Exploring Recycled Rubber Applications with VESTENAMER® and POLYVEST®

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VESTARO GmbH
Joint Venture between Evonik and Forward Engineering

EVONIK is one of the world's leading specialty chemicals companies with a long expertise in developing epoxy- and polyurethane raw materials for composite applications. Evonik support their clients with tailor-made solutions from laboratory scale to serial production.

Leading Beyond Chemistry

FORWARD ENGINEERING is the competent development partner for lightweight design of composites. From idea to serial production Forward Engineering assists international clients from the automotive and engineering industry.

Automotive. Composite. Solutions.

The potential arising from the combination of **Evonik** and **Forward Engineering** as strong partners for **chemical** and **engineering know-how** is the basis for our success

The problem
End-of-life tires are a global waste problem

25 million tons
end-of-life tires
per year globally

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Tires are valuable materials
…even beyond their primary use

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By using VESTENAMER®* and POLYVEST®**

It is possible to enhance the properties of recycled rubber from tires

VESTENAMER® opens rubber recycling to innovation

POLYVEST® improves specific properties of rubber

* *trans*-polyoctenamer
** *liquid polybutadiene*

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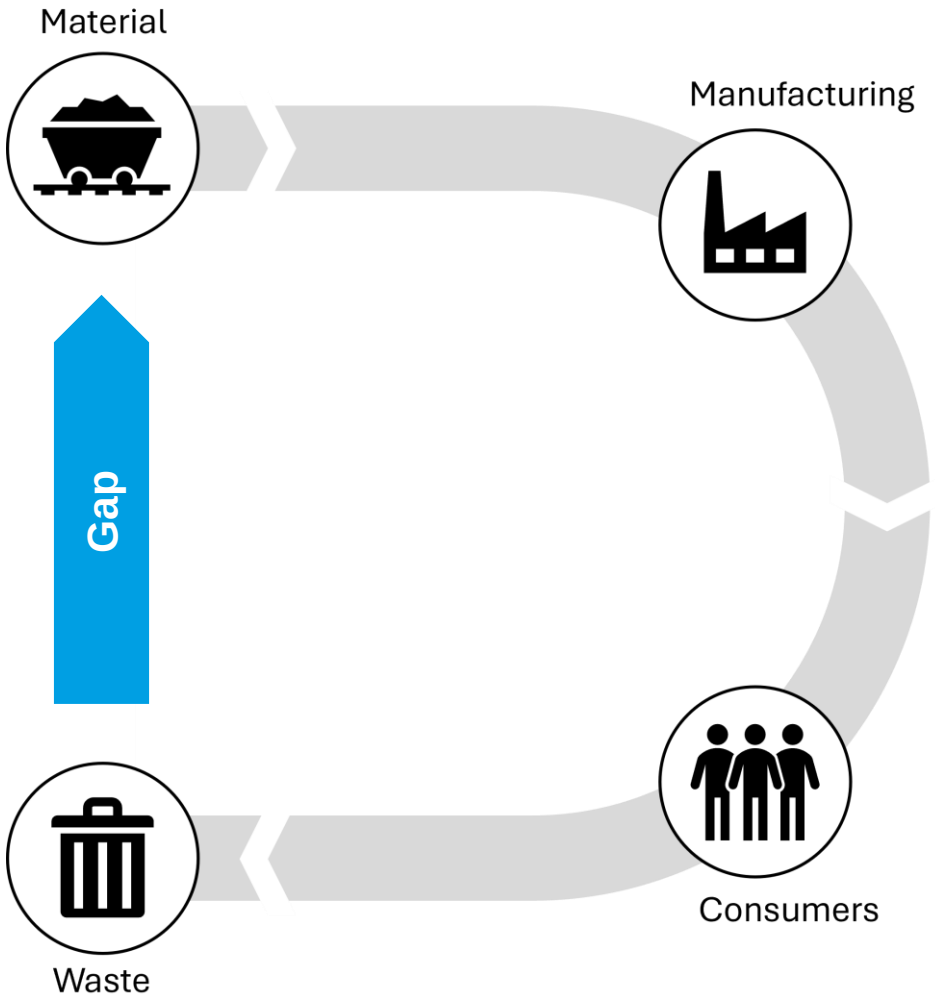
Today rubber manufacturers have established processes and value chains

Yet, there is still a gap between waste and new products



HOW TO OVERCOME THE GAP?

