NEXT GENERATION AUTOMOTIVE SEATING:

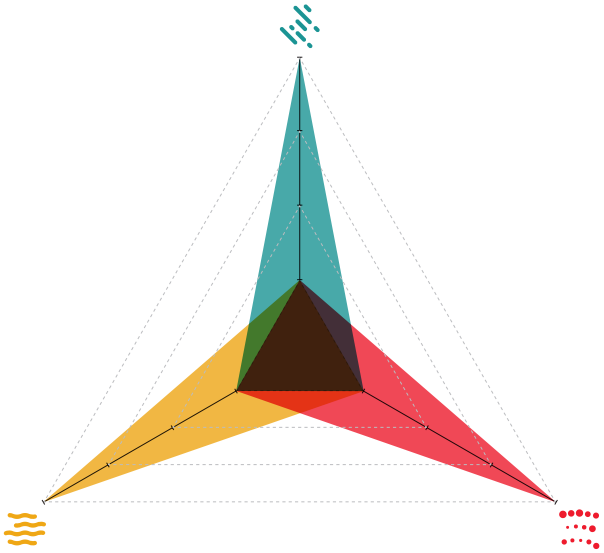
INFINAIR™ Polymers for 3D Loop technology

The need

The science of comfort

Creating the most comfortable possible seating has always required designers to deliver multiple physical properties, from ergonomics to sensation and microclimate.

Infinair™ polymers for loop technology by



Microclimate
- Temperature
- Humidity
- Freshness

Ergonomics
- Elasticity
- Durability
- Support

Sensation
- Touch
- Imprint
- Travel

New design needs

To produce the next generation of vehicle seating, designers need to address a range of additional needs, driven by the latest technologies, design trends and consumer demands.

1. Circular economy

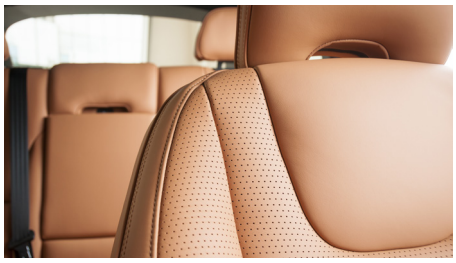
To help tackle climate change and the plastic waste crisis, there's a growing need for vehicle seating to be both recyclable and made from recycled materials. This need is reinforced by public expectations and the ambitious circularity targets set by policymakers and OEMs.

2. Shared mobility

The growing popularity of shared mobility services, like car-sharing and ride-hailing, is driving a need for seating that can be easily cleaned, to maintain hygiene and freshness when multiple passengers use the same vehicle over the course of a day.

3. Autonomous vehicles

The rise of autonomous driving will accelerate the trend for people to treat their cars as a "third space" outside the home and office. As people spend more time on the road, car seating's breathability and heat management will become increasingly important.



Our solution

INFINAIR™ Polymers for 3D Loop technology

Infinair™ polymers for loop technology

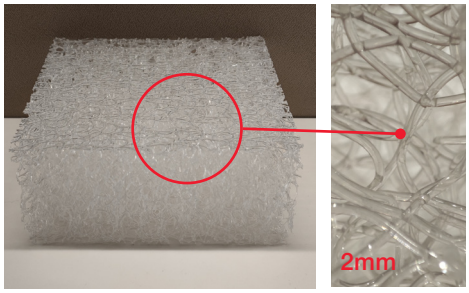
2021 R&D 100 FINALIST

Dow has innovated on the seating material for the vehicles of the future.
As well as being designed for **comfort**, INFINAIR™ Polymers for 3D Loop offers a range of additional benefits:

- Designed for 100% recyclability
- Excellent thermal management
- Low VOCs/Odor
- Washability
- Breathability
- Very low moisture retention

How 3D Loop is produced

The polyolefin material is produced using a melt extrusion and water cooling process to fuse thermoplastic elastomer filaments into thousands of bonded loops.



