



LEADING PHARMA INNOVATION

Research Center Pharmaceutical Engineering

Leading Pharma Innovation

Research Center Pharmaceutical Engineering GmbH (RCPE) is a globally recognized, independent research company at the forefront of pharmaceutical process and product development.



WHO WE ARE

RCPE supports partners worldwide in designing, developing, and manufacturing innovative medicines more efficiently and reliably. By combining cutting-edge modeling and prediction tools, Quality by Design (QbD), material science, process design, and quality control, we deliver tailor-made solutions across the entire value chain – from continuous API synthesis and advanced formulations to next-generation manufacturing of medicines ranging from small molecules to biologics, nano-medicines, and new modalities.

Founded in 2008 in Graz, Austria, RCPE has evolved into an internationally recognized center of excellence in pharmaceutical engineering.

Our state-of-the-art pilot plant enables testing a broad range of manufacturing technologies, allowing rapid evaluation of products and processes developed with advanced digital methods. It also supports the safe handling and processing of active pharmaceutical ingredients up to OEB 4, making this capability a distinctive strength of RCPE.

MISSION

Our mission is to accelerate the development of tomorrow's therapies, de-risk pharmaceutical development, and enable efficient, reliable scale-up. This strengthens the competitiveness of our partners and, in turn, helps improve patients' lives worldwide.



PHARMA INNOVATION



OWNERSHIP AND PARTNER NETWORK

RCPE is an independent R&D company jointly owned by Graz University of Technology, the University of Graz, and JOANNEUM RESEARCH. As a COMET center, we collaborate with leading pharmaceutical and technology companies, European institutions such as DG HERA, and other stakeholders in application-driven R&D projects, acting as a neutral partner that bridges academia and industry. Our business model is built on long-term partnerships and science-based solutions that translate directly into industrial practice. We have collaborated with more than 150 partners worldwide, including all major global pharmaceutical companies, technology providers, and regulators such as FDA and EMA – creating trusted relationships that turn scientific excellence into implementable solutions.



Discover RCPE
and our mission



End-to-End Pharmaceutical Process and Product Development

RCPE develops next-generation tools and solutions that enable pharmaceutical companies to rapidly design, formulate, and manufacture medicines. We focus on a broad range of drug delivery systems, from oral tablets and inhalers to injections, biologics, nano-medicines, and topical formulations.

Our research spans high-performance modeling and simulation, personalized and continuous production, flow chemistry, drug design, digitalization and machine learning, advanced process control, material science, emergency production, and biopharmaceutics.

What makes RCPE unique is the integration of a broad range of disciplines, methods, and infrastructure. We combine laboratory research, pilot-scale capabilities, advanced analytics, and simulation in one integrated environment to accelerate development, deepen process understanding and enable smoother scale-up.



From first concepts to scalable production and tech transfer, RCPE connects expertise across the full pharmaceutical value chain:

■ **MODELING & DIGITALIZATION**

Mechanistic and data-driven models for process understanding, prediction, and scale-up.

■ **API FLOW SYNTHESIS**

Continuous flow processes for safer, more efficient, and more sustainable API manufacturing.

■ **ADVANCED FORMULATION DEVELOPMENT**

Advanced drug products and delivery systems for robust manufacturing and patient-centric performance.

■ **NEXT-GENERATION DRUG MANUFACTURING**

Advanced manufacturing concepts, including continuous solutions and process analytical technology (PAT), for robust and efficient production.



From early stage molecule and formulation concepts to integrated manufacturing solutions, RCPE provides end-to-end pharmaceutical process and product development from a single, trusted partner.

Explore our core competencies



Bridging Science and Industry

RCPE supports pharmaceutical and life sciences companies in enhancing their development and manufacturing capabilities by offering flexible collaboration models – ranging from targeted services to multi-year co-funded COMET projects and long-term strategic partnerships.

HOW YOU CAN WORK WITH US

■ COMET PROJECTS

Up to 50% publicly funded, multi-partner, multi-year R&D projects within the pre-approved funding of the COMET framework – ideal for exploring innovative concepts with balanced risk and investment. RCPE manages coordination and reporting to funding agencies.

■ FUNDED COLLABORATIONS BEYOND COMET

Flexible collaborations supported by national and international funding programs. We assist in identifying suitable calls and preparing proposals, execute projects with our expert teams, and ensure professional reporting to funding agencies.

■ CONTRACT RESEARCH PROJECTS

Targeted, contract-based research where RCPE delivers results for partners; fully client-funded, with IP ownership residing with the client.

