

The innovative 'green' JRS Plant Fiber Technology

Highly functional Plant Fiber Products for all aspects of modern life

Manufacturer, Solution Provider, System and Technology Partner

Better. Green. Intelligent.

Nature offers us a seemingly endless reserve of useful functions which have been integrated into the plant world since the beginning of time. Every type of plant has its own specific properties. JRS innovative 'green' future-oriented technology opens up these valuable functions and properties for all areas of modern industry.

At JRS, J.RETTENMAIER & SÖHNE Group, we are committed to the development, processing, and optimization of high-grade natural fibers from cellulose, wood, grain, and fruit plants for use in pharmaceuticals, foodstuffs, animal feed, industry and technology.

Multiple Dimensions of the 'Green JRS Concept'

- 'Green' JRS plantfiber technology
- 'Green' plant raw material (also from resource saving side stream products)
- 'Green' efficient functionality
- 'Green' substitution of dangerous substances
- 'Green' production (all products are recyclable)
- Sustainable 'green' management of resources
- Practicable social sustainable values (social responsibility)
- 'Green' location policy



Functions of 'Green Products':

- Environment protection
- Energy saving
- Material saving
- Replace of dangerous material
- Recycling/ cycle of materials
- Waste reduction
- Health
- Better nutrition
- Safety at work

Good conscience for a worthwhile, better future!

Certified sustainability - manufactures from sustainable, plant derived raw matieral:







JRS products follow innately the vision of a natural cycle of materials.



Nature, tradition, future, sustainability.

As a **System and Technology Partner of Industry** we create solutions for many products and technical chemical processes with our fibers in almost every aspect of daily life. In everything we do, we endeavour to fulfil high ecological standards – from the selection of raw materials to the use of environmentally friendly manufacturing processes wherever possible.

In doing so, we aim for ecological as well as economical sustainability: in times of a growing world population we see ourselves as a pioneer for a modern, worth living world where all people have access to healthy food, worldwide available medical care, and resource saving, environmental friendly industry production.



Ideas designed by nature.



CEO Josef Otto Rettenmaier

As an independent, family owned and managed company group with clearly defined goals, we pursue a long term, reliable development strategy based on sustainability and partnership.

A spirit of inventiveness and close customer relations has shaped JRS for more than 140 years. What began in 1878 with the acquisition of an oil and grain mill has developed into one of the world's leading groups of companies involved in organic fibers.

While our headquarters are firmly rooted in the countryside of Swabia in Germany, our mentality and activities are fully internationally oriented.

Manufacturer, solution provider, system and technology partner:

Our sales and logistics concept is focused on the needs of modern industrial production – all around the world.

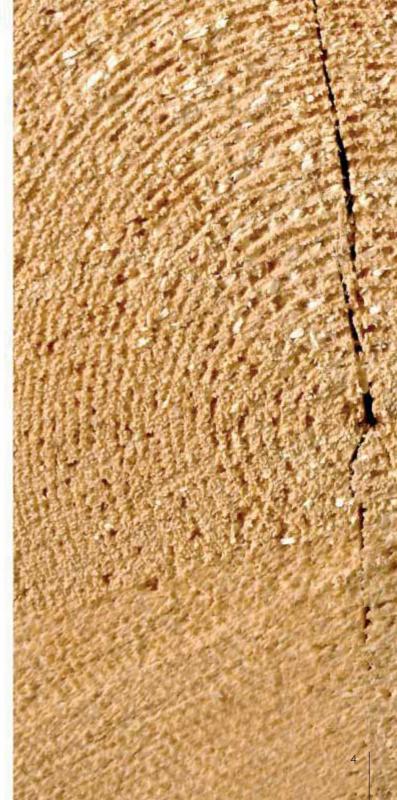
The engagement for a better world of tomorrow is our focus of activities – the 'green' JRS Plant Fiber Technology is our contribution on burning questions of world's health and nutrition, sustainable environment protection, and conservation of resources.

