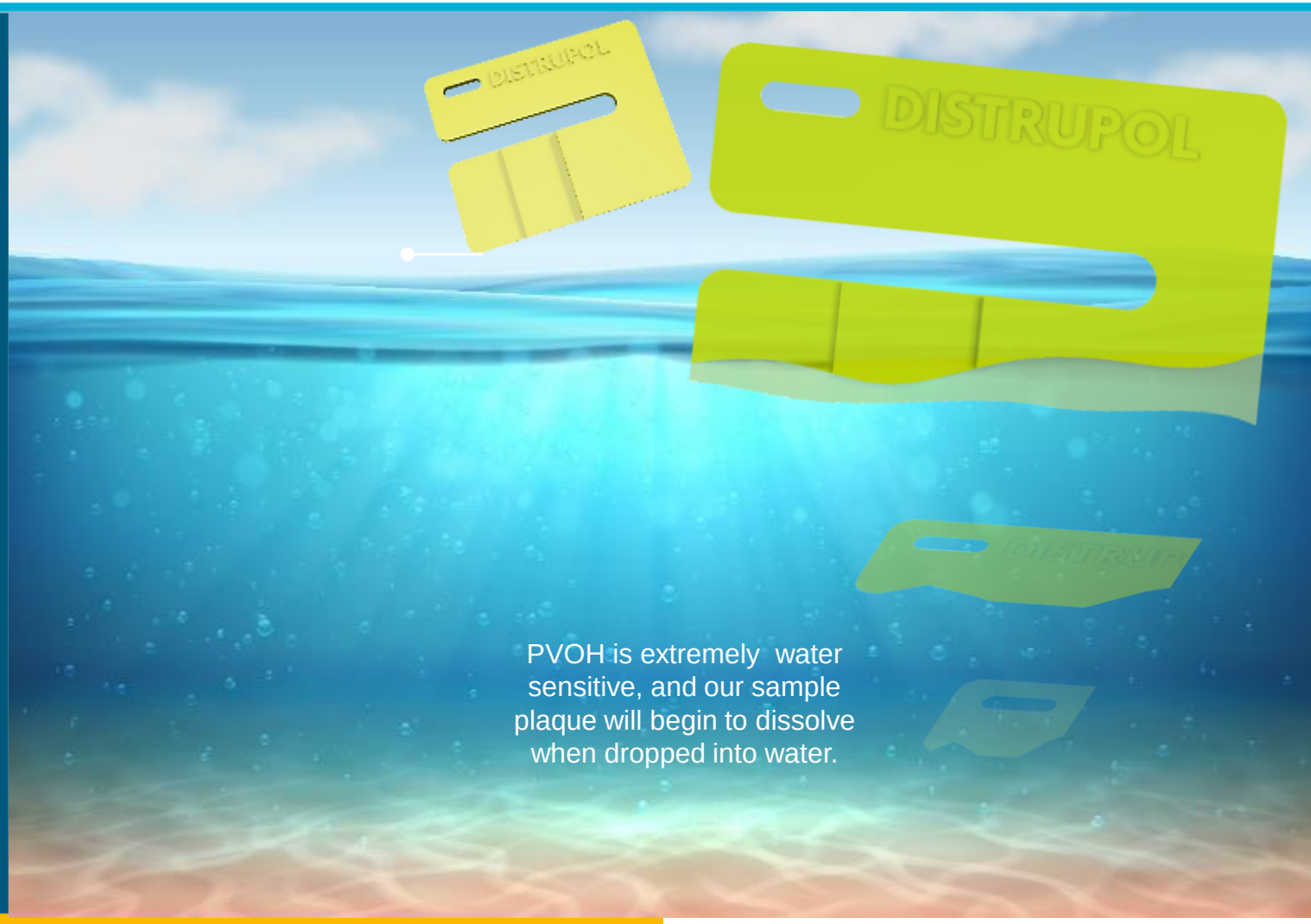
Water-soluble polymer

Distrupol is proud to introduce the most biodegradable polymer in the our portfolio – PVOH. PVOH is a polymer which is similar to LDPE or polypropylene in terms of rigidity, but has the ability to completely dissolve in water, not leaving behind any microplastics whatsoever. The only remaining items after biodegradation are:

- Water
- CO^2
- Biomass

PVOH is also highly tuneable and can be modified to either dissolve rapidly in cold water or slowly in warmer water. In addition, PVOH can be compounded with specialist additives such as pharmaceutical ingredients. There are many innovative opportunities with this material, as once the polymer dissolves another feature can be created.

The Distrupol PVOH plaques will instantly dissolve when put in contact with water, e.g. if discarded in the sea*.
**Please note we do not recommend doing this.*



PVOH is extremely water sensitive, and our sample plaque will begin to dissolve when dropped into water.

PVOH

The polymer that dissolves in water

See below just some of the novel ways in which PVOH has been utilised:

- PVOH has been used to replace gelatine in pharmaceutical drug capsules, thus removing the need for animal-based derivatives and biproducts. PVOH is non-toxic and will fully dissolve in the digestive system.
- PVOH is used in fishing bait deployment capsules. An injection moulded PVOH capsule that contains the bait is cast to the required location and then dissolves and releases the bait gradually.
- PVOH has also been used in standard applications, including, but not limited to, food and industrial applications such as blow moulded bottles, film packaging, seed encapsulation and injection moulded caps.

