Closed Loop of Biocomposites

Eve Saarikoski 11.6.2026

KCL - Your Partner in Biocomposites

At our facility in Lohja, Finland, we combine advanced compounding technology with proven expertise to deliver consistent performance.

With KCL, you get more than materials: we can partner with you through contract manufacturing, tailored formulations, and R&D support from first ideas to full-scale production.

KCL
BIOCOMPOSITES

KCL Biocomposites Offering

KCL Formi® brand products

Injection Moulding

Additive Manufacturing

Extrusion

White label products

Custom compounds

Contract manufacturing

Services

Development projects

Re-granulation

Recycling

Industry & Our Offering

We offer advanced materials for industrial manufacturing, designed for injection molding and large-scale 3D printing.

Our core products are high-performance biocomposite compounds (pellets), engineered for seamless use in existing plastics manufacturing processes and customizable at scale.

Our materials:

- Fully Developed
- Industrially Validated
- Meet regulatory requirements, including food-contact applications

Cellulose-Based Biocomposites

for injection moulding

Formi® Neo
(Food-contact material)

Formi® Pro

for large-scale 3D Printing

Formi® 3D
Arctic White

Formi® 3D
Nordic Birch

Formi® 3D
Iconic Black (UV)

Alternative Side-Stream Materials

for large-scale 3D Printing

Formi® 3D
rPETG (UV)

Formi® 3D
Retex*
(textile-derived)

*Development is supported by Business Finland

Selected Examples of Customer End Products

Our materials are most commonly used to produce

Automotive parts

Speaker cabinets

Reusable cutlery

INJECTION MOULDING

LARGE-SCALE 3D PRINTING

Moulds and Tooling
for several industrial applications

Furniture
indoor and outdoor

Interior Design

Driver seat armrest
Photo: illustrative

Speaker Cabinets
Photo: Illustrative

Reusable mug
by Nature Line Cutlery

Vacuum infusion mould
by REDU

Osebol bench for outdoors
by Rutger Andersson

Complete Interior Design of
Škoda Auto Headquaters,
Praque, Czech Republic

Injection moulding / food contact

From Regulation to Circularity: Enabling Closed-Loop Food-Contact Materials

EU regulation is driving purity, traceability – and enabling circular food-contact materials

- Strict EU food-contact regulations enforce exceptional purity and full material traceability
- These requirements initially limit recycled content – but also create the framework for safe circular use
- Closed-loop recycling between trusted partners ensures controlled input streams and compliance

Closed-loop ecosystems enable recycled materials also in food-contact applications

- Known material origin and controlled reuse cycles make recyclates viable
- Traceability is the key enabler for regulatory acceptance
- Industrial partnerships replace open recycling with verified material loops

Our fibre-reinforced materials combine performance, low plastic content, and designed circularity

Additive Manufacturing

Closing the Loop in 3D Printing: From Local Production to Circular Ecosystems

3D printing enables localized, zero-waste production – but requires material loop ownership

- Local production allows internal recycling and near-zero material waste
- Especially in product development, iteration cycles are fast and material flows are fragmented
- Companies often lack capability or focus to manage recycling internally

Material suppliers must close the loop

- Scalable circularity requires that materials can be taken back, reprocessed, and redeployed
- Supplier-driven closed loops ensure consistency, quality, and usability across iterations
- Enables lean development without waste handling burden

Closed-loop material ecosystems are critical for scaling industrial 3D printing

Target State:

Waste-Free Ecosystems

Ecosystems where:

- Materials remain in continuous use
- Side streams are captured and reused
- Waste is treated as a resource, not a by-product

Waste-free manufacturing is a system-level design choice.

Example Case:
Closed loop Recycling Ecosystem

Nature Line Cutlery needed a fully compliant and technically reliable material to meet tightening EU food-contact regulations for their new product line

After validating sustainability, regulatory compliance, purity, and mass-production performance, they selected our cellulose composite as their preferred solution.

Beyond material performance, we established also closed-loop ecosystem together: production waste is collected and returned to us for controlled reprocessing*.

- Meet top-tier food-contact standards
- Enable traceable, closed-loop material systems
- Combine performance with circularity in regulated applications

*Development of controlled processing and tracebility is supported by Business Finland

Example Case:
Local closed loop recycling at RISE

RISE is Sweden's national research institute and one of Europe's largest, working with industry to develop sustainable, industrially scalable technologies.

- Continuous use of Formi materials since 2019
- 100% Recycled Material in Large-Scale 3D Printing
- Extensive prototyping and testing
- Material thermal history is tracked and managed

Reliability comes from controlled systems, not from materials virginity.