Thanks to this philosophy and the great affinity with our employees the JRS Family as a strong community looks into a successful, sustainable future!

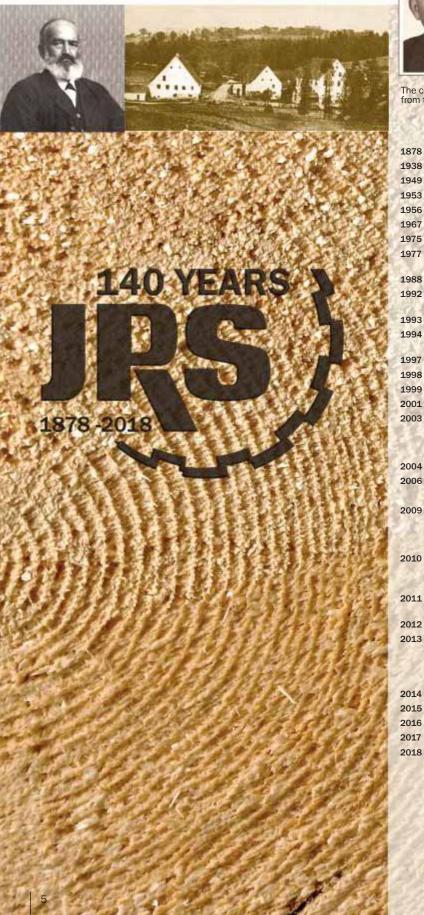
Yours,



Founder Jakob Rettenmaier 1854 - 1927



More than 140 years experience, know-how, and innovation.













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1878	Acquisition of the mill at Holzmuehle.
1938	Production of wood flour begins.
1949	Acquisition of Heilbronn plant.
1953	Foundation of the J. Rettenmaier & Söhne OHG.
1956	Production of cellulose powder begins.
1967	JRS develops new cellulose granulate.
1975	Further refinement of cellulose powder.
1977	JRS offers cellulose fibers as an environmentally friendly alternative for the asbestos processing industry.
1988	Production of fiber granulate for road construction in Hanover plant.
1992	Weissenborn site takes on production of microcrystalline cellulose for the pharmaceutical industry.
1993	Production and market introduction of wheat fiber.
1994	Lodenau plant begins production of fiber granulate for road construction. First JRS office in Hong Kong opens.
1997	Manufacturing start of carboxymethyl starch (CMS) in Pirna plant.
1998	Establishment of JRS production facility and sales offices in the USA.
1999	Pirna plant takes on production of croscarmellose.
2001	Production start of oat fiber in Lodenau plant.
2003	Purchase of excipient business from US competitor, reorganization and establishment of JRS Pharma USA and Europe with new production facilities in Finland and the USA. Production start of colloidal MCC in Weissenborn plant.
2004	Expansion of capacity for MCC production.
2006	Further US facilities for foodstuff production in the USA.
(B)	Joint-Venture JRS PHARMA and GMW, Gujarat, India Production of MCC.
2009	Aquisition of the company DEMACSA in Zacapu, Mexico Production of HPMC, MC. Start of the new gel production line, next MCC line and production of PROSOLV® at MCW Weissenborn.
2010	Start of serial production UFC (ultra fine cellulose) and MFC (micro fibrillated cellulose).
	Integration of ProJect Pharmaceutics GmbH, biotech services.
2011	Introduction of the Swedish office. Integration of Celonic AG, biotech services, into JRS Pharma Business.
2012	Completion of the Balakhna Works, Russia, road construction products.
2013	Founding of Rettenmaier Schweiz AG.
	Acquisition of animal bedding business of Zoosano AG Switzerland.
	Integration of Absorption Corp. USA. Further production lines in MCW Weissenborn.

Opening of a food laboratory in Asia.