Gas Barrier
- PVOH has amazing gas barrier properties

Flexible or Rigid
- Tune for properties like LDPE to PP

Reinforce
- Increase rigidity with bio Hemp

Single-use Plastic
- The ultimate single use plastic

Compost-able
- PVOH will biodegrade and provide nutrients itself

Tune Your Dissolve
- Grades for slow dissolve only in hot water
- Grades for fast dissolve in cold water

Medicine Release
- Compound medicines into PVOH that release on dissolve

Chemical Release
- Compound chemicals into PVOH that release on dissolve

Fish Attractant
- Compound in fish attractants for fish bait products

Seed & Compost
- Add compost and seeds so if the product dissolves a plant is born and fed

DISTRUPOL℠

Sustainable Polymers
Polymers in Action

Delrin® CPE

A new generation in acetal chemistry

Delrin® is the strongest acetal on the market due to its patented homopolymer chemistry. No copolymer acetal can compete on mechanical strength due to the copolymer chemistry (which features micro-inconsistencies in the molecular structure that reduces its tensile and impact properties).

To increase the advantage, Delrin CPE, as opposed to standard Delrin, is the latest development from DuPont™ which pushes the homopolymer chemistry advantages even further. Delrin CPE will be the start point of the next generation of acetal grades from DuPont as we continue to push, develop and improve our product offering.

- Best-in-class for low emissions / low odour with CPE technology
- New enhanced processing with lower mould deposits
- Improved mechanicals versus other Delrin 11 series grades
- 20% higher tensile properties versus competing copolymer acetal technology
- Use its rigidity advantage to become sustainable, improving your eco credentials

The future is Delrin® CPE

Chemistry driven enhancements

Find us on LinkedIn

Contact us today for further information.
info@distrupol.com | www.distrupol.com

DESIGN DEVELOP DELIVER

Delrin® CPE

Homopolymer acetal - the difference

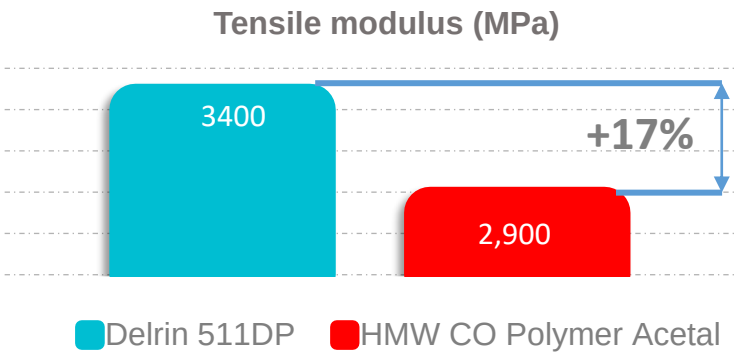
Comparing some of the mechanical data on the technical data sheets, we can pick out some easy examples which clearly indicate the Delrin® mechanical advantage provided by its pure homopolymer chemistry.

Comparing the tensile modulus, which is an indication of its rigidity, we can see in the chart to the top left that we have a distinct advantage. Use this increased stiffness to strengthen your designs or to simply use less plastic and be sustainable.

The chart to the bottom right also shows that even with a higher flow rate grade that is easier to process, we still offer higher impact strength, so use this for ease of processing and improved mechanical performance.

- Higher tensile and impact strength
- Higher tensile strength at yield / higher strain at yield

Why wouldn't you use Delrin acetal when you need mechanical performance?

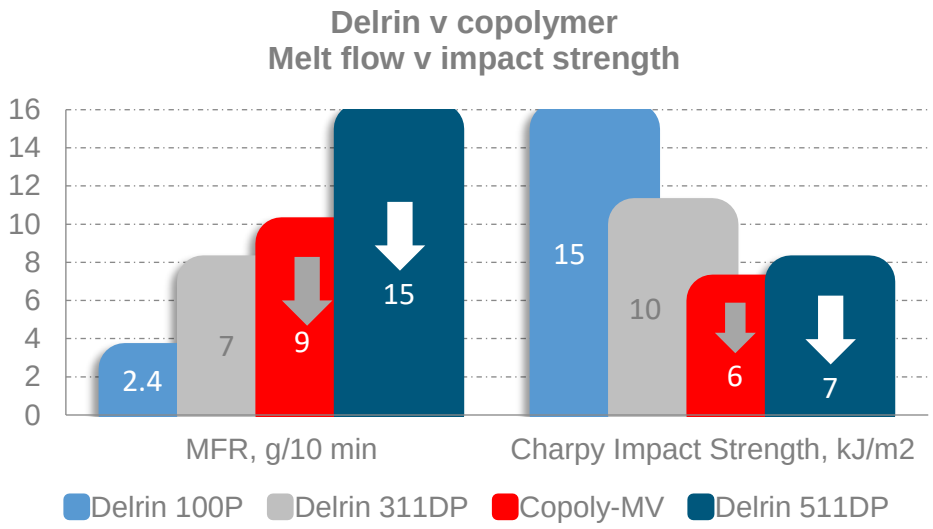


Tensile modulus
Delrin is stiffer and stronger than any other acetal on the market. Use this to your advantage:

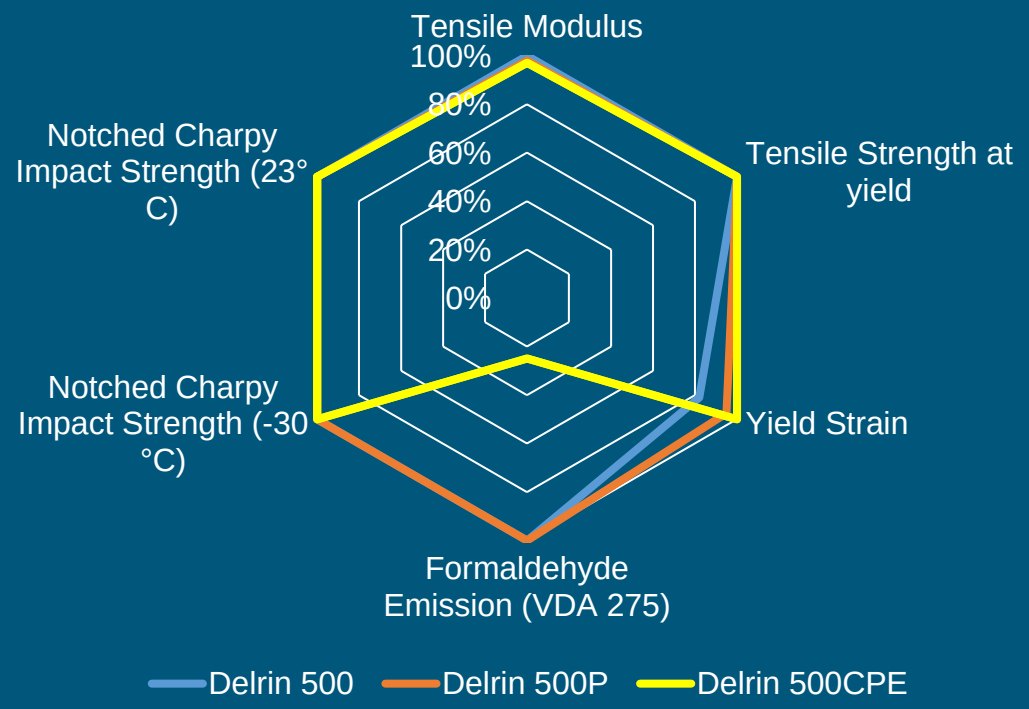
- Stronger parts
- Thinner parts
- Sustainable design

Flow versus impact
As a general rule, the higher the melt flow, the easier to process, but with generally reduced mechanical properties.

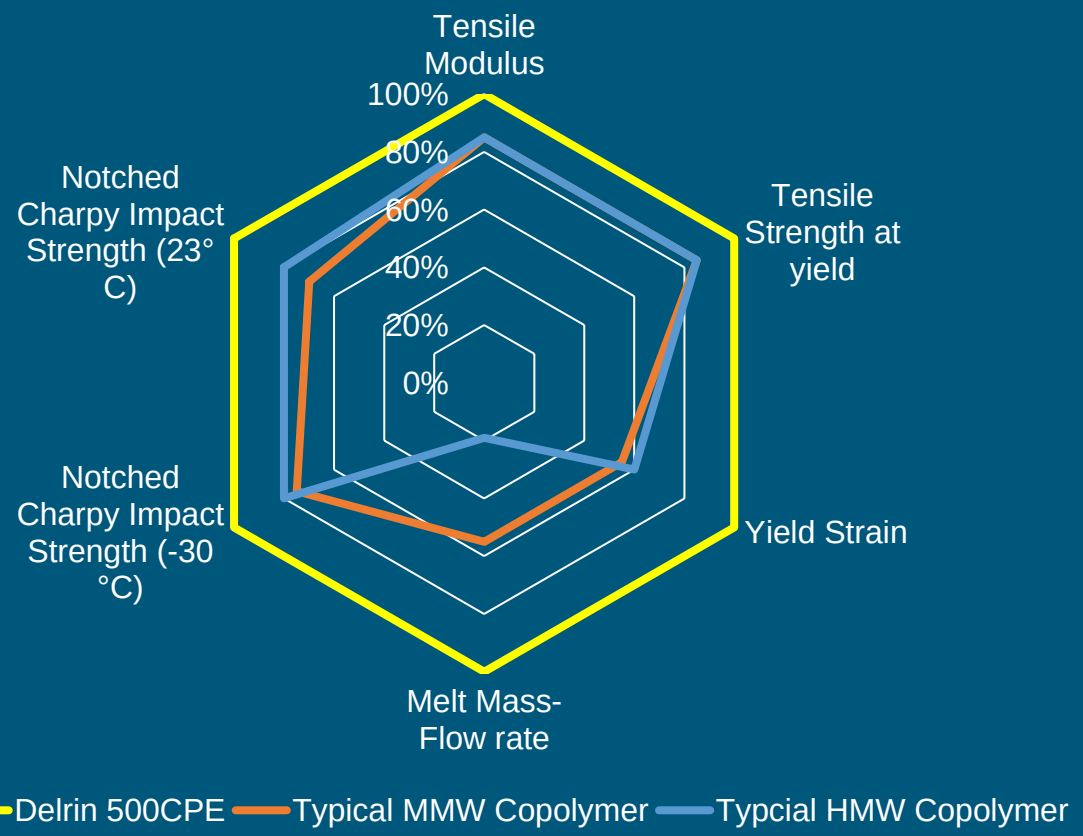
Delrin 511DP (dark blue bar) defies logic by offering 66% more flow properties than a melt 9 copolymer (red bar) and 16% better impact.



