



Sustainability with Delrin®

How to reach your sustainability goals with renewable certified acetal homopolymer

DuPont Delrin®



CONFIDENTIAL

Agenda

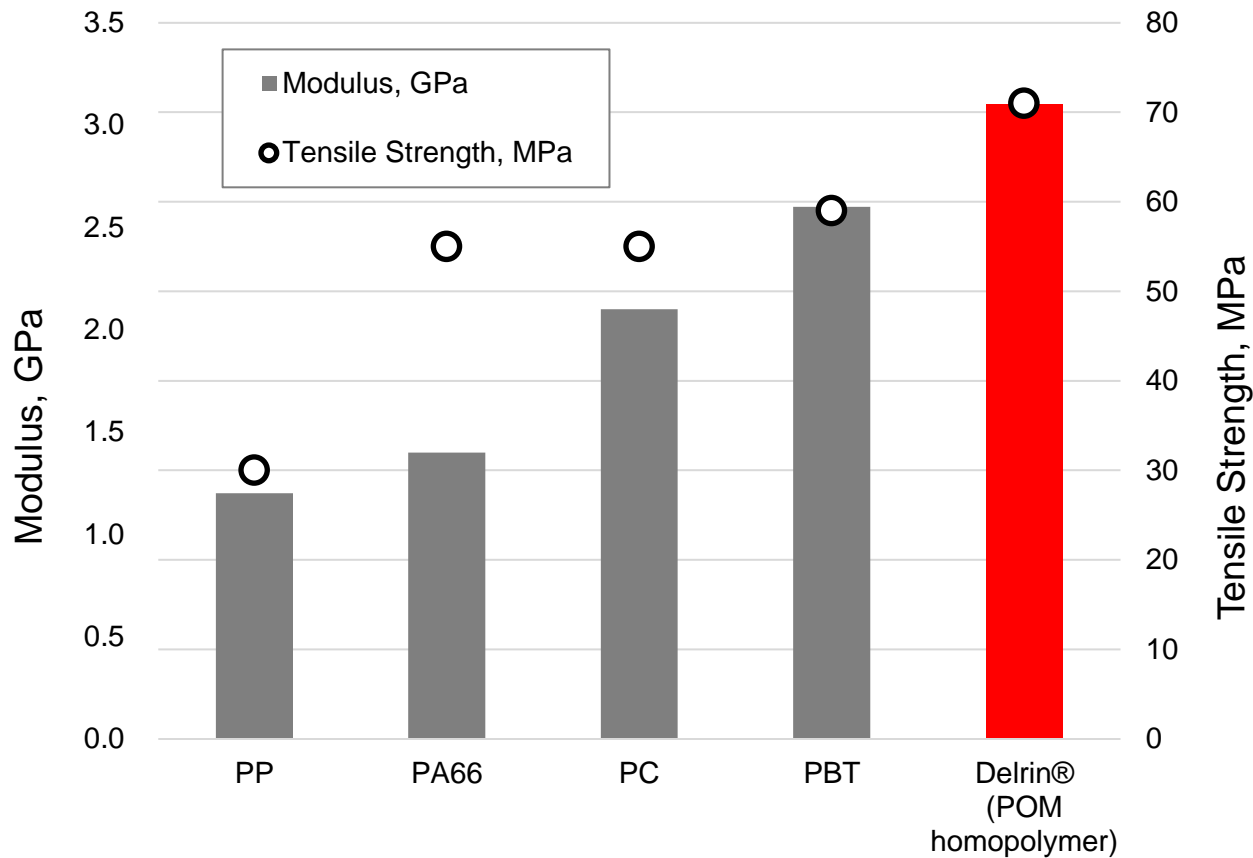
- Delrin® from a 40,000ft View
- What is Sustainability for Delrin®
- Delrin® Renewable Attributed
 - Mass balance approach
 - ISCC certification
- Improve your carbon footprint with Delrin®
- Summary