Plants Brenil, France and JRS Holzenergie

Opening MCC Plant, China and new subsidiaries in

Latvia, Canada, Ukraine, Denmark und Korea.

Integration of Canadian Harvest®.

Aquisition Allied Blending, USA.

Integration Alginat Plant France.

Creating diversity from fibers.

JRS supplies a broad range of fiber products and applications to meet the needs of our global focus. Many of these products are unique to JRS. With our 'green' JRS cellulose and plant fiber technology we stand as a technology and world market leader.













In top quality and form.



Over the decades, we've acquired comprehensive know-how in specialized areas through in-house development of trendsetting application technology, continual research, and improvement.

With ultra-modern production facilities and consistent quality management, we can guarantee maximum efficiency and reliability on a systematic basis – as shown by our certifications ISO 9001, ISO 50001, QS, FSSC 22000, HACCP, PEFC, and GMP conformity (application-related).

Our 'green' raw materials come from the heart of nature:

Wood from native forests – environmental friendly obtained from **sustainable forestry**. From these, we prepare high-grade wood fibers in a range of sizes, grades and forms.

Fruit, **plant and grain fiber** material center stage for our **food applications**.

Wood is also the **natural**, **plant source** of what has become our most important base material – cellulose. It is obtained from the structural components of plants through a chemical process. Its special structure allows a wide variety of finishing, characterized by high mechanical and chemical stability. We process cellulose into versatile fibers, finest powder, compactions, mixed products, or derivates.

Wherever reasonable and possible, we use environmental friendly, resource saving side stream raw materials.





Many industries with a common denominator.

JRS activities are organized in 12 business areas.

Specialists in various disciplines and application areas are available as idea generator, advisor and competent problem solvers for all questions about JRS fibers.

The versatile synergy effects from different applications are for the benefit of all users of JRS plant fiber and cellulose technology.

JRS 'Life Science'	
	Tabletting evaluates for the abayman autical industry
JRS PHARMA BU Excipients	Tabletting excipients for the pharmaceutical industry: High-grade binders, economical fillers, superdisintegrants,
Do Excipionto	lubricants and novel multi-functional stabilizing excipients.
JRS PHARMA	Ready-to-use coating systems and MR technologies.
BU Coatings and	, , ,
MR Technologies	
BU Food	Food fibers for dietary fiber enrichment and functional
B0 1 000	additives from plant based raw materials – for healthier and tasty food products with improved product properties and
	optimized product processes.
BU Home and Personal Care	Natural oxidiants offset navidays who less salutions
BU HOME and Personal Care	Natural exfoliants, effect powders, rheology solutions for attractive and modern personal-care products. High functional additives for home-care products, e.g. for cleaning agent tabs.
	and a second control of the second control o
BU Animal Nutrition	Natural raw fiber concentrate for farm animal breeding and pet food.
IDOJE'I A I' I'	
JRS 'Fiber Applications'	
BU Filtration	Filter aids from natural, renewable raw material for precoat
20 1 111 41011	filtration contemporary materials, adhesives.
PII Chamieter	Fibers for the plactice industry, applications in page 27
BU Chemistry	Fibers for the plastics industry, applications in paper and packaging material industries, carrier for enzyme and detergent industries.
BU Industrial Applications	Fibers for building material chemicals and bitumen
Do maastral Applications	applications, cellulose for polyurethane leather manufacturing and welding electrodes.
BU Technical Applications	Smoking products for butchers and meat industry, plant fibers as cleaning, polishing and absorbent material for seed-coating and flooring.
	soca coating and nooning.
BU Road Construction	Cellulose fibers for high-quality, durable 'green' asphalt road pavements (SMA, PA, etc.).
BU Contract Manufacturing	Product refinement with the most modern milling, mixing
BO Contract Manufacturing	(blending) and compacting technology.
JRS 'Consumer Products'	
BU Petcare	Litter products for cats, dogs, rodents, small and exotic animals - manufactured from natural plant fiber.