Example Case:
Closed loop Recycling Ecosystem

Closed Loop for One-Time-Use Moulds produced with Large Scale Additive manufacturing

- Thermoforming and vacuum infusion moulds used once
- Moulds returned after use
- Material recycled into new production*

Business logic:

Customer receives material discount based on returned mass

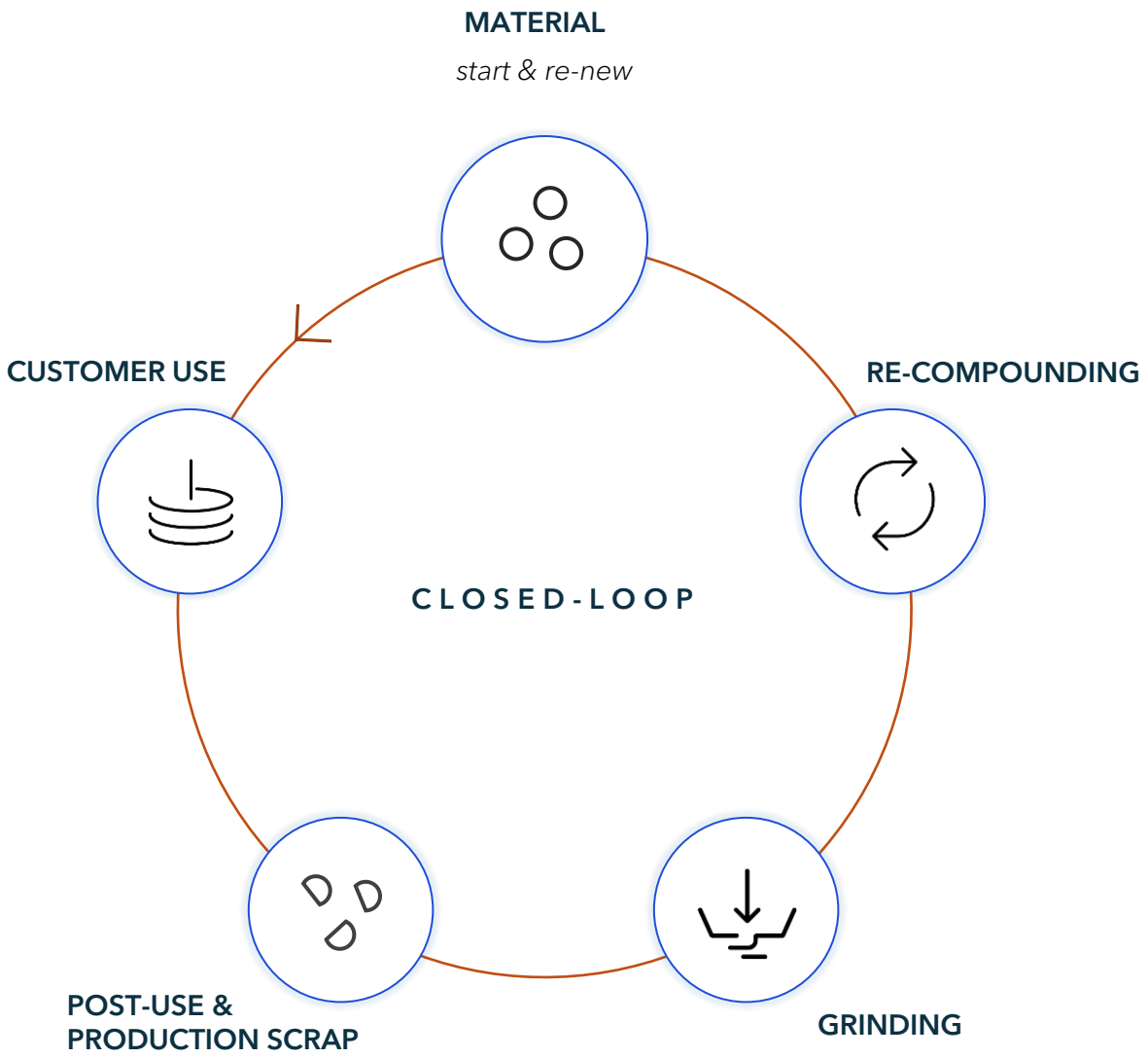
Result:

No new infrastructure – loop closed within industry.

AUTOMOBILE

*Development is supported by Business Finland

KCL Formi® Closed-Loop Material Cycle*



KCL BIOCOMPOSITES

MATERIAL

Starting point and re-newed outcome

High-performance biocomposite materials designed for recyclability and long-term circulation. Material performance is maintained across multiple life cycles.

CUSTOMER USE

Materials are processed into products and tools, including durable components and one-time use moulds, depending on application requirements.

POST-USE & PRODUCTION SCRAP

Industrial side streams, rejected parts and end-of-use items are collected through agreed logistics for closed-loop reuse.

GRINDING

Materials are size-reduced and prepared under controlled conditions to ensure consistent, quality-controlled recyclate.

RE-COMPOUNDING

Recyclate is reformulated with polymers and additives to meet performance requirements for the next application.

RE-NEW KCL FORMI® COMPOUNDS

Ready-to-use recycled biocomposite compounds, enabling continuous material circulation within the closed-loop system.

*Development is supported by Business Finland

KCL
BIOCOMPOSITES

CONTACT

Eve Saarikoski, D.Sc. (Tech)
Development manager
KCL Biocomposites
+358 40 835 2395
eve.saarikoski@kcl.fi