Designed for 100% recyclability

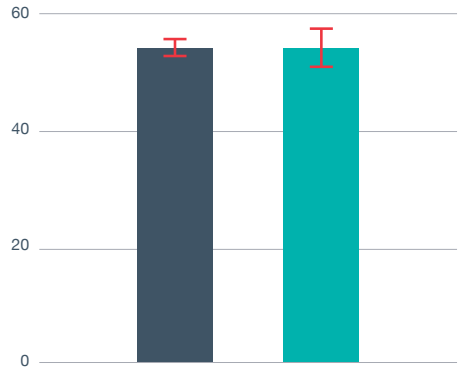
Recycled 3D Loop offers almost exactly the same performance as fresh 3D Loop. This means that when it's mechanically recycled, it can be used to go back into the same seating application without downcycling.

Fresh vs Recycled 3D Loop

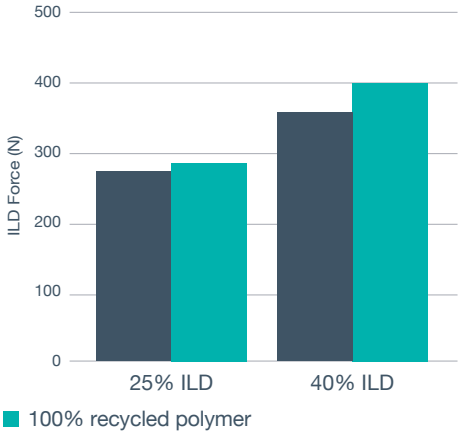
Structure: same	Rebound: same
Color: same	Hardness: minor change (<10%)

Fresh polymer | 100% recycled polymer

Rebound %



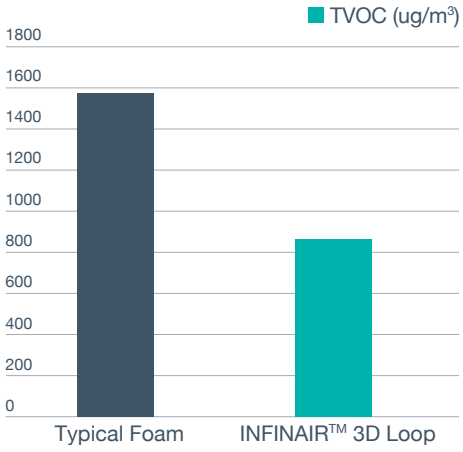
Hardness



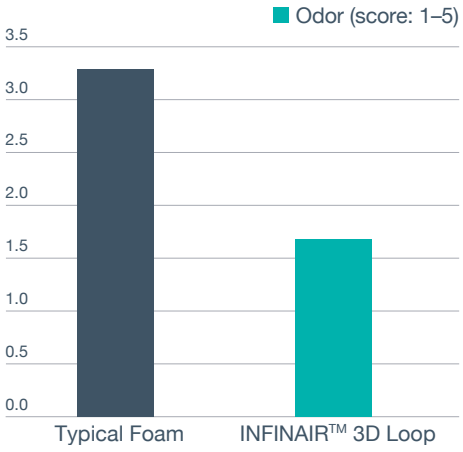
*Typical values, not to be construed as specifications. Users should confirm results by their own tests.

Low VOCs/Odor

INFINAIR™ Polymers are **solvent-free, adhesive-free** and contain **few volatile organic compounds (VOCs)**. As well as making them safe and reducing their odor, this entails **lower emissions overall.**



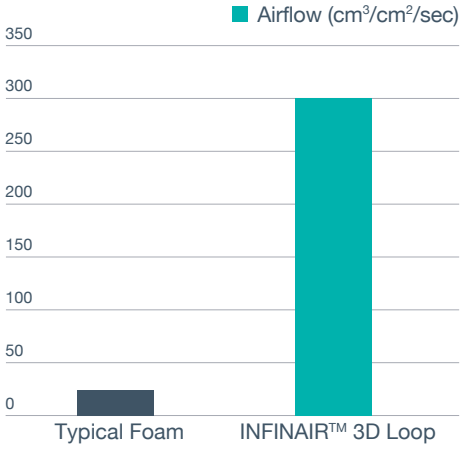
Test method: Toyota TSM 0508G (gas bag)