Delrin® CPE – the comparison



Comparing CPE technology with legacy Delrin grades, not only are we offering you the same market leading mechanical properties, but also massively reduced formaldehyde emissions and up to 65% improvements.



Comparing Delrin CPE technology with brand leading medium and high molecular weight copolymer grades, we still maintain our cutting edge performance, even with easier processing and higher melt flow grades. Ensure you use the mechanical advantage to become sustainable only with Delrin CPE.

Delrin® CPE

Homopolymer acetal - become sustainable

So what if we were to say Delrin® could save you money and processing time? By using the extra rigidity you get with Delrin acetal, you can 100% achieve this.

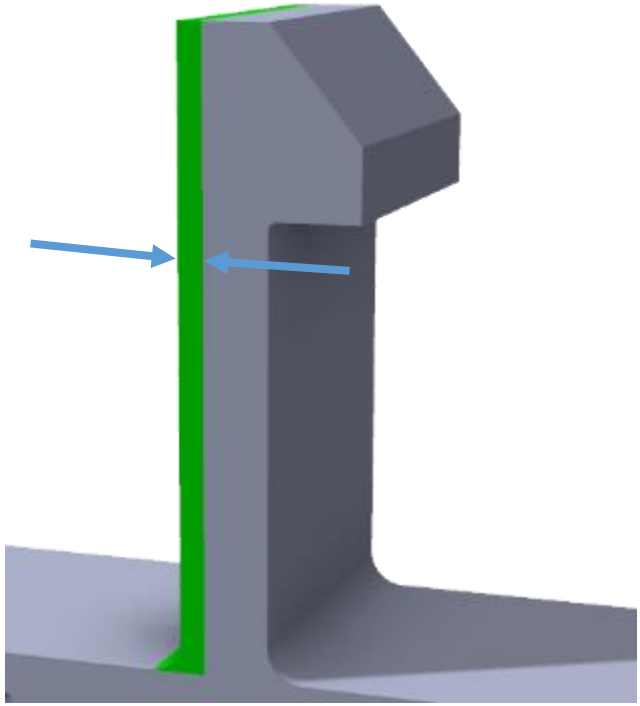
Take an example of a cantilever clip that works by deflecting backwards during fitment and relies on the material's natural spring energy to fire forwards and engage. In copolymer, to have a good positive spring back force you will always have to design the part thicker than Delrin, to have comparable spring back force. Furthermore, if you choose Delrin and design your clip thinner, for every 0.5mm of thickness saved, you should save on average, 4 seconds of hold pressure time.

So use Delrin to:

- Reduce your part weight
- Reduce your material spend
- Reduce your cycle times
- Increase your moulding time capacity
- Become sustainable through design

Copolymer acetal
Copolymer acetal is not as strong as Delrin, so you have to design copolymer acetal parts thicker to give the same spring forces.
This not only increases your part weight, but also your cycle time.

Delrin acetal
Save up to 20% in your part weight and your yearly material spend, just by designing your part thinner, using Delrin's mechanical advantage. Every 0.5mm of wall sections saved provides on average 4 seconds of cycle time saving.