Raw materials + Functionality + Application + Production

The JRS Core Competence: **Unique Know-how and Technology Combination**





In just about every aspect of daily life, consumers come into contact with products that have been produced with the help of JRS fibers.

An important future aspect for JRS:

We are committed to a sustainable, healthier nutrition which satisfies the requirements of the consumers all over the world. And tastes delicious!





Ideas for a better, healthier and tasty nutrition.



VITACEL® dietary fibers can be used to create health-oriented, state-of-the-art food that tastes simply delicious. Fiber enrichment, fat, sugar or calorie reduction, vegetarian, vegan, gluten or lactose-free products are all the latest trends and dietary habits. Clinical studies provide ample evidence of the importance of our dietary fibers in the area of digestion, an improved impact on insulin and other nutritional aspects.

The success of health-oriented foods on the market depends greatly on consumer acceptance.

With their sensory and haptic properties, VITACEL® Fiber Concentrates offer optimal solutions for tasty and successful recipes. VITACEL® Oat, Wheat, Pea, Potato, and Apple Fibers improve bread and other baked goods, sausages and meat products, snacks, cereals, noodles, dairy products, fruit preparations, dietary nutrition, beverages and much more. In addition, JRS offers high-performance formulation components with functional additives based on raw plant substances.

As the world's largest manufacturer of fiber concentrates, JRS represents decades of expertise and know-how in production, raw material selection, application and technological service for the benefit of the international food industry. 19 specialized, food-certified production sites ensure the provision of highest-quality products, reliable supplies, and customer proximity.



JRS filter celluloses for precoat filtration are used as a sustainable, environmentally friendly alternative for kieselgur and perlite, for all types of liquid, pre and final products in food manufacturing.

RÄUCHERGOLD® Smoking Products are used equally in modern, automated smoking plants as well as traditional ones. They refine ham, sausage, fish, and special cheese for an incomparable flavor experience and ensure a pleasant, natural coloring. At the same time, they preserve premium smoked products – highly sophisticated JRS Smoking Engineering and the traditional way it's been for hundreds of years work hand in hand.



Popular Life Science Partner in pharmaceutical and cosmetic industry:

JRS contributes know-how, decades of experience, and most sophisticated application knowledge to successful customer relationship. As a globally acting manufacturer, system and technology partner, JRS stands for competence, security and reliability.





JRS PHARMA is committed to a reliable medical care all over the world.

Big pharmaceutical companies, innovative special products suppliers – all trust in the reliability, security, and quality of the JRS PHARMA products worldwide, which are used for the manufacturing of tablets, capsules, and other pharmaceutical or neutraceutical products.

JRS PHARMA is one of the biggest producers of cellulose based, pharmaceutical excipients worldwide, and world market leader in MCC binders as well with the established quality brands **VIVAPUR®** and **EMCOCEL®**. The tightly standardized JRS production network consisting of 17 production plants on 3 continents guarantee excellent and consistent quality standards, security of supply, and short delivery distances. With competence centers in Europe, America and Asia JRS Pharma offers practice-oriented support in formulation development and technical advice to the pharmaceutical industry all over the world.

One-stop shop: Tablet binder, disintegrant, coatings, functional material for a secure, powerful production - JRS PHARMA offers all products a modern manufacturer of active ingredients needs for a custom-fit tablet formulation, among that a number of unique, innovative special products, just as the High Functional Excipients PROSOLV® SMCC and EasyTab.

Natural JRS Cosmetic Celluloses and Pflant Fibers revolutionize the big world of the international cosmetic industry. As environmental friendly replacement for dangerous PE spheres or as custom-fit functional additive, they bring the 'green' technology and new sustainability in the world of beauty and care. In the meantime, all international supplier use JRS products and their technology for offering more nature and health to the end user.