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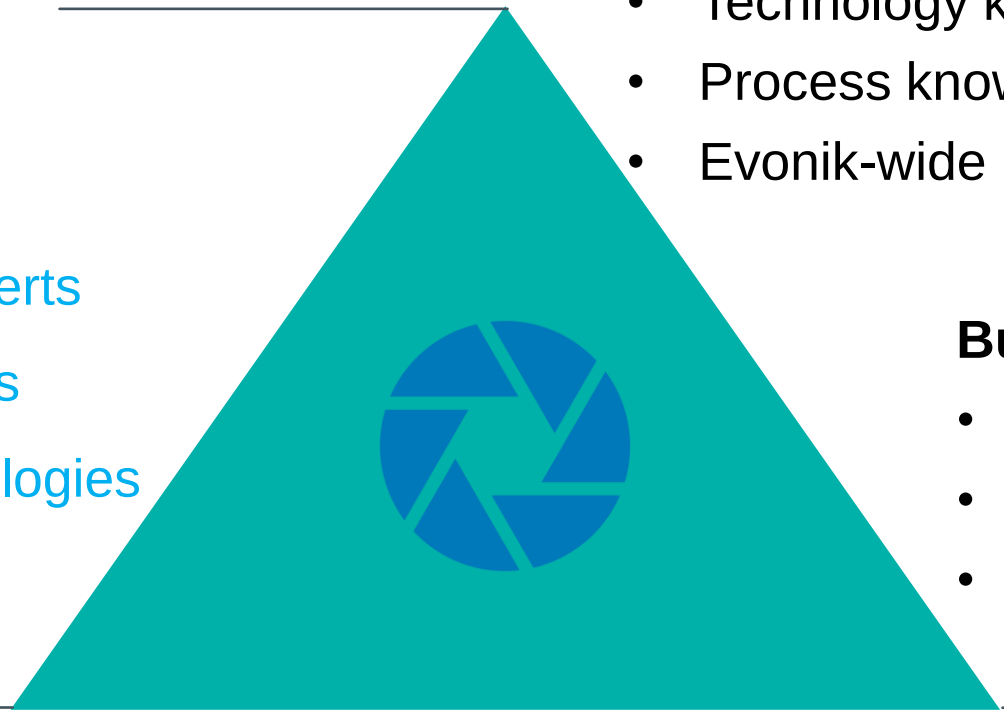
Essential for realizing new Business and new Applications for Evonik is
… to work in this triad

Technology Deployment

- Technology know-how
- Process know-how
- Evonik-wide network



- Engineering experts
- Agile approaches
- Startup methodologies
- Independence

Business Lines

- Chemical expertise
- Process know-how
- Laboratories and pilot plants

Success with the synergies of Evonik and Vestaro

Accelerating the business with the Joint Venture

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Then the right application for this new material needed to be identified

Identified via „Design Thinking“ by VESTARO

World´s first tennis ball made of recycled rubber from tires!

Source: Vestaro

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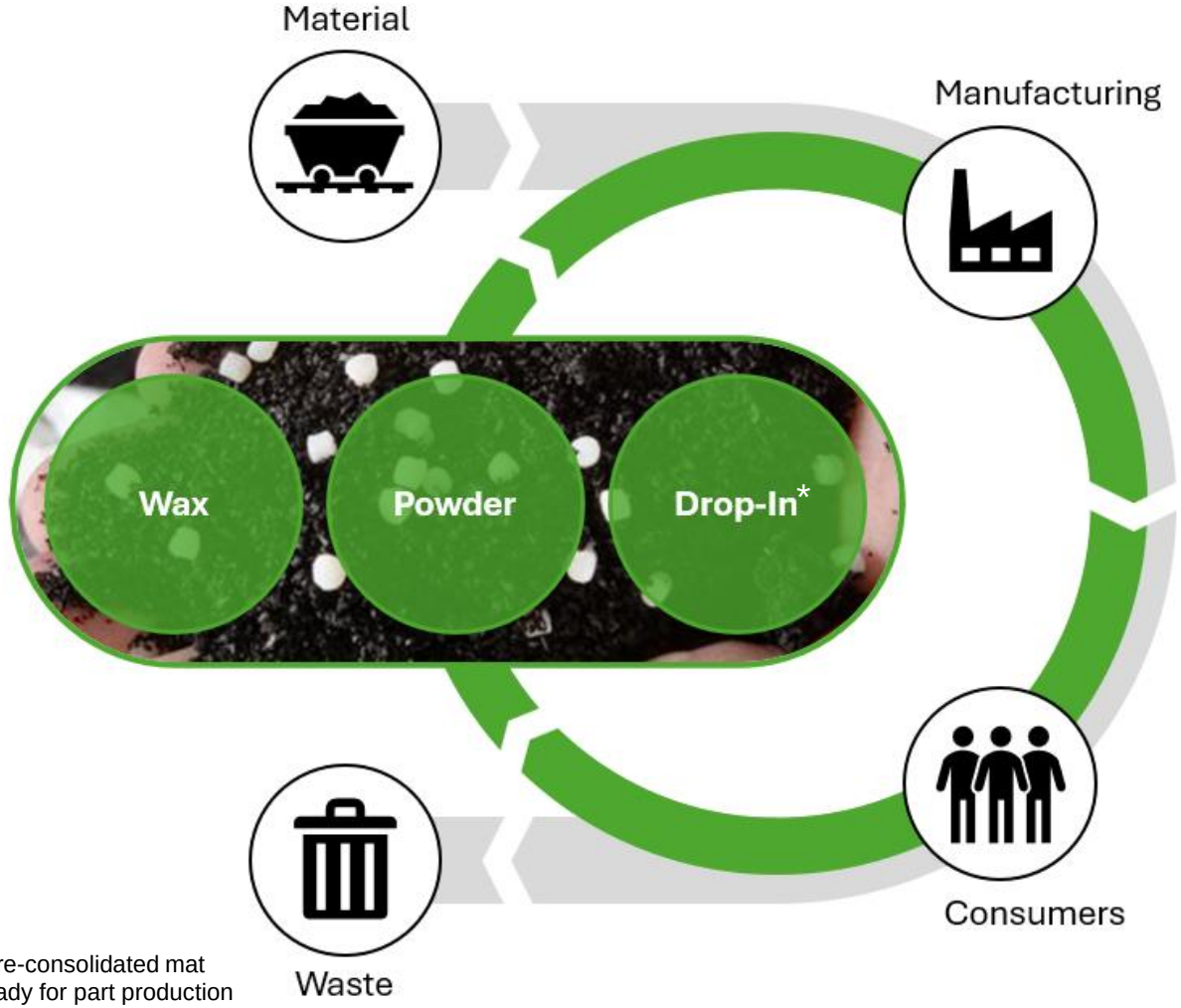
A drop-in solution was developed very fast with Wax and Powder

The new formulation was patented by Evonik and Vestaro



*pre-consolidated mat ready for part production

- **Material properties adapted** to product requirements
- **Delivery form adapted** to manufacturer‘s needs
- **Finished toolset** for fast integration and iteration at new product developments
- Potential to **reduce** both **material consumption** and **waste production** of rubber industry

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Same performance – same cost

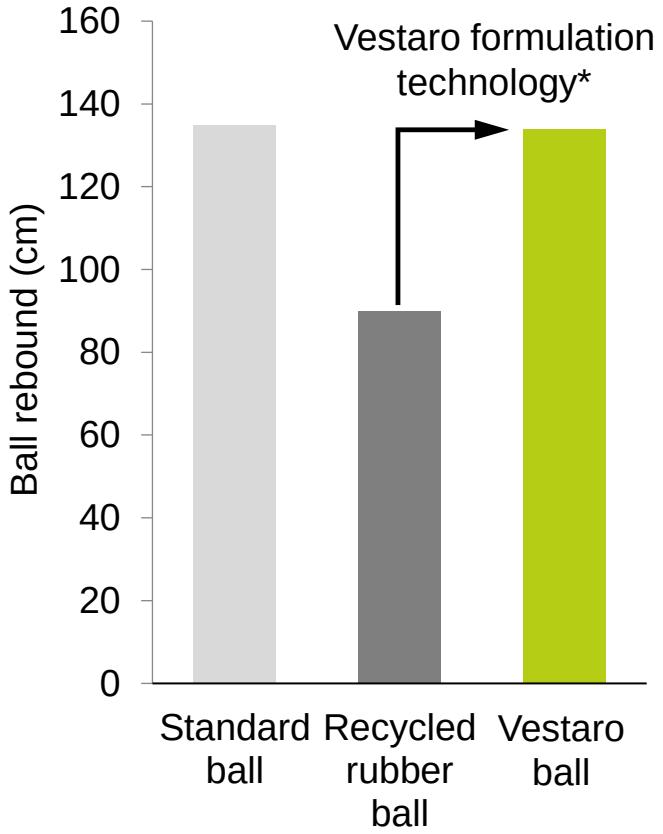
…but maximum sustainability!

Standard ball

- Made from virgin rubber
- Energy intensive mixing

Vestaro ball

- Made from **recycled rubber** from tires
- Innovative powder mixing technology
- No compromise in costs/performance



CO_2 savings and contribution to solve a global waste problem

*enabled by VESTENAMER® and POLYVEST®

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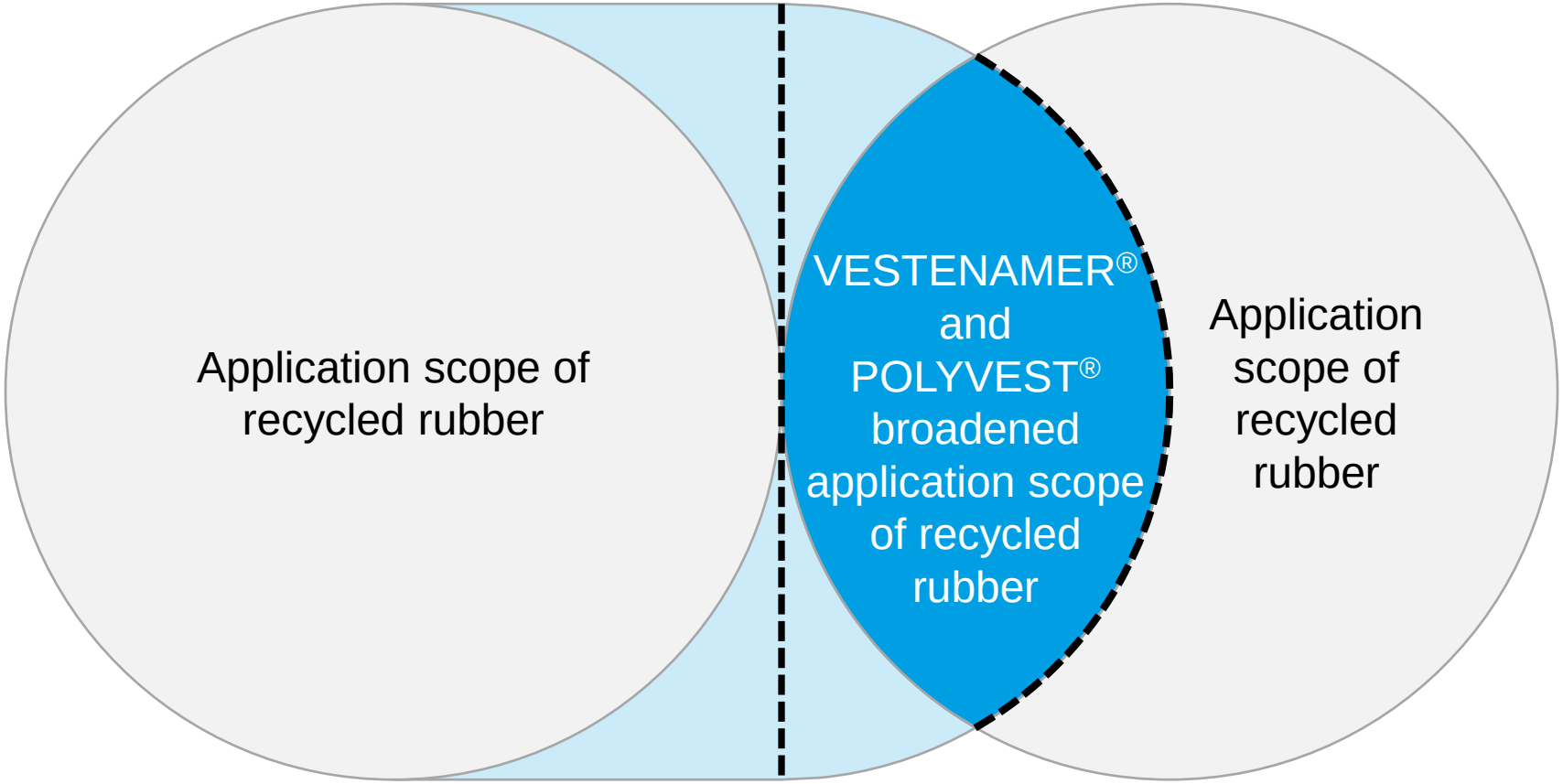
Identifying the right Product-Technology Fit and Product-Market Fit

This is key within Evonik and Vestaro



More sustainable Applications to come:

- Solid rubber tires
- Shoe soles
- Automotive parts

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Why is Technology Deployment that important to this project?

The combination of product, material and technology leads to success

Rubber Recycling

- Contributing to solve a global waste problem
- Carbon footprint reduction

- Closing a value chain gap via Vestaro outside Evonik

- Creation of additional value by combining technology with Evonik products

Sustainable Business

We enable sustainable growth for Evonik by technology

- Developing technical system solutions based on Evonik products VESTENAMER® and POLYVEST®
- Creating tennis ball reference
- Fostering collaboration in new eco-system together with Vestaro

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