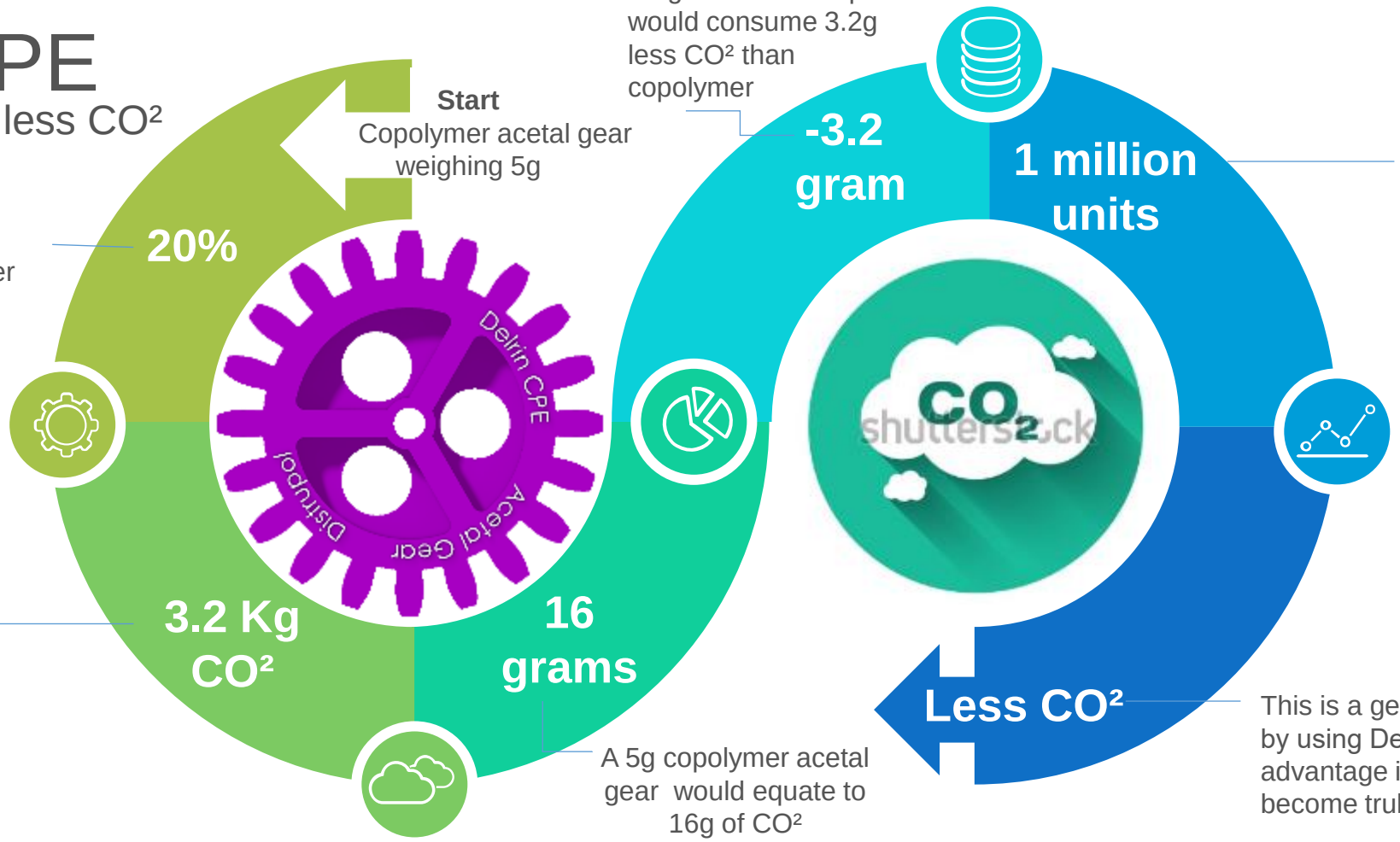
Delrin® CPE

20% less polymer = less CO^2

Using Delrin's mechanical advantage, a part has been 20% thinner than a copolymer acetal part. This part now weighs 4g.

Start
Copolymer acetal gear weighing 5g

A 4g Delrin acetal part would consume 3.2g less CO^2 than copolymer



Per 1 million units of acetal moulding made our 3.2g saving in CO^2 is the equivalent to:

- Charging a mobile phone 400,000 times
- Driving 7,800 miles in an average car

Data source: Ecoprofiles & www.epa.gov

Whether it's co- or homopolymer acetal, it has been calculated that for every kg of acetal made, 3.2kg of CO^2 is generated.
Source: PlasticsEurope2014

A 5g copolymer acetal gear would equate to 16g of CO^2

This is a genuine CO^2 saving by using Delrin's mechanical advantage in the design to become truly sustainable

Delrin® CPE

New CPE advantage for reduced emissions

CPE technology brings many benefits, but one of the most important jumps in molecular technology is the reduced emissions you'll experience only with Delrin® CPE. Every polymer has its own unique chemical scent, which is simply released volatiles from the polymer itself. It's the reason for the new car interior smell or even the smell when you first put on a motorbike safety helmet (which have polymer components in the construction).

Acetal components will be used in the helmet shown on the right for the pivot components to allow the face shield to raise. You'll also find acetal in the air vents that direct air to your nose and mouth and it's these components (and others) that will be releasing volatiles.

Delrin CPE reduces the volatile emissions by around 60%, which is a huge leap in emission technology. Now, when in an enclosed environment, the experience will become more natural, comfortable and only with Delrin CPE.

Air vents
Air vents have sliding features to increase or reduce the air flow and are usually constructed from acetal components. Use Delrin CPE to reduce volatiles.

Delrin CPE
Internal acetal components will act as bearings and sliding faces to raise the face shield. When closed, Delrin CPE will make the enclosed environment more natural due to reduced emissions.