Delrin[®] from a 40,000ft View

Delrin® from a 40,000ft View

Un-reinforced properties



PA66 conditioned to 50% RH



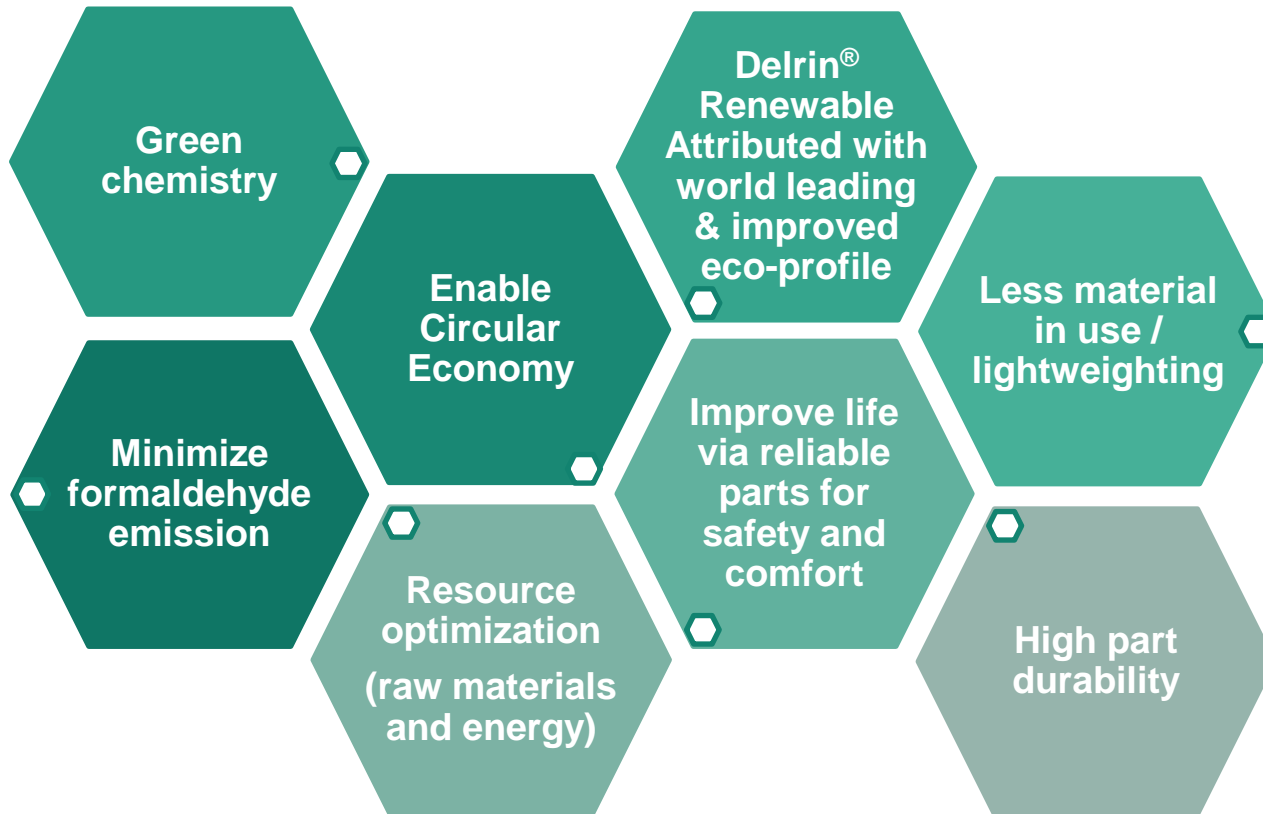
Delrin® acetal homopolymer
The stiffest and strongest unreinforced engineering polymer on the market



Image : LIMBS International

What is Sustainability for Delrin®

What is sustainability for Delrin® ?