■ STRATEGIC PARTNERSHIPS AND FTE-BASED CONTRACTS

Long-term collaboration models, including FTE “subscription” contracts, providing continuous access to a dedicated RCPE expert team and priority use of our facilities aligned with your strategic priorities.

■ LAB SERVICES

Specialized analytical and material science lab services support characterization, method development, and troubleshooting across all project types.



A Global Partnership Ecosystem

RCPE is a trusted partner for leading global pharmaceutical companies, as well as innovative small and mid-sized enterprises. Our network of more than 150 partners includes originator and generic pharmaceutical companies, equipment, technology, and software providers, as well as regulatory stakeholders, complemented by leading universities and research organizations.

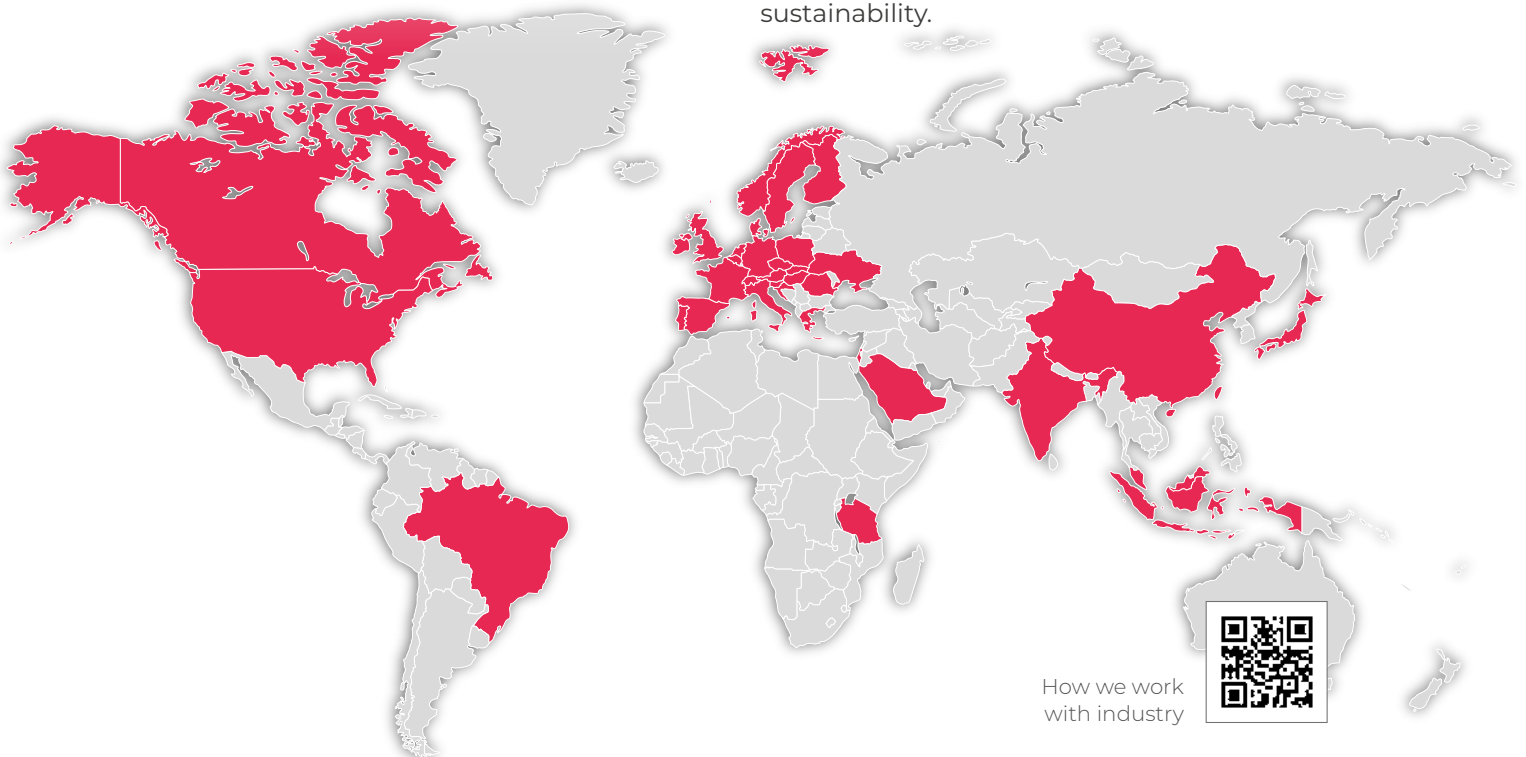
As an independent COMET Competence Center, we provide a neutral environment where industrial and academic partners can jointly explore new concepts, de-risk technologies, and translate scientific advances into industrial reality.