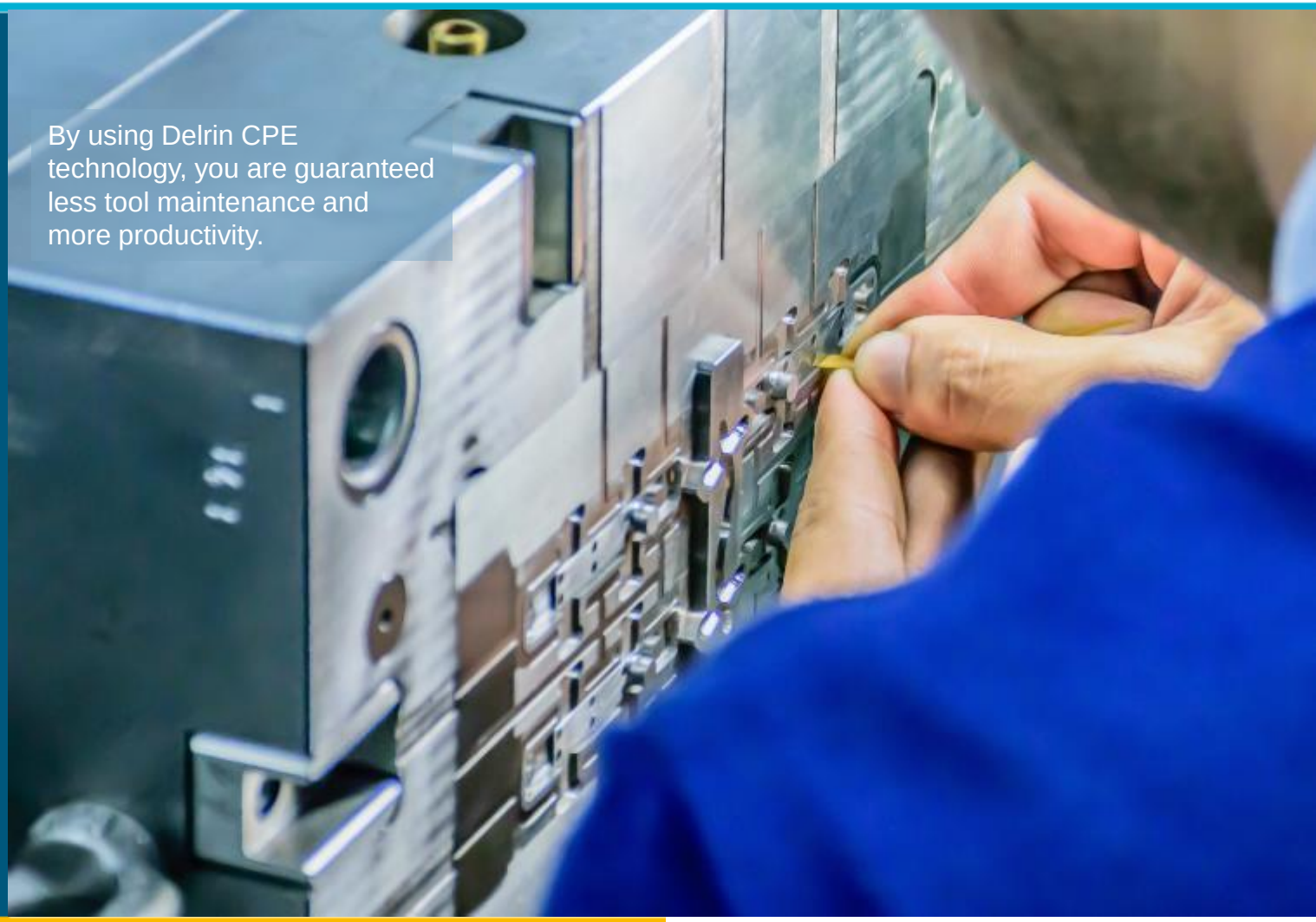
Delrin® CPE

New CPE Advantage - Lower Mould Deposits

It is natural, when moulding any acetal, to experience a build up of white deposits on the mould tool face. At a certain point, the moulder will need to plan to remove the mould tool from the press for preventative maintenance activities (i.e. cleaning).

With the new and improved Delrin® CPE, white deposits will become less of a problem as the new modifications at a molecular level massively reduces such problems. So now, you can run your mould tool for longer with less maintenance, less down time and much improved part quality.

Speak to Distrupol about sampling Delrin CPE and be part of the next generation of acetal technology.



By using Delrin CPE technology, you are guaranteed less tool maintenance and more productivity.

Delrin®CPE

Product catalogue

Extremely new and growing monthly, Delrin® CPE offers a focused grade slate from high molecular weight 100CPE to high modulus and easy to process 511CPE.

Please check with Distrupol for any particular grade you need as the slate offer may have increased from the time of publishing this document.

Grade	Description	MFR (g/10min)	Tensile Modulus (MPa)	Tensile Strain at Yield (%)	Charpy Notched Impact Strength, 30°C (kJ/m²)
Delrin 100 CPE	High molecular weight, highest mechanical properties of all	2.3	2900	28	13
Delrin 300 CPE	Low to medium molecular weight, excellent mechanicals	7	3100	25	10
Delrin 500 CPE	Ease of processing with good mechanicals	15	3100	18	8
Delrin 511 CPE	Ease of processing, fast cycle time, enhanced rigidity	14	3400	13	6.5

Compol™ 94

Industrial compostable solutions

Compol™ 94 is a hybrid, patented PLA with advanced temperature properties. The feature of heat distortion has been specifically focused on to help with items like takeaway coffee cup lids. Standard industrial compostable polymers do not always have the specific properties needed for temperatures of up to ~90°C. They tend to soften, resulting in the lid going floppy and popping off the cup itself. This can lead to accidents and burning injuries.

Compol 94's advantages include:

- High heat resistance versus standard PLA
- Industrially compostable via 6 month process in line with EN13432 compostability standard
- Ideal for items like coffee cup lids and other takeaway packaging
- Suitable for blown and cast film extrusion, cast sheet extrusion, injection moulding and vacuum forming

DISTRUPOL SM

Sustainable Polymers
Polymers in Action

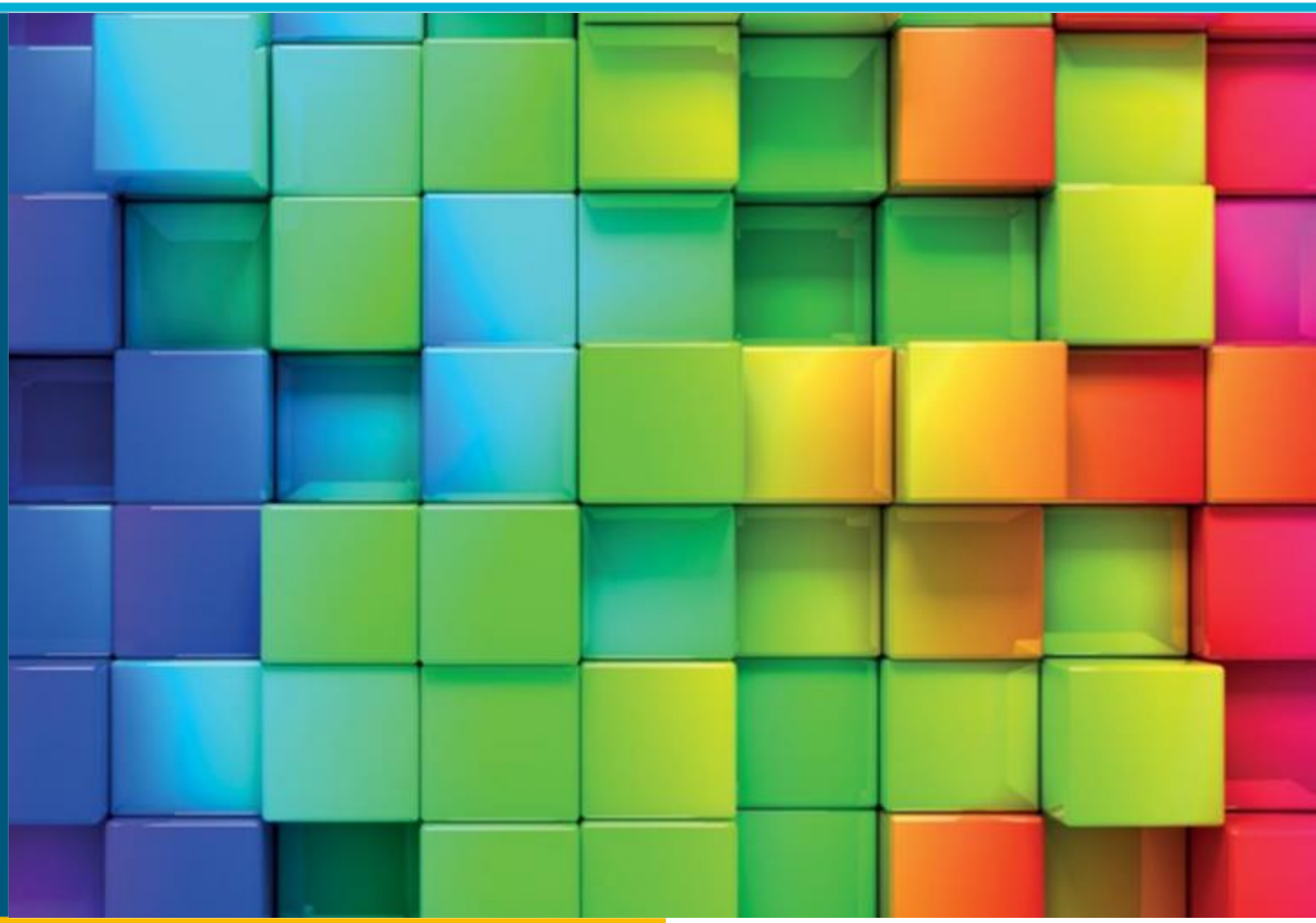
Colour Compounds

Distrupol Colour

One of the major advantages of thermoplastic materials is their ability to be coloured to a huge range of colours and shades. From the whites, blacks and greys of consumer electronics and business machines, to the bright reds, greens and blues that attract the eye and make products more appealing to prospective customers.

- 48 hours colour match service
- Sample material as low as 25kg
- LAB colour measurement control
- On site colour match service
- From 25kg to truckload supplies of colour
- Colour compounding on nearly all chemistries

If you want your office chair moulding in a particular colour, enhanced with anti-microbial properties or even with scents and fragrance adding, Distrupol can offer this compounding service.



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Technical Support

Design · Develop · Deliver

To support customers with their new development, Distrupol provides an engineering support package with time served and skilled engineers to help you with your project.

- Design support and advice
- Finite Element Analysis
- Moldex 3D® filling simulations
- Polymer selection services
- Troubleshooting support
- Fault identification via laboratory analysis
- Process optimisation
- Innovation
- Secondary operation advice
- Access to manufacturers' scientists for support backup

So challenge us with your new project and use the support package that we provide. We're sure you won't be disappointed.

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Contact us today for further information.
info@distrupol.com | www.distrupol.com

DESIGN DEVELOP DELIVER

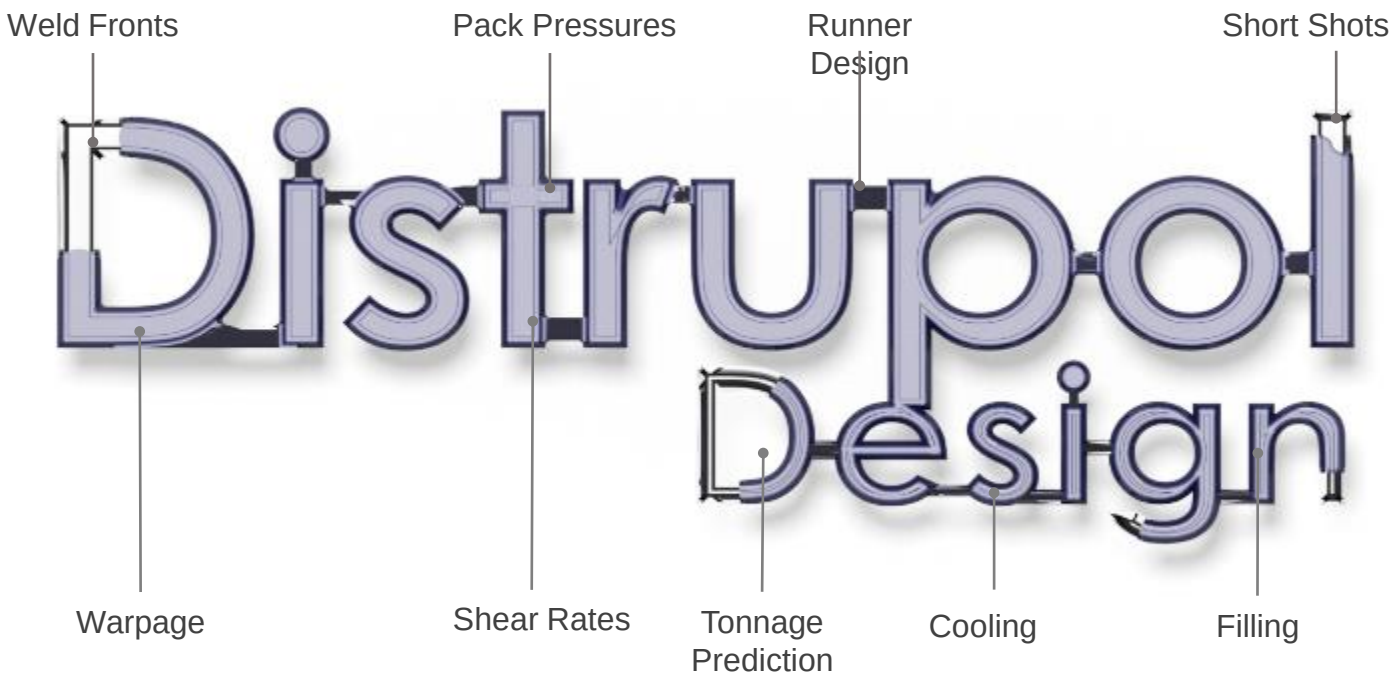
Technical Support

Design · Develop · Deliver

Moldex3D® is the latest investment from Distrupol to provide customers with the ultimate technical support service. This simulation software enables us to assist you at the concept stages of your 3D design, to ensure it is optimised to fill with the chosen polymer without the known problems that can come with injection mouldings. Issues and questions such as:

- Will the part fill?
- Are the fill pressures within your machine's capabilities?
- Any warpage challenges?
- Are there focus points for additional cooling?
- Any potential for sink marks?
- Will the polymer be damaged due to shear?
- Any designed wall sections too thin to fill?
- …and much more!

Involve us at the early stages and we can help ensure you get it right, first time.



Complete Portfolio

From Polyethylene to PEEK

As well as the products mentioned, we also offer 4,000 other polymer grades to cater for all markets and industries, with local warehousing in all Distrupol regions. Contact your local sales or technical representative to find out more.

Delrin® POM	Zytel® PA6 & 66	Crastin® PBT	Zytel® HTN PPA	INEOS® EBA	Rynite® PET-GF
Hytrel® TEEE	INEOS® PP	INEOS® HDPE	Riblene® LDPE	Kibiton® SBC	Trifilon® PLA-HEMP
Polylac® ABS	Wonderlite® PC	Kibisan® SAN	Flexirene® LLDPE	Toray® PPS	Acrystex® SMMA
Dryflex® TPE	Kibilac® ASA	Wonderloy® PCABS	Flexirene® MDPE	RTP® PEEK-GF	Polyrex® PS
Diakon® PMMA	Sarlink® TPV	INEOS® PVC	Greenflex® EVA	Polylac® MABS	Zytel LC® PA 10/10