Delrin[®] Renewable Attributed

Delrin[®] Renewable Attributed – Breakthrough of Sustainability



Bio-waste

Bio-Methanol



Municipal waste

Heating source



Wind energy

Renewable-sourced electricity



Delrin[®] Renewable Attributed *

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Reduces CO₂ emissions



Reduces the use of fossil resources



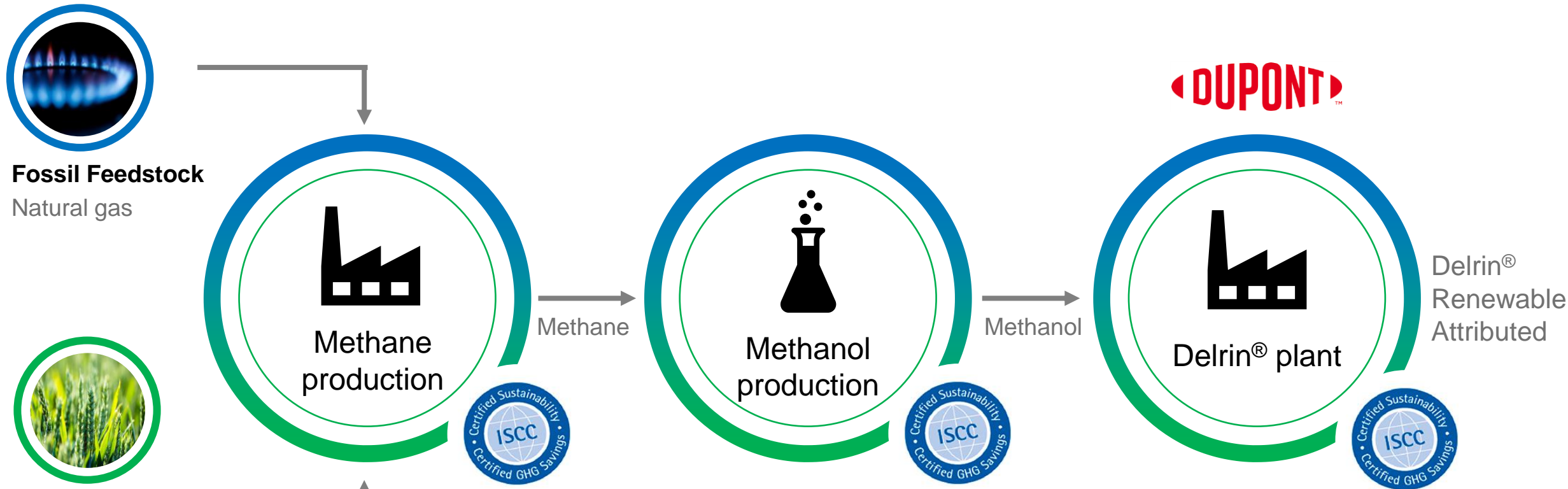
Maintains identical properties



Delrin[®] Renewable Attributed:
Up to **75%** lower carbon footprint
and up to **57%** reduced use of fossil resources vs. fossil-based Delrin[®]