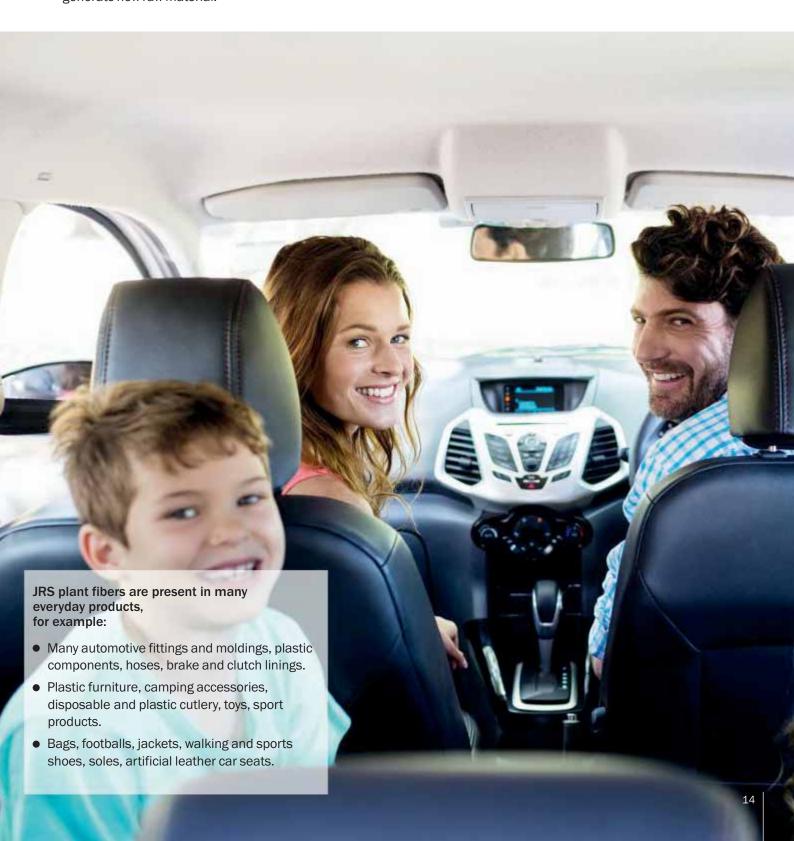


Pharmaceutical excipients for tablets, capsules, crèmes, and syrups.
Natural additives for personal-care products.



JRS fiber products are found as **process or functional materials** in many products that make our daily lives safer, simpler or more comfortable.

As a result of their versatile 'green' functionality, they help realize **environmentally-friendly** technical solutions, resp. generate new raw material.





In synthetic materials from anti-lock brakes to zips.



ARBOCEL® Cellulose Fibers are established functional components of many plastic products for home and leisure, just lately also in bio-plastics. Clothing, plastic formers, seals, soundproofing, rubber tires, artificial leather



covers, hoses, and other building components are endowed with functional characteristics, stability, surface structure or volume through **ARBOCEL**® or **LIGNOCEL**® fibers.

We help to make the world of plastics more 'green' and better!

LIGNOCEL® Wood Fiber Compounds enable completely new wood and synthetic materials (liquid wood or wood like plastic) with wood content of up to 80 %. Injection molded and extruded components for the furniture industry, window manufacture, profiles and corner sections, decorative elements, and many other applications form the basis of its multipurpose uses.

JRS Contract Manufacturing uses state-of-the-art special mill technology to process custom-fit adhesive or for plastics recycling.

Special ARBOCEL® Fibers for brake and clutch linings guarantee long lasting, extremely effective brake, contact, and friction linings. Added as process fibers and as additives in the manufacturing process, they often replace what are considered to be dangerous substances such as asbestos.

Products made from artificial PUR leather such as modern shoes, soles, car linings, footballs, bags, and other accessories require ARBOCEL® Special Cellulose to give them a high quality appearance and surface structure.



On the building site, in houses and apartments, or on the street, hardly anything would exist without JRS fibers.