This innovation ecosystem has already led to multiple patents, six RCPE spin-offs, and several new company locations in our region, such as **PRSG** for regulatory support and filings, **MeltPrep** for advanced experimental tools for polymer processing and **SimVantage** for digital bio-process design.



Project structures and teams are tailored for each collaboration, ensuring the right balance between scientific objectives, timelines, cost efficiency, and confidentiality.

Our integrated management system, certified to ISO 9001 (Quality Management) and ISO 90003 (Software Development) and complemented by ISO 14001 (Environmental Management), ensures robust, reliable processes and reflects our strong commitment to quality and sustainability.



How we work
with industry



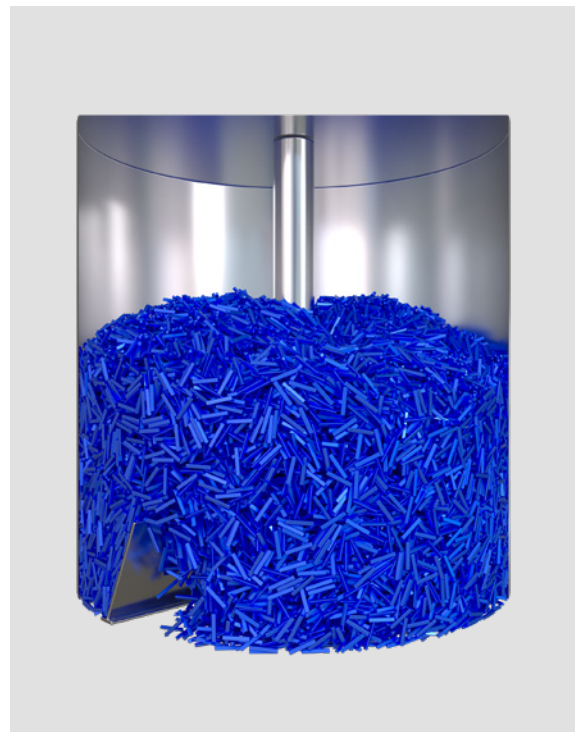
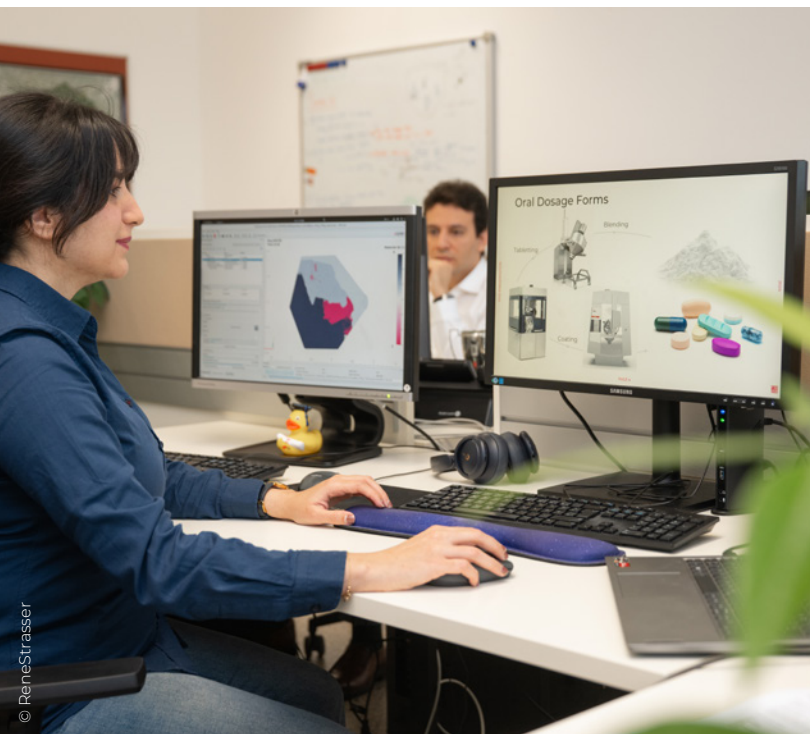
Modeling and Digital Tools

From molecular to the full process scale, RCPE combines mechanistic modeling and AI to build digital twins that predict how molecules, materials, and processes behave - reducing experimental effort and development risk. Using tools such as Discrete Element Method (DEM), computational fluid dynamics (CFD), molecular modeling, AI, and hybrid data-driven approaches, we help partners understand how critical material attributes and process parameters influence quality, robustness, and sustainability. This enables companies to explore process options virtually, design better control strategies, and scale-up with greater confidence.