* based on ISCC mass-balance

From biomass waste to Delrin[®] Renewable Attributed



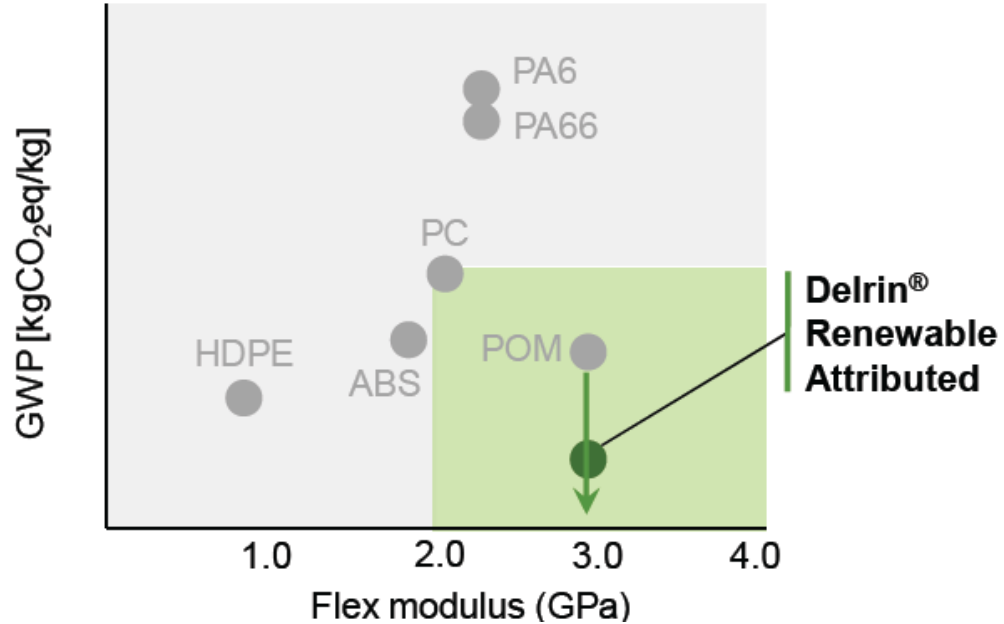
**Sustainability certificates are passed over the supply chain.
An externally audited system verifies the origin of the upstream
feedstock and the conversion for all the production steps**



Improve your carbon footprint with Delrin®



Favorable eco-profile compared to other resins



Indicative comparison using cradle-to-gate data from PlasticsEurope. Average tensile modulus of non-reinforced resins, extracted from public database (Campus)

Balance

demanding technical requirements and environmental impact

Save CO₂

and non-renewable resources when using Delrin® Renewable Attributed vs. other resins.



Delrin® Renewable Attributed produces substantially less CO₂ and uses less non-renewable resources energy during production, maintaining outstanding mechanical properties.

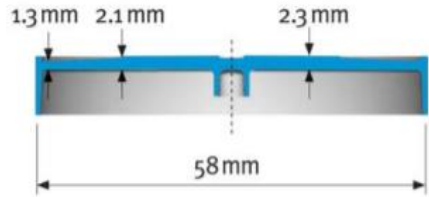
When Delrin® Renewable Attributed is produced instead of PA6, at the production gate :

90
%

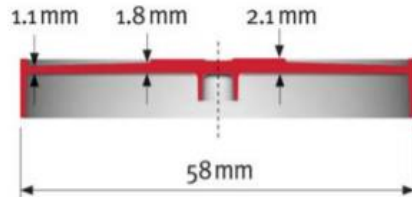
Less CO₂ is emitted in the atmosphere

Optimized design for lightweighting

Up to **20%** reduction of part weight achieved by re-design of the part.



Original design in acetal copolymer: 8.8 g



New design with Delrin® Renewable Attributed: 7.0 g

Optimize

your design, for parts that are lighter, more durable and reliable over time.

Easier molding

achieving better strength, toughness, creep and fatigue with a significant increase in flow rate compared to standard POM copolymer.



If 3g of POM is used per part. By redesigning these parts to achieve a 10% material reduction, for 100 million annual production, you save * :