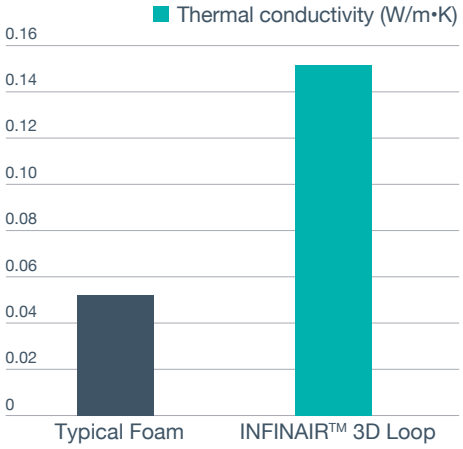


Test method: VDA270 (sensory test)

Breathability

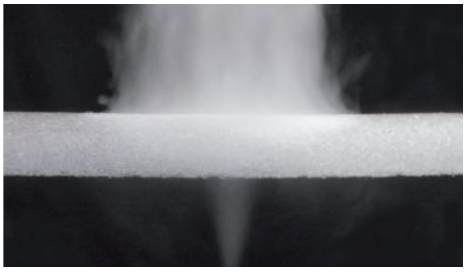
3D Loop has a 90% open structure, which allows air to flow freely through the material. It's therefore **highly breathable**, with **excellent heat management properties**. This helps to keep the seat temperature comfortable for longer times sitting in the vehicle.





Heat retention

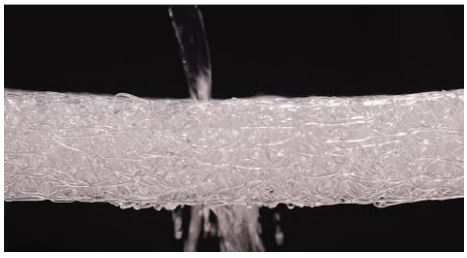
Highly breathable



Washability

3D Loop's open structure means that unlike traditional seating foams, it's both **washable** and **fast drying** – a particular benefit for shared commercial vehicles like buses, trains and trucks.

Washable



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Comfort

3D Loop produced using INFINAIR™ Polymers has **high rebound** and **customizable firmness,** to achieve the right level of support desired.

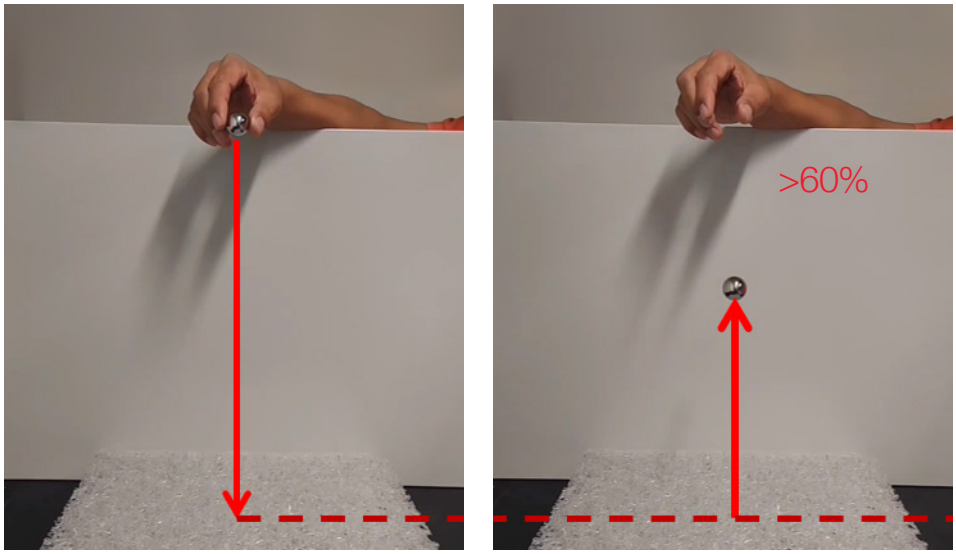
			Typical Foam	INFINAIR™ 3D Loop
Density	(kg/m^3)	ASTM D3574	35–75*	**40–100**
Hardness	25% ILD (N/314cm^2)	ASTM D3574	130–250**	**130–250****
	65% ILD (N/314cm^2)	ASTM D3574	380–720**	**380–720****
Comfort	Hysteresis loss (%)	JIS K 6400	15–25	**25–35**
Durability	Thickness loss (%)	JIS K 6400	4	**5–6**
Resilience	Ball rebound (%)	ASTM D3574	50–70	**50–60**

*Depends on different parts and applications (headrest, cushion, backrest, etc.).
**Can be adjusted.