XPS – EXTENDED PARTICLE SIMULATIONS

XPS is RCPE's GPU-accelerated DEM platform, developed specifically for pharmaceutical powder applications. Its advanced calibration capabilities and high computational performance give unprecedented insight into powder behavior without time- and labor-intensive experiments.

Discover our
digital solutions



XPS-based simulation of drying dynamics for needle-shaped crystals in a stirred tank

- **PREDICTIVE PROCESS AND PRODUCT DESIGN**

Mechanistic and hybrid models and digital twins to design, optimize and scale processes instead of large experimental campaigns.

- **DATA-DRIVEN DECISION SUPPORT**

AI enhanced and reduced order models that turn lab, pilot and PAT data into tools for fast development and troubleshooting.

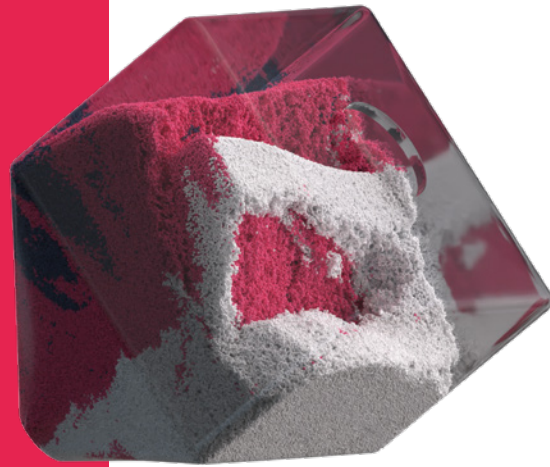
- **QUALITY AND REGULATORY INSIGHT**

Model-based links between materials, processes, and critical quality attributes to support QbD and regulatory dossiers.

- **DIGITAL ENABLERS FOR CONTROL**

Virtual process windows and soft sensors that support smarter control strategies and more robust manufacturing.

XPS-based simulation of industrial powder blending to ensure a uniform dose in every tablet



SYNTEGON

Your full lifecycle partner in the development and manufacturing of solid oral dosage forms for the pharmaceutical and nutraceutical industry.

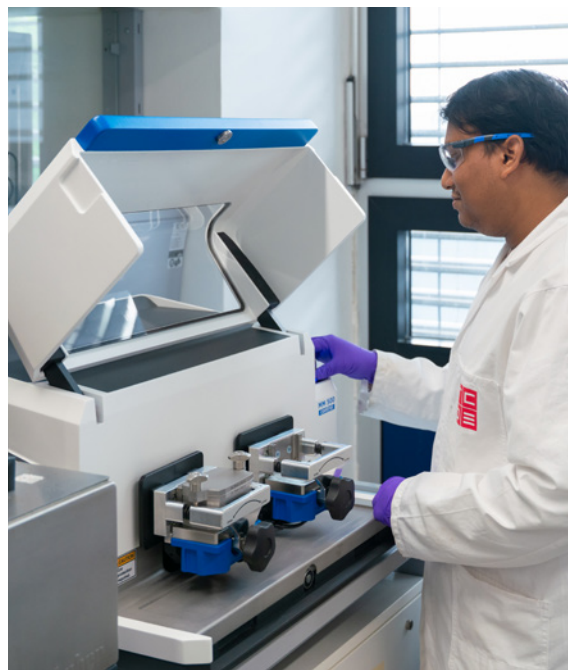
**From lab to
global scale**



API Flow Synthesis



RCPE develops and applies modern flow technologies to transform how active pharmaceutical ingredients (APIs) and fine chemicals are made. By combining innovative synthetic chemistry with chemical engineering, automation, and data-driven digital process development, we turn lab-scale routes into robust and scalable continuous processes tailored for industrial application. Safety, efficiency, and green chemistry principles are embedded in every project from day one.



WHY PARTNER WITH RCPE FOR FLOW SYNTHESIS?

RCPE offers dedicated flow platforms for mechano-, photo-, and electro-chemistry, high pressure/high temperature syntheses, and multi-step sequences, plus the analytics and control needed to run them safely and reproducibly. We use these setups to shorten development times, de-risk scale-up and create continuous processes that are cleaner, more efficient, and more sustainable than batch.