600 tons CO₂ /year



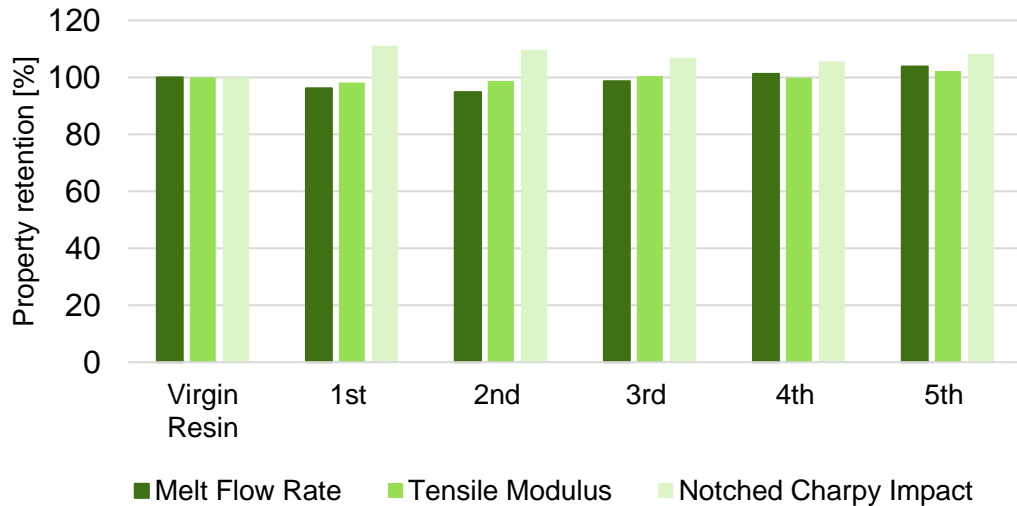
The energy of ~ 75 homes for 1 year

* Estimated from PlasticsEurope EPD for POM

The perfect solution for circular economy

100%

mechanical properties retention after 5 passes of 100% regrind.
Unique ability to reveal process window limits.



Reduce

your material in use and your waste

Increase

your internal recycling of material, with financial and environmental benefits



For a Delrin® consumption of 1000 tons/year, when a 20% regrind is introduced, you save * :