As 'green' functional additives and process fibers they perform a valuable service in the most diverse areas.



For a sustainable 'green' road construction all over the world: VIATOP® Fiber Additive Pellets allow the manufacturing of longlasting, cost-effective and noise reduced asphalt road surfaces in SMA, PA or other special construction methods, such as asphalt recycling. Whether it's a highway, overloaded main road, racing circuit or airport runway, 'green' JRS Fiber Technology moves traffic around the globe.

Construction chemical products are almost unthinkable without **ARBOCEL®** or **LIGNOCEL®** Fibers.

Applications include plasters, mortars, construction and tile adhesives, grout and repair fillers, putties, plasterboards, paints, bitumen products, floor coverings, and wall papers.

They control drying and curing processes, e.g. to improve open time of tile adhesives. They prevent sagging of fillers or paint, inhibit the formation of cracks in putty, fine plaster or paint, give materials surface structure and stabilize mixtures or reduce dust.











'Green' JRS Technology – for streets, building, and living.



Animal nutrition, veterinary medicine, animal hygiene for pets or agricultural animal husbandry - our functional 'green' JRS Fiber Technology provides sustainable application and product solutions. All based on renewable, organic raw materials.





Hygiene, nutrition, and medicine for animals.



Based on renewable, organic raw material, JRS offers one of the world's most comprehensive, technologically highly functional portfolios of high quality **hygiene products for modern, natural pet care.** These highly effective bedding and litter products are specially designed to meet the needs of cats, dogs, small pets, horses, birds, rodents, or reptiles. **Perfect hygiene solutions for every type of animal!**

JRS competence brand lines for modern pet and animal care worldwide – **CAT'S BEST®**, Europe's No.1 **organic cat litter** with the unique odor and bacteria trap; the extensive **CHIPSI®** product range for small pets; horse box bedding and **DOG'S BEST®** litter for small dog hygiene.

As an innovative, strong **system partner** to international traders and retailers, JRS sets standards for modern pet hygiene in the fields of technology, quality, production, service and logistics. Both with the successful JRS brand

lines and as an attractive private label partner.

In the animal feed segment manufacturers of dog, cat and other pet food products place their trust in the highly functional characteristics of JRS crude fiber concentrates. In today's animal nutrition



industry ARBOCEL® and VITACEL® Crude Fiber Concentrates are playing an increasingly important role as natural feed additives, which successfully help to ensure the healthy and efficient growth of animals throughout the world. All products are based on stringent scientific parameters.

RS PHARMA also offers a wide-ranging portfolio of excipients for many different dosage forms for veterinary medicine – e.g. tablets and suspensions for pets or premixes for medicated feed in the animal husbandry segment.

JRS fibers are often the 'silent partners' in manufacturing processes and are not recognizable in the end product. As a drying and thickening material, carrier material, separator or carbon provider, they are indispensable functional 'green' contributors.

'Green' JRS Filter-Cellulose for the modern precoat filtration: In industrial metal working JRS Filter Aids help with environmental friendly processing of coolants and lubricants. High-grade motor and gearbox oils can be economically and ecologically filtered using JRS Filtration Products. In the metalworking and automotive industry, special filtration products help in processing cooling lubrication mixtures.

ARBOCEL® Fibers are an important component in the coating of **high-performance welding electrodes** e.g. for pipeline construction.

ARBOCEL® Functional Fiber Additives work in many kinds of adhesives.

ARBOCEL® Special Fiber Additives help make production processes in the **paper and packaging** material industries faster, more cost-effective and economical.

ARBOCEL® UFC is an innovative, ultra-fine disperse cellulose that leads paper coating in new dimensions.