Experts for Continuous Processing Solutions

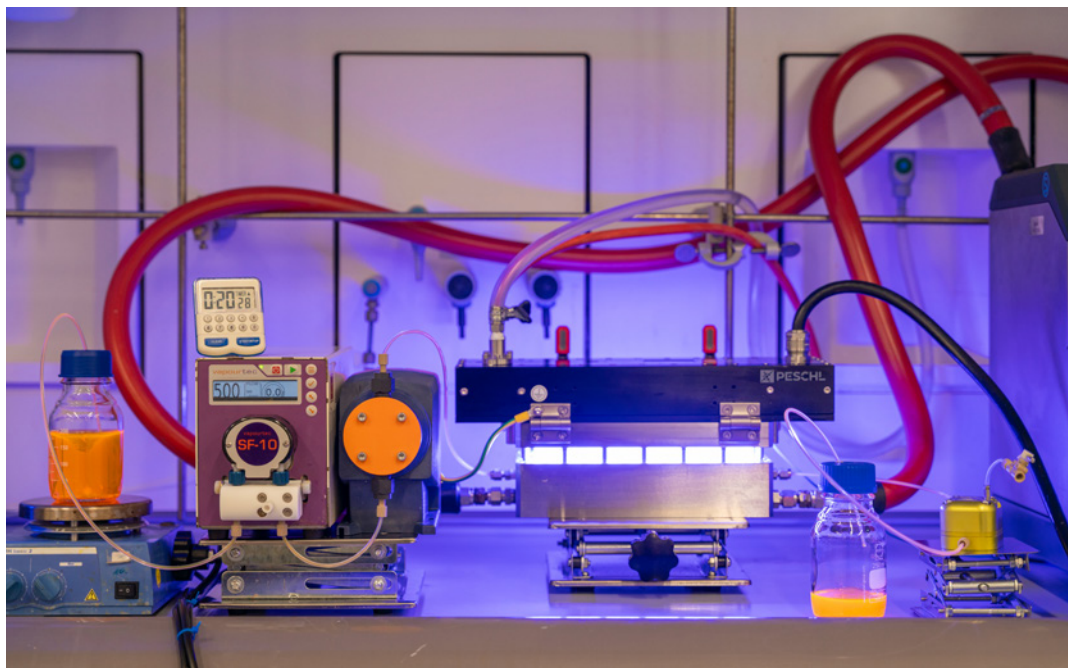
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8412 Allerheiligen b.W.

 +43 3182 62626 0

 office@microinnova.com

 www.microinnova.com





■ SAFER, MORE ROBUST API SYNTHESIS IN FLOW

We design continuous flow routes for APIs and key intermediates that improve safety, reproducibility, and process control compared to batch processing.

■ FLOW PHOTOCHEMISTRY AND ELECTROCHEMISTRY

We develop photochemical and electrochemical transformations in flow as greener, highly controlled alternatives to conventional redox chemistry.

■ MECHANOCHEMISTRY AND ALTERNATIVE TECHNOLOGIES

We apply mechanochemistry and other alternative reaction technologies to reduce solvent use and energy consumption while maintaining high yield and selectivity.

■ PROCESS INTENSIFICATION AND MULTI-STEP FLOW

We combine multiple reaction and work-up steps into uninterrupted multi-step flow sequences to shorten cycle times and simplify complex syntheses.



Explore our API flow
synthesis capabilities



**The Patent
People.**

Dilg, Haeusler, Schindemann
Patentanwalts-Gesellschaft mbH
www.dhs-patent.de



**EVOLUTION
OF TECHNOLOGY**

Vom Konzept bis zur Umsetzung:
ZETA – Ihr Partner für die Pharma- und
Biotechindustrie!



Zetaplatz 1, 8501 Lieboch, +43 3136 9010 1000, office@zeta.com

Advanced Formulations

RCPE designs and advances next-generation pharmaceutical formulations and delivery systems, from small molecules to biologics. Building on our deep expertise in solid state chemistry, material science, particle engineering, biomolecular chemistry, and biopharmaceutics, we develop drug products tailored for stability, manufacturability, and patient-centric performance. Our work spans oral, parenteral, inhalation, and other complex dosage forms, supported by advanced analytics, modeling and pilot-scale capabilities.