Customizable firmness

Soft **Rigid**

High rebound



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Making INFINAIR™ 3D Loop even more sustainable

To further help our customers produce seating foam that's not only recyclable but which incorporates bio-circular or recycled content, we've developed two special versions of INFINAIR™ Polymers. More sustainable than standard options, they offer exactly the same performance, so there's no need for requalification.

INFINAIR™ CIR

Polymers with circular content made using recycled materials – reducing the use of virgin fossil-based resources. This production process is ISCC+ certified on a mass balance basis.

INFINAIR™ REN

Polymers with bio-circular content made using other industries' plant residues as raw materials – which significantly reduces carbon footprint.

Recycled Polymers / Circular Feedstocks

Infinair CIR polymers for loop technology

Circular option

Bio Feedstocks

Infinair REN polymers for loop technology

Bio option

Polyolefin elastomers (POE) using other industries' bio residues as raw materials helps to save fossil resources

- No food/feed competition
- Certified sustainable forestry/farming
- Plant-based POE resins are ISCC+ certified
- Enabling performance for bio-based POEs: **No requalification needed**
- Supporting CO_2 reduction versus fossil fuel-based equivalent

New Vehicles

Interiors

Seating foam and skins, and other interior trims

Our wider MobilityScience™ sustainability strategy

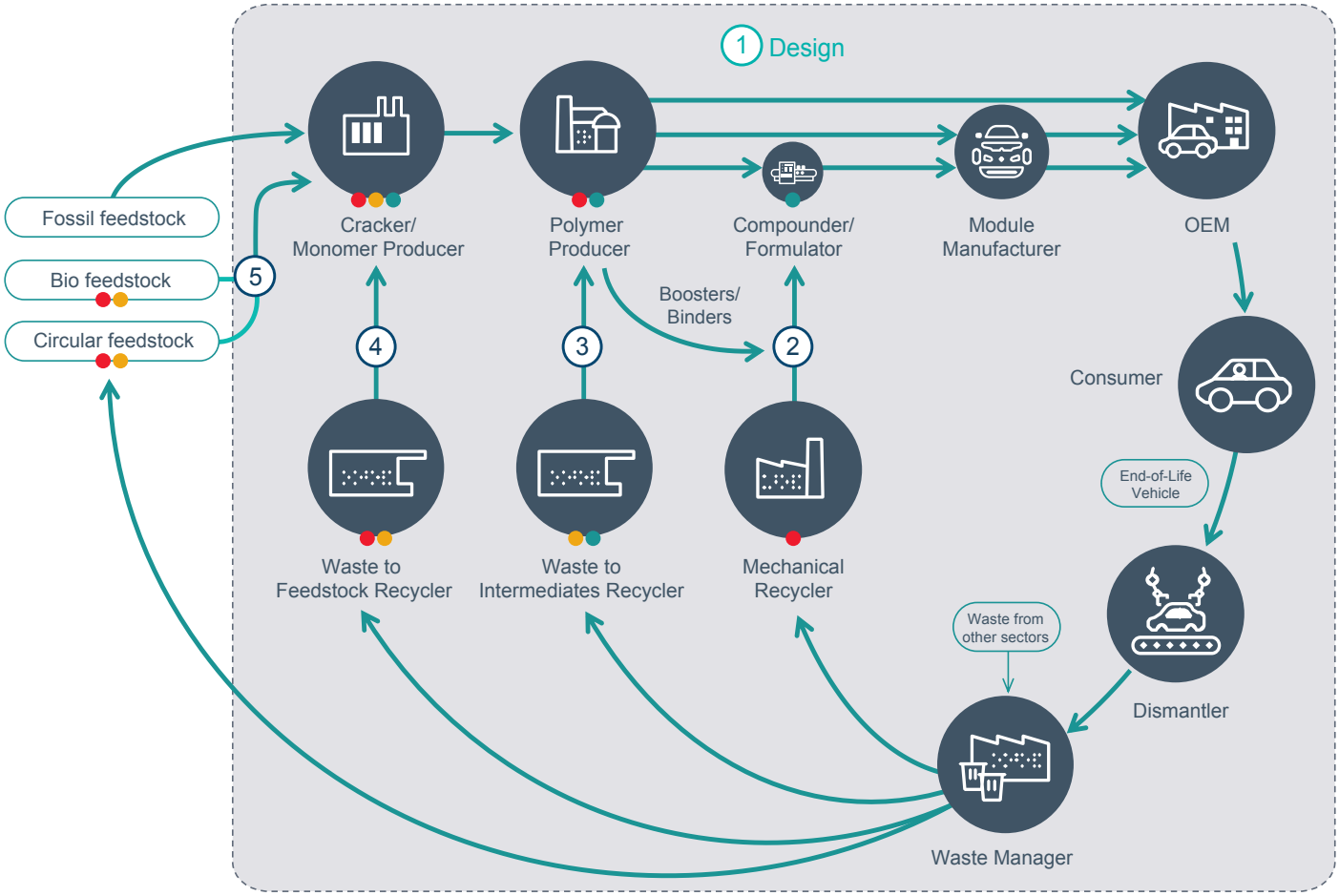
Designing for seat foam circularity is just one of the ways that we're helping to build a sustainable future that supports resilient, low-carbon mobility.

Innovating across the full range of mobility challenges, we're committed to driving sustainability in three key areas: **climate protection, safer materials,** and **circular economy.** Our offerings span the entire lifecycle of automotive plastics – from their **Design** to their **Production**, **Use** and **End-of-Life**.

Dow's circular technologies

Zooming in on circularity from our three sustainability goals, we are investing in innovations and collaborations across the value chain, to help build a circular ecosystem for all types of automotive plastic.

① Design	② Mechanical Recycling	③ Waste to Intermediates Recycling	④ Waste to Feedstock Recycling	⑤ Bio or Circular Feedstocks
We help design for longer life and end-of-life by bringing in-depth experience and innovative materials that make vehicle parts easier to recover, reuse and recycle, while offering properties needed both for production and for performance during the vehicle's life.	Coupled with our experience in automotive requirements for safety and aesthetics, our technologies support mechanical recycling into new vehicles not just with our PCR offering, but also a wide range of boosters and binders for diverse recyclates.	We give a second life to hard-to-recycle materials like thermosets, by converting them back into monomers, significantly reducing overall product carbon footprint and our reliance on fossil feedstocks.	We contribute to the circularity of even harder to recycle streams by converting plastics back into feedstock, producing new materials with identical performance and reducing the plastic waste going into landfilling or incineration.	We help the industry realize further decarbonization and circularity with our products made from bio-circular and circular feedstocks. These come from non-food/ feed-compete sources and have virgin-identical properties.
Circulibrium™	Renuva™			Renuva™ Ecolibrium™



Technologies for Automotive Circularity from Dow & Dow Partners

● Polyolefins	Boosters for PP (TPO), PA, PET, PBT, ABS, PC & PC Blends	Exterior (bumpers, etc.), Interior (panels, skins, airbag covers, etc.), Under-the-Hood
	EPDM	Weatherseal, Under-the-Hood, Tires
	PE	Under-the-Hood (air ducts, windshield water tanks)
● Polyurethanes	PU (PUR)	Interior (seats, skins, etc.), Acoustics, Battery Systems, Tires
● Silicones	Silicone Composites, VMQ	Battery Systems, Interior (skins, airbags), Power Electronics/ADAS, Under-the-Hood, Cables & Connectors, Lighting Systems, Tires

Images: dow_54672627810, dow_ 67498085423, dow_63074638175, dow_75718857322, dow_66181102855, dow_88216368113, dow_73312867326, dow_80420597477

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