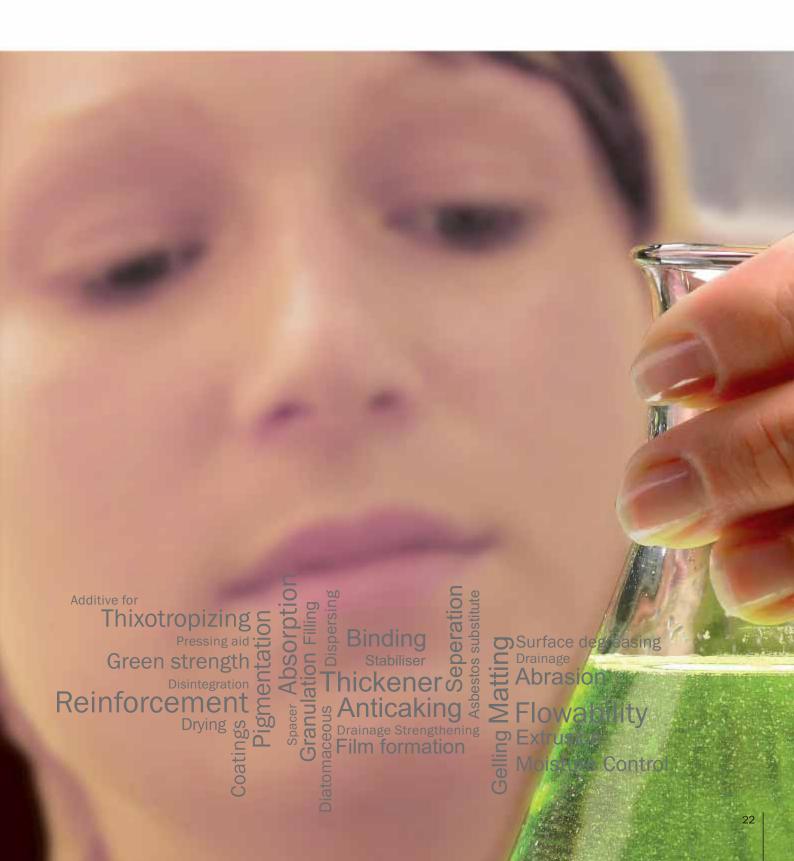
In many other technical applications too.



From development into practice and back again.

The wide range of applications of JRS fiber products demand well founded scientific support in application technology, research and development.

That's why new applications and product improvements are constantly being worked on in our laboratories alongside day-to-day quality and application support.





















Inside track: different particle structures provide different functions.

Versatile FUNCTIONALITY that gets results.



Examples:

Abrasive Materials Absorbents Anti-caking **Binding Agents** Carriers Decomposition Disintegrants Dispersion Drainage Drying **Dust Reduction** Excipients Exfoliants Extrusion Fat Replacer Filtration Filling Flowability Agents Gelling Granulation Greenstand Matting Nano Structure Pigmentation **Pressing Aids** Reinforcement Retardant Separators **Spacers** Stabilisers Strengtheners Structure Providers **Tabletting Aids** Thixotropic Materials Thickening Agents

... and many more ...

System and technology partner:

Our research and development experts are in continuous contact with actual applications and work closely together with our customers. This enables us to react quickly to customer and market requirements and to find optimized custom solutions.

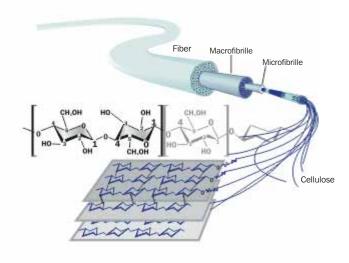
Our customers profit from our many years of experience in virtually all disciplines of modern technology and a huge pool of tried and tested solutions.

Since decades JRS customers benefit of this know-how and process transfer:

Competitive advantage – thanks to ,green' JRS Plant Fibers Technology!