INTEGRATED FORMULATION, ANALYTICS, AND SCALE-UP

At RCPE, formulation scientists, material and analytical experts, and pilot plant teams work hand in hand – from pre-formulation and material characterization to process development and scale-up. This integrated environment allows us to rapidly move from concept to industry-ready processes and to de-risk critical decisions along the way.



NETZSCH

SMART THERMAL
ANALYSIS AND
RHEOLOGY SOLUTIONS
FOR LIFE SCIENCES





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■ ORAL SOLID DOSAGE FORMS AND SOLID DISPERSIONS

We design robust tablet and capsule formulations, including amorphous solid dispersions, to overcome solubility limits and ensure reliable exposure.

■ NANO AND ADVANCED BIOLOGICS FORMULATIONS

We create nano-enabled and complex parenteral formulations to improve bioavailability, stability, and targeted delivery for challenging drugs, including high-dose biologics.

■ INHALATION AND PULMONARY DELIVERY

We develop inhalation products and engineered particles that enable efficient lung deposition and consistent dose delivery.

■ BIOPHARMACEUTICS AND PERFORMANCE PREDICTION

We link material and formulation properties to *in vitro* and *in silico* performance to support bioavailability, food effect, and dosage form decisions.



Explore our advanced formulation expertise



Sympatec GmbH
System | Partikel | Technik

PARTIKELMESSTECHNIK

▮ Laserbeugung

▮ Dynamische Bildanalyse

▮ Ultraschallextinktion

▮ Dynamische Lichtstreuung

www.sympatec.com

We size your particles.

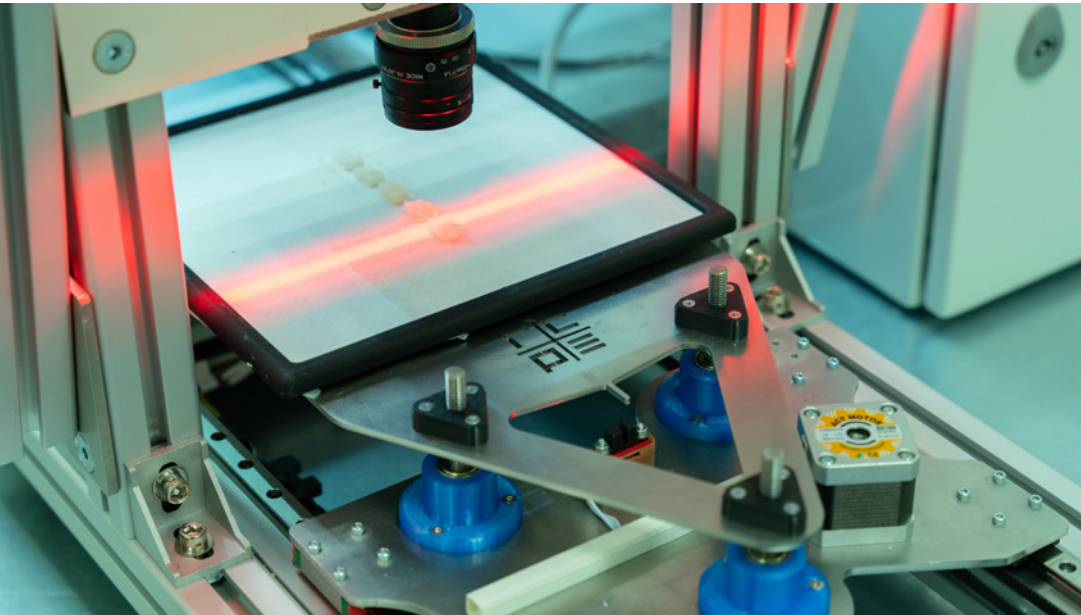
Next-Generation Drug Product Manufacturing

RCPE links advanced process science with deep manufacturing know-how to create robust, efficient, green, and scalable pharmaceutical production processes. Our work spans continuous and intensified manufacturing, biologics production, hot melt extrusion, spray drying, oral dosage form manufacturing, nano-production, and personalized routes. With integrated PAT, advanced control concepts, and digital twins, we help partners modernize manufacturing, improve quality, and reduce risk and time to market.

FROM CONCEPT TO COMMERCIAL READY PROCESSES

At RCPE, formulation development, analytics, modeling, and pilot-scale manufacturing are closely connected, allowing us to move manufacturing concepts from lab trials to clinical and commercialization-ready processes. By combining continuous and batch technologies, PAT, and digital tools, we help partners translate innovative ideas into robust, scalable production platforms that are ready for real-world implementation.