640 tons CO₂ /year



Taking out of the road **135 cars** for 1 year



Planting **~2.6 km²** of forest

* Estimated from PlasticsEurope EPD for POM

Estimated environmental advantages



Very low GWP among engineering resins

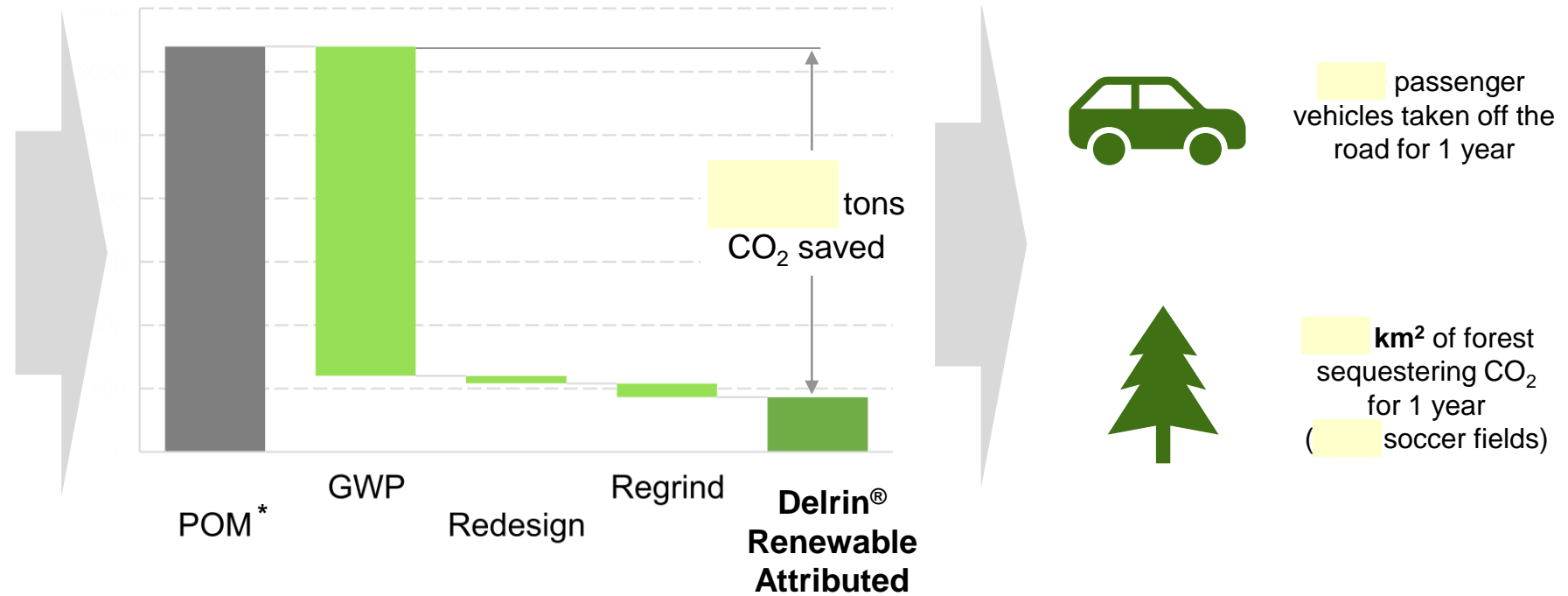


Up to 100% recycling with no mechanical loss



Sustainable design of thinner, lighter and more durable parts

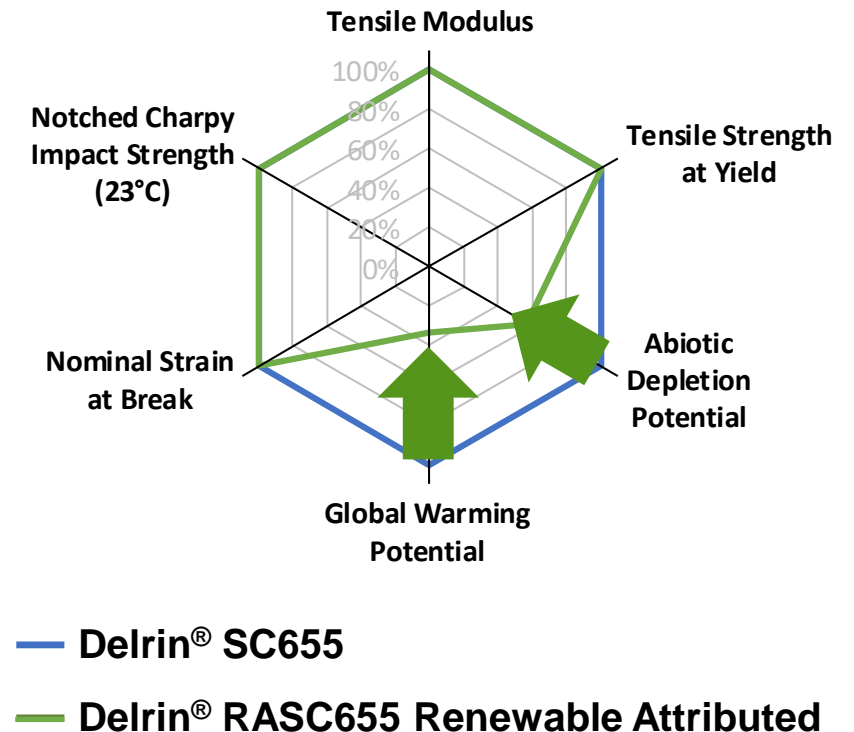
Exemplary case study: potential CO₂ savings
(1 kTon Delrin® converted to Delrin® Renewable Attributed)



can share under NDA

Delrin® RASC655 Renewable Attributed

| | | Delrin® SC655 | Delrin® RASC655 Renewable Attributed |
|--|-------------------|---------------|--------------------------------------|
| Global warming potential | % | 100 | 26 |
| Abiotic Depletion Potential | % | 100 | 54 |
| Melt mass-flow rate | g/10min | 15 | |
| Molding shrinkage (parallel / normal) | % | 2.0 / 1.9 | |
| Density | kg/m ³ | 1420 | |
| Melt temperature | °C | 178 | |
| Tensile modulus | MPa | 3100 | |
| Yield stress | MPa | 71 | |
| Yield strain | % | 17 | |
| Nominal strain at break | % | 30 | |
| Charpy notched impact strength (23°C) | kJ/m ² | 9 | |
| Charpy notched impact strength (-30°C) | kJ/m ² | 8 | |



Same processing, mechanical and tribological properties.

Allows fast adoption !



Manufacturing according to GMP principles, Food contact statements (EU/FDA), Testing against selected parts USP Class VI, Testing against relevant parts ISO 10993, extended change management process.

Delrin® Renewable Attributed solution space

Transformations in mobility, healthy living, and sustainability trend driving significant change in consumer behavior. Rewarded & Unique portfolio to meet the most stringent requirements.



Global Mega-trends

Automotive



Design cars of the future for sustainability, comfort, and safety

Industrial



Automation drives growth in material handling, food processing

Consumer



Lifestyles driving growth in sports and fitness devices like urban mobility

Healthcare



Smart healthcare enable Bio monitoring, smooth drug delivery

Portfolio offering

| | | | |
|--------------------|---|--|---|
| | General Purpose enhanced for car interior, optimized productivity | General Purpose enhanced for Food / Water Contact (FG) | Designed for Healthcare (Special Control, SC) |
| High Performance | RA100CPE | RAFG100 | |
| High Viscosity | RA300CPE | | |
| High Productivity | RA500CPE | RAFG500P | RASC655 |
| Medium Viscosity | RA511CPE | RAFG511DP | |
| Enhanced Tribology | | | RASC698 |

Further portfolio based on business case

Summary

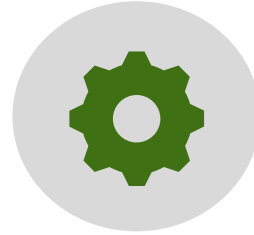


Summary: Delrin[®] Renewable Attributed helps achieving your sustainability goals



Increase the amount of renewable material in your products

100% of the base polymer of Delrin[®] Renewable Attributed is produced from renewable feedstock (mass balance)



Design parts that are thinner and lighter

The unique combination of stiffness and toughness of Delrin[®] compared to fossil based copolymer unlocks sustainable design



Give value to your waste

Delrin[®] can be reground multiple times without any loss of material properties

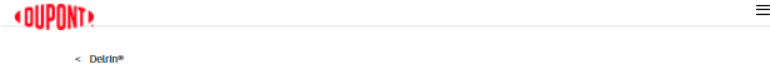


Reduce your CO₂ emission and fossil resource use

When using Delrin[®] Renewable Attributed, you design parts that are more sustainable: think of CO₂ / part !

Visit our website

<https://www.dupont.com/delrin/delrin-renewable-attributed.html>



< Delrin®

Delrin® Renewable Attributed

Advancing sustainability through leading eco-profile

As part of DuPont's 2030 Sustainability Goals, a new, sustainable portfolio of Delrin® has been added to the brand family. Delrin® Renewable Attributed (RA) base polymer is produced from 100% bio-feedstock from waste according to ISCC Plus mass balance certification. With a world-class environmental impact profile and a low carbon footprint, Delrin® Renewable Attributed offers excellent durability and reliability for less waste in part replacement. It is produced from 100% certified renewable electricity and offers the same quality, performance, processing and sensory experience as Delrin®, which makes it easy for customers to adopt as they work toward their own sustainability goals. Continuing the Delrin® reputation, Delrin® Renewable Attributed enables lightweighting, integration of functions, and the highest levels of part performance.



Advantages



Improved footprint
Improvement in CO₂e footprint and reduced usage of non-renewable resources



Renewable
Bio-feedstock from second-generation sources, not in competition with the food and feed chain, and 100% certified renewable electricity used for production



Bio attributed
Base polymer produced from 100% certified bio-feedstock from waste according to mass balance



Certified
By ISCC (International Sustainability and Carbon Certification)

Featured Grades

- DuPont™ Delrin® Renewable Attributed RAFG100
- DuPont™ Delrin® Renewable Attributed RAFG500P
- DuPont™ Delrin® Renewable Attributed RAFG511DP
- DuPont™ Delrin® Renewable Attributed RASC655
- DuPont™ Delrin® Renewable Attributed RASC698
- DuPont™ Delrin® Renewable Attributed RA100CPE
- DuPont™ Delrin® Renewable Attributed RA300CPE
- DuPont™ Delrin® Renewable Attributed RA500CPE
- DuPont™ Delrin® Renewable Attributed RA511CPE





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