Examples of JRS Innovation:

- JRS Cosmetic Cellulose, for example as replacement for polluting PE Plastic Spheres in tooth pastes and shower gels
- **Ultra-fine cellulose** e.g. for paper coating and rheologic functionalities
- Colloidal systems e.g. for ice cream and other disperse systems
- PROSOLV® SMCC with increased surface area as multifunctional tabletting and combination material
- PROSOLV® EasyTab ready-to-use tabletting composite (multi-component system)



Request our detailed technical information or visit our website - **www.jrs.de**

Strong people, strong roots, strong values.

A company is only as good as the employees that form it. That's why we, at JRS, are proud of a highly motivated team of well trained experts from a wide range of disciplines and technologies – all committed with engagement and all their energies to the innovative 'green' JRS philosophy. With our work we want to make the world a bit better every day!

At JRS, each person counts as an individual on eye level, integrated in the strong supportive community of the JRS family.

Every single JRS employee has a role to play in the success of the company.

Worldwide, all JRS employees are successfully involved with their individual personalities and knowledge in this partnership based value system.

Behind all this is the philosophy of a self-confident, independent, family business with active customer orientation.

Our CSR corporate guidelines set out our code of ethics and define our responsibility within our social and societal environment. Corresponding, SEDEX compliant documents are available on demand. Our environmental manual, included in our corporate guidelines, summarizes our position on ecological responsibility and our system of rules for its practical implementation in our day-to-day activities.

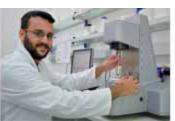
As an attractive employer and education partner we are committed on a sustainable 'green' future.

Continual training and ongoing education help us to secure the future of our organization and our competitive advantage, which we pass on to our customers.

Benefitting our customers around the world.











For satisfied customers and a healthy environment.



A strong group.

Some examples from the worldwide JRS production network:



Facility I JRS PHARMA Cedar Rapids, Iowa, USA



Facility II JRS Food Cedar Rapids, Iowa, USA



Facility JRS USA Schoolcraft, Michigan



Facility JRS-GMW, India



Facility JRS Portage, USA



Facility DEMACSA, Zacapu Mexico



Facility Mansfield, UK



Production Changzhou, China



Facility Balakna, Russia



Facility JRS PHARMA Nastola, Finland



Alginate plant Landernau, France

More than 3500 committed employees at about 90 productions and sales sites in Europe, the US, Asia.



JRS Headquarters, Rosenberg, Germany

The geographical center of the JRS Group is our headquarters in Rosenberg, close to Ellwangen, Germany, with sales, logistics, and administration. This is also the main production location for technical products.

Specialized production sites distributed across Germany, France, the UK, Finland, Russia, the US, Mexico, India and China ensure closeness to users and, at the same time, guarantee reliability of supply. They operate, networked together, as 100% subsidiaries under the umbrella of the JRS Group of Companies.

JRS is present, with its products in more than **120** countries.

R+D and Application Technology Centers in Europe, the US and Asia are the technological basis of JRS.





The global JRS production and service network.



Facility CTL Lodenau, Germany



Facility CHP Pirna, Germany



Facility MCW Weissenborn, Germany



Production Brenil, France



Facility JRS Heilbronn, Germany



Facility JRS North Kiel, Germany



Facility JRS West Bremen, Germany



Facility JRS Process Technology Calenberg, Germany

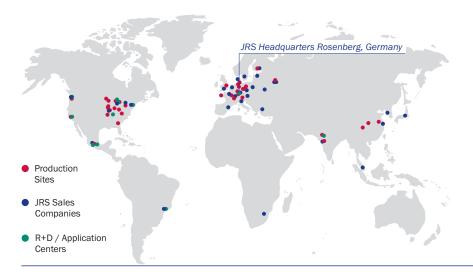


Worldwide - always close.

The **global JRS company network** stands for a globally organized, secure supply concept.

As a production and technology partner of the industrial world JRS guarantees short connections and excellent service.

JRS - YOUR Qualified Partner - worldwide





JRS Headquarters, Rosenberg, Germany



www.jrs.de

WORLDWIDE HEADQUARTERS

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