Explore next-generation
manufacturing

■ CONTINUOUS AND INTENSIFIED PROCESSES

We develop and implement continuous and intensified manufacturing concepts to increase efficiency, robustness, and flexibility.

■ HOT MELT EXTRUSION AND SPRAY DRYING

We design HME and spray drying processes, for example for amorphous solid dispersions and advanced particle engineering.

■ PAT, CONTROL STRATEGIES, AND DIGITAL TWINS

We integrate PAT, advanced control strategies, and digital twins to enable real-time insights and smarter production decisions.

■ HANDLING COMPLEXITY AND HIGH POTENCY

With flexible labs, a GMP-like pilot plant, and experience up to hazard class OEB 4, we safely establish and scale complex and highly potent manufacturing processes.



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**Integrated
Process
Solutions.**

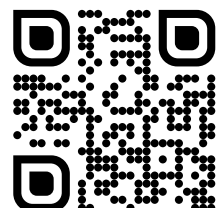
Pharmaceutical Services

Process Technology

Pharma, Food, Feed & Fine Chemicals

Process & Plant Engineering

DISCOVER MORE





CONNECTING COMPANIES SUPPORTING BUSINESS ENABLING GROWTH

More than 150 companies • 45,000 employees within the cluster • € 5 billion in annual revenue

HUMAN.TECHNOLOGY. STYRIA

Founded in 2004, Human.technology Styria GmbH (HTS) is a cluster organisation dedicated to human technology and the life sciences. We connect research, innovation and industry to create synergies, provide Styrian companies with targeted

access to new technologies and expertise, foster new partnerships, and strengthen the region's visibility on both a national and international level.

OUR SERVICES

NETWORKING

- Connecting companies across our cluster community
- Bringing together key players from industry, academia and policy at regional, national and international level
- Providing access to industry associations, committees and relevant expert networks
- Connecting businesses with specialised industry experts

INTERNATIONALISATION

- Access to international delegations and company visits
- Visibility at leading international trade fairs and conferences at preferential rates
- Support in exploring and entering new international markets

BUSINESS DEVELOPMENT

- Scouting and development of project partnerships
- Identification of research and funding programmes
- Access to EU projects and other collaborative initiatives

OUR PUBLICATIONS

Discover
more



Continuous Pharmaceutical Manufacturing

RCPE is a recognized leader in continuous pharmaceutical manufacturing, helping companies design, test, and adopt continuous and hybrid production concepts from API synthesis to the drug product, including oral solids, biologics, nano-enabled, and other advanced products.

We combine formulation, process design, PAT and digital tools to create continuous lines that are more efficient, more flexible, and easier to monitor in real-time. Using our versatile pilot plant and highly potent API capabilities, production concepts can be tested and de-risked under realistic conditions before technology transfer to industrial sites.

- Continuous lines for oral solid dosage forms and complex formulations.
- Definition of operating spaces for existing and new products.
- PAT-enabled, data-driven control concepts for improved robustness and real-time quality control.



© LUPLSPUMA



Learn about continuous manufacturing

High End Labs and Pilot Plant

RCPE offers more than 1,000 m² of state-of-the-art laboratory and pilot plant facilities that closely resemble real-life pharmaceutical production environments. Our GMP-like pilot plant, flexible process labs, and experience with highly potent drugs (up to hazard class OEB 4) enable safe process establishment, optimization, and scale-up.

PILOT-SCALE DEVELOPMENT UNDER REALISTIC CONDITIONS

Our dedicated pilot plant accelerates formulation and process development from lab to industrial scale. It combines continuous and

batch technologies for oral and complex dosage forms – including nano-manufacturing platforms, hot melt extrusion, spray drying, tableting, milling, wet granulation, and advanced coating – to test and refine processes under realistic conditions.

With pharma standard clean rooms (ISO 7) and GMP-like operations, partners can evaluate processes under near-industrial conditions, generate regulatory relevant data, and de-risk scale-up and technology transfer.

Leistritz

Scalable innovation meets reliability.

**Decades of experience
in pharmaceutical extrusion.**

- / Hot melt extrusion, Wet granulation, Wet extrusion, Melt granulation, Lipid extrusion.
- / Extruder series from 50 g/h to more than 100 kg/h (screw diameters from 12 to 50 mm).
- / Cooperation with institutes and universities around the world.
- / Top GMP design and containment solutions.
- / Vast process know how and expertise in qualification.



extruders.leistritz.com



HIGHLY POTENT PILOT PLANT – UP TO OEB 4

RCPE's facilities support the development and testing of processes involving highly potent active ingredients up to hazard class OEB 4, including energetic and explosive materials. This capability allows partners to assess containment concepts, handling strategies, and process robustness for demanding molecules at an early stage.

