

Fibers Designed by Nature for Sustainable Polymers



ARBOCEL®

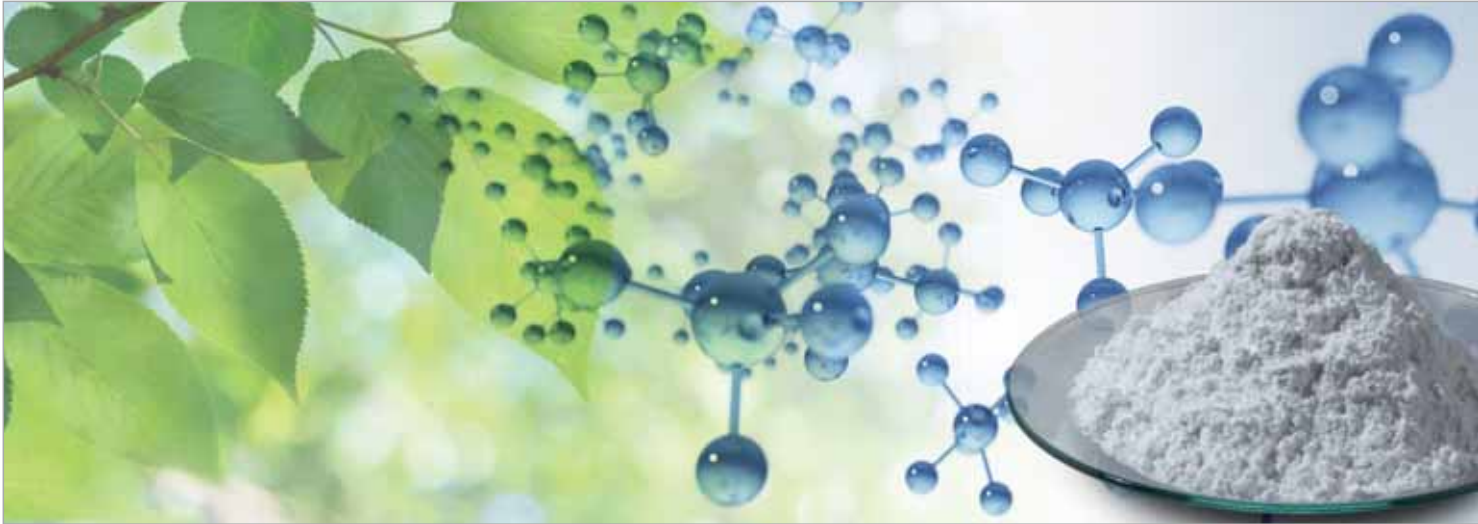
Fibers and compounds
based on plant resources
for the innovative materials
of today and tomorrow



ARBOCEL®

Multifunctional
Plant Fiber Products

JRS Combines Nature and Plastics



Partner in Competence

As an innovative system and technology partner, globally involved with research and processing of functional plant fibers, we bring the rich functional resources of nature into the world of plastics for **value added applications**.

State-of-the-art production facilities and consistent process and quality management according to ISO 9001 guarantee maximum standards – from the selection of raw materials to end products. Our raw materials derive exclusively from the heart of nature, in accordance with international PEFC guidelines from sustainable forests.

JRS stands for:

- Constant quality
- Stable processes
- Cost savings
- Supply security



PEFC
PEFC/04-31-1223
Promoting sustainable
forest management
www.pefc.de

safe
flexibel fast
**RAW MATERIAL
MANAGEMENT**
worldwide security of supply
LOGISTICS **Export**
reliable
on time

Natural Fibers in a Variety of Sizes and Shapes

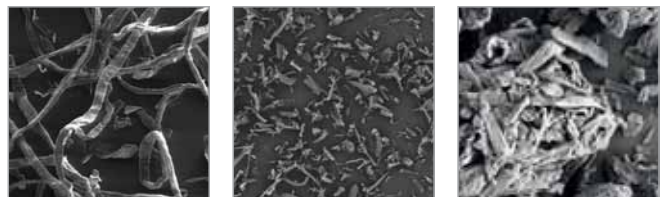


JRS offers a wide range of different, highly functional natural fibers.

Fibrous or particulate structures, in granulate or powder form – we produce and supply materials in a variety of application-oriented forms. Additionally to continuous process and performance optimization, **constant high quality for stable production processes** is our priority.

Tailor-made

- Wood fibers from different types of wood
- Cellulose fibers (technical and high purity grades)
- Cellulose microfibers
- Granulates
- Compounds
- Fiber coatings
- Fibers based on annual crop plants (corn, oat, wheat and others).
- Cellulose derivatives



ARBOCEL® Wood and Cellulose Fibers



ARBOCEL®

Multifunctional
Plant Fiber Products

From the Idea to Your Success



Approach to Innovation and Optimization Potential

Over 130 years of experience and versatile know-how in the field of natural fibers in plastics applications form the basis for a partnership with a promising future.

As a product and application specialist, JRS offers you competent **advice** combined with reliable and flexible service.

Networking – a Key to Success

We are the go-to contact for innovative ideas, with versatile networking and an eye for what is feasible. JRS fibers are used as reference and quality standards in innovative projects. Over the years we have established a **global network** of universities, institutes, manufacturers of machines and raw materials from which you as our customer can benefit in all your efforts.



Your Strong Technology and Systems Partner



Research and Development

JRS operates three R&D centers in Europe, the USA and Asia where we work on the development and modification of fibers and fiber derivatives. An example is the use of chemical and mechanical changes to the fiber structure, functionalization of surfaces and additives for coating and wetting of the fibers.

With the help of these versatile **development opportunities**, we realize both product enhancements as well as innovative product developments.

Implementation and Application Optimization

Always close to real-world practice and working in close contact, we accompany you throughout your product launch.

This helps bridge the gap **from idea to market**.

We are always there to provide support with further projects with the goal of long-term product optimization always in mind. With our many years of experience, we also help with questions regarding production processes such as dosing with big bag stations or silos.

Who has his fingers
on the pulse of time
takes his **IDEA**
to **SUCCESS**

We put the 'W' in WPC



Outdoor Applications

WPC – wood polymer composites – is the term for completely new fields of application and markets for innovative plastics. In further developments, natural fibers are combined with polymers to make composite materials. The proportion of natural fibers in the composite ranges from a few percent up to >80 %.

Longevity, form stability and the look and feel of wood are just some of the characteristics that can be realized and specifically engineered in combinations of these two "worlds" – plastics + natural fibers – and our fibers can do a lot more than that!

WPCs are often used as substitutes for classic wood products. The largest market share is for WPC deckings as well as privacy and facade elements. In addition, modified plastics are becoming more and more popular in automotive applications.

JRS fibers are characterized mainly by constant and uniform quality and availability.

What we want, what we demand of ourselves, is customer satisfaction in long-term partnerships.

Indoor Applications / Interior Design

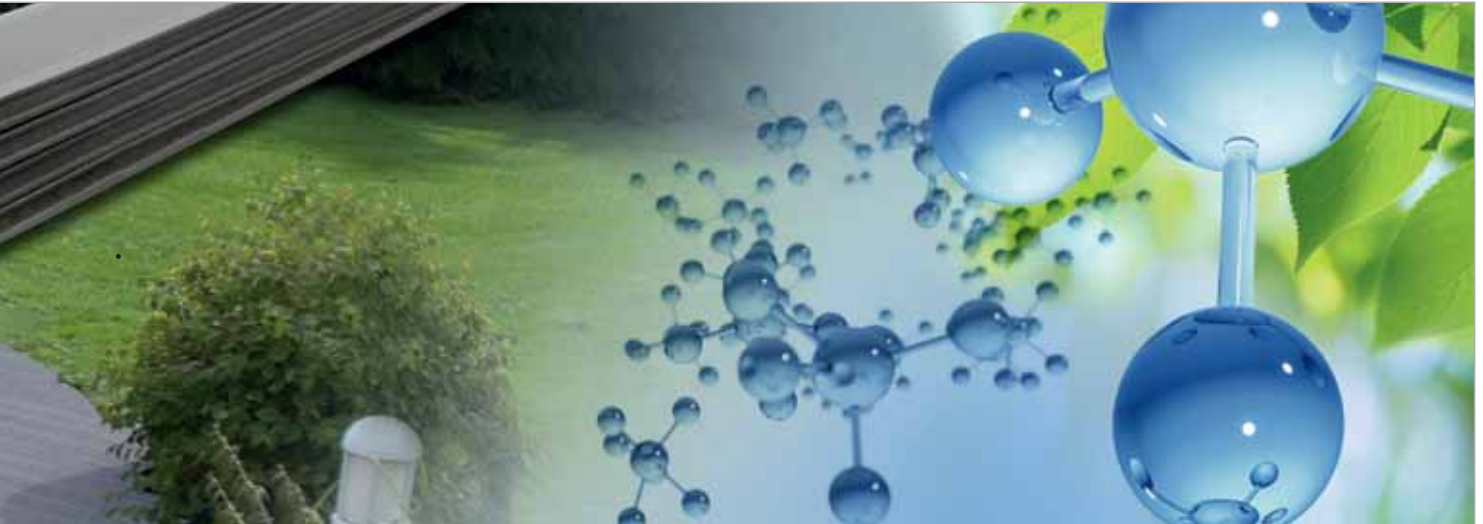
The special features of composite material also lead to products for interior design and furniture. This includes wall coverings made of WPC foam, door frames and moldings, shelf systems, seating furniture and much more.

Specific requirements on the wood material are controlled in particular by modern production steps and targeted engineering of wood fiber properties.

JRS Natural Fibers are used in these standard procedures in the thermoplastics sector:

- Compounding
- Extrusion
- Injection molding
- Thermoforming
- Rotational casting
- Calendering
- Pressing
- Blow molding

... and that's not all



Packaging & More

More and more, a trend of today is the use of alternative materials for packaging of consumer goods.

In the search for replacement for standard plastics, biodegradable WPCs are emerging as a promising opportunity.

On the one hand, **ARBOCEL®** natural fibers optimize the mechanical properties of pure biopolymers. On the other hand they upgrade the ecologically relevant component of standard plastics.

Consumer Products

There are hardly any limits to creativity in the use of WPC.

Using suitable manufacturing technologies, innovative product ideas can be realized that were not even conceivable in the nineties!

To develop WPC for further applications, improved performance can be achieved by suitable combinations with other materials, for example using coextrusion.

Pollutant-free toys, kitchen utensils in wood design, biodegradable planting pots, entertainment electronics with improved acoustics, writing devices such as the longest colored pencil in the world...





ARBOCEL®

Multifunctional
Plant Fiber Products

Innovative Fibers for the Industries of the Future



Sophisticated Materials

JRS natural fibers provide professional solutions to **innovation-hungry industries** searching for new approaches, for example in the automotive, aerospace, **mechanical engineering and energy systems** fields...

In addition to components made from thermosetting plastics and interior trim elements, applications include elastomer and duroplastic drive system components and brake pads.

The continuing progress in the field of material development reflects the ongoing and increasing demand for renewable raw materials with specific functions.

Applications in which the use of natural fibers would have been inconceivable in the past are now integrating modified fibers from JRS in a wide variety of polymers.

The trend in new developments is clearly pointing to **"green concepts"**, so natural fibers are a main focus in the selection of raw materials.

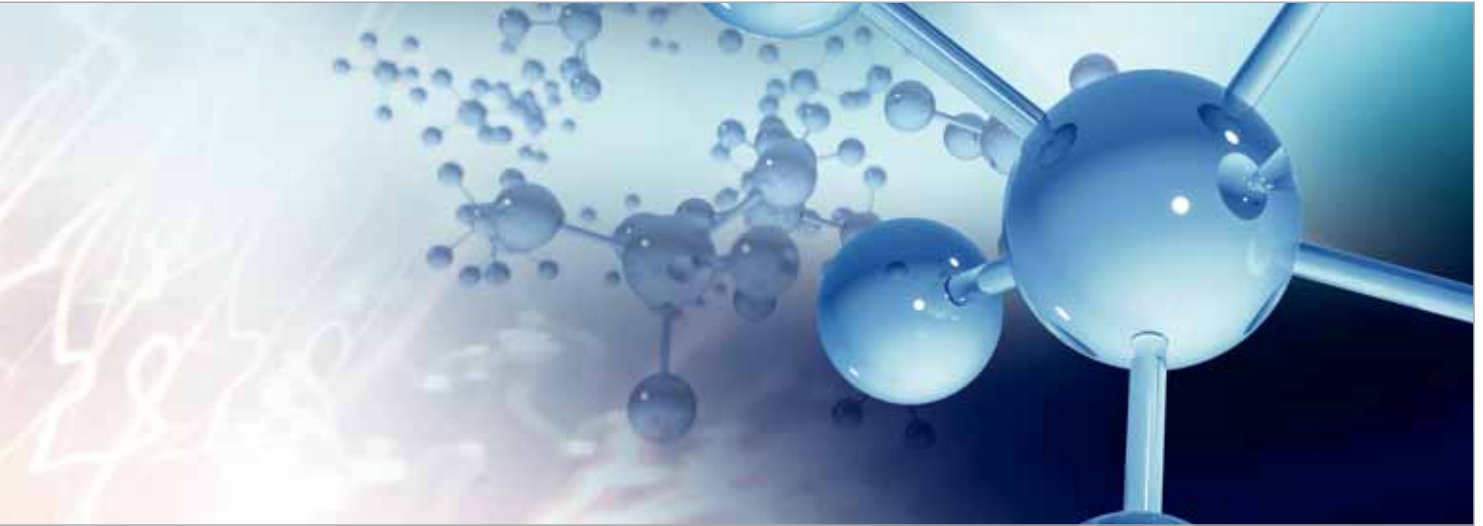
Force transfer

KEY COMPONENT REINFORCEMENT

KEY FEATURES Sealing systems

Process stabilization Material strength upgrades

Focus on Automotive and Mechanical Engineering Applications



Rubber and Elastomers

V-belts, seals and specific compounds are among the fields of application in which our products have been successfully established.

ARBOCEL® cellulose fibers provide fiber reinforcement in flat seals for oil and water cooling units.

ARBOCEL® microfibers. Their capillary structure facilitates absorption of oil fluids for optimization of the lubrication properties of dynamic sealing systems.

ARBOCEL® cellulose fibers improve the performance of V-belts with their compressible fiber structure and specific impact on shore hardness for optimized dynamic properties.



Thermosetting Materials

Molding compounds of phenol, melamine and polyester resins are widely used in electrical components, vehicle components for ignition systems or consumer goods.

In addition to cost savings, **ARBOCEL®** and **LIGNOCEL®** wood and cellulose fibers enhance the mechanical properties of the brittle duroplastic matrix.

In contrast to mineral fillers, the fibrous structure of **ARBOCEL®** and **LIGNOCEL®** improves the dimensional and form stability of the end products.

ARBOCEL® Cellulose fibers provide maximum color stability for high white and light colors: Depending on the specific color requirements, JRS cellulose fibers are chosen as highly pure, non yellowing cellulose or off white technical cellulose.

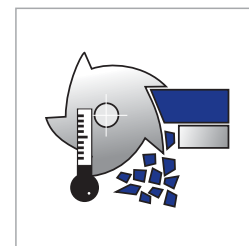
LIGNOCEL® wood fibers, on the other hand, are applied in molding compounds with darker colors.

JRS – Contract Manufacturing for the Plastics Industry



Milling of Plastics and Polymers

JRS Prozesstechnik GmbH & Co. KG – the Calenberg plant of the JRS Group – is our address for competence and technical know-how in upgrade processing of plastics. The objective is to create functional value added by means of specific product adaptations of customer plastics. The path leading to this goal involves a variety of methods of process engineering and mechanical modification.



CRUSHING FINE GRINDING
COLD MILLING MICRONIZING

Raw materials

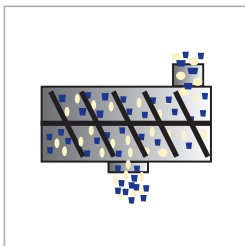
- Nearly all standard, technical and high-performance plastics and elastomers can be processed
- 1A goods as well as recyclates
- Natural colors, transparent or dyed



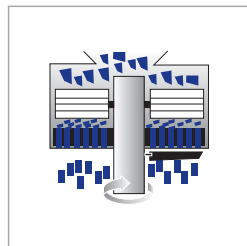
Processes

- From 5 kg test batches up to large serial production volumes, fine grades down to 32 µm
- Inline or separate fractionation
- Dosing of additives
- Mixing, homogenizing, filling and transferring
- Wide range of pack unit variants

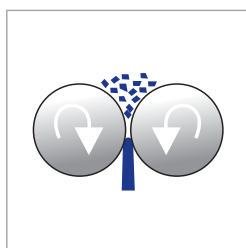
... Services all around Natural Fibers – and More !



MIXING
HOMOGENIZING



PELLETIZING



GRANULATING

Contract Manufacturing

The structure of fibrous raw materials gives them different properties for subsequent treatment and dosing than those of polymers.

In addition to the polymer processing, we therefore offer a further level to facilitate further work with JRS natural fibers.

In these processes, **ARBOCEL®** and **LIGNOCEL®** are added to the polymer during the mixing, then processed to make a composite material in the required form (powder mixture, pellets, granulate).

We perform your plastics and elastomers in the desired shape !

- With competent advice
- Reliable and flexible
- World-wide supply security
- Highest quality standards
- Unique product diversity
- Perfect service
- System partners

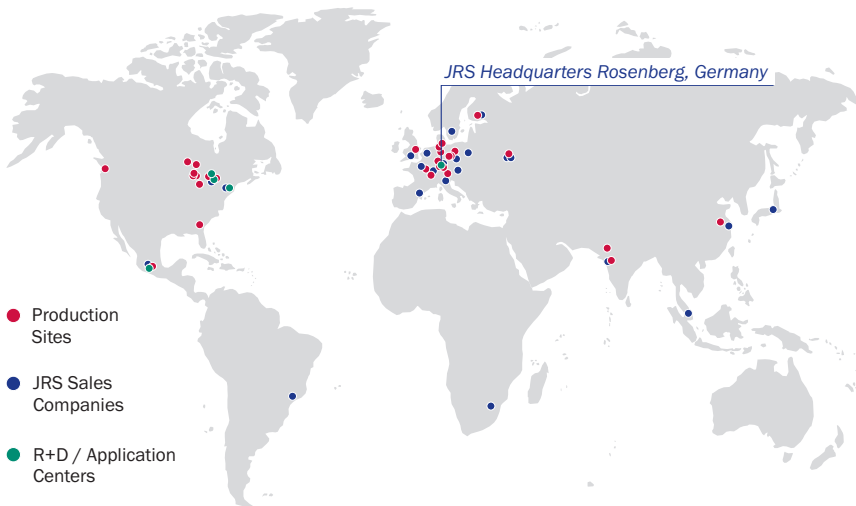


BUSINESS UNIT

CHEMISTRY

JRS – Your Competent Systems Partner and Solution Provider for Organic Fibers in Industry and Technology

JRS – YOUR Qualified Partner – worldwide



- Worldwide logistics and presence
- High availability and efficient, high-capacity production
- In-house research and development, application services
- Over 250 technical representatives around the world
- Decades of experience and comprehensive application know-how
- Quality manufacturing according to ISO 9001



JRS Company Headquarters, Rosenberg Plant (Germany)

J. RETTENMAIER & SÖHNE
GMBH + CO KG



Fibers designed
by Nature

www.jrs.de

WORLDWIDE HEADQUARTERS

Business Unit Chemistry
73494 Rosenberg (Germany)
Phone: +49 7967 152-906
info@jrs.de