INTEGRATED PROCESS ENVIRONMENT

Our pilot plant and process labs are closely connected to RCPE's formulation, material and analytical expertise, enabling process concepts to be tested and optimized under real-life conditions. This integrated setup supports earlier, better decisions on manufacturability and scale-up.

Discover our pilot plant
infrastructure



Laboratory Services

RCPE's analytical and material science labs provide end-to-end support, from early-stage characterization to transfer-ready methods and deep material understanding. We help partners connect analytical data and material properties with manufacturability, stability, and product performance to make key decisions earlier and with greater confidence.

ANALYTICAL SCIENCE LAB

We develop and optimize methods to assay purity and impurities and perform release and stability testing for small molecules and complex analytes, using HPLC/UPLC with diverse detectors, dissolution testing and plate-based analytics to generate robust data for development and scale-up.

We modernize challenging or legacy methods and design forced degradation and stability studies to reveal degradation pathways and shelf life, providing a robust analytical foundation for smooth technology transfer.

MATERIAL SCIENCE LAB

Our material science lab characterizes solid and liquid materials to understand how their properties influence manufacturability, stability, and product performance. Capabilities include solid state and polymorph screening, particle and powder characterization, such as size, shape, flow, and charge, and in-depth structure-property-performance studies.

With our material-sparing approach, we generate insights that guide formulation design and process selection, show how materials behave under mechanical, thermal and environmental stress, and deliver rapid solutions to manufacturability and scale-up challenges.



X-ray Analytical Solutions

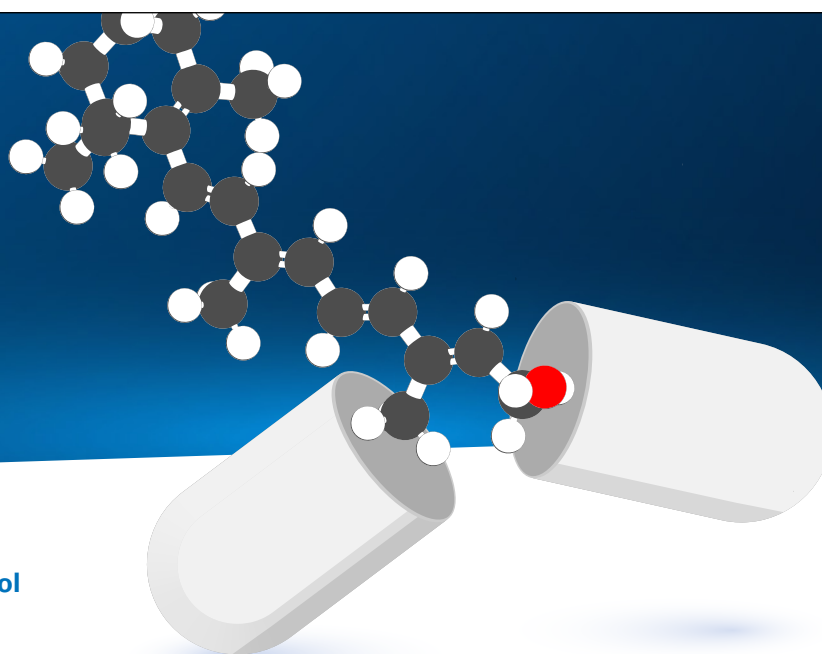
Drug Discovery & Development

XRD & SC-XRD Structure Analysis

Drug Manufacturing & Quality Control

XRM, XRF, TXRF, XRD

Discover more at bruker.com/pharma





Explore our analytical and
material science lab services



Emergency Production for Critical Medicines

Recent medicine shortages highlight the vulnerability of Europe's manufacturing base and its dependence on Asian API suppliers. RCPE addresses these risks by developing faster, greener, and more cost-effective manufacturing routes, including API flow synthesis, continuous manufacturing, and decentralized production.

RCPE has also patented a "smart stockpiling" technology that combines ultra-long-term API storage (10+ years) with rapid production of finished dosage forms. This approach cuts costly, wasteful storage of packaged medicines with limited shelf life and is now being driven forward together with Austrian and European agencies.



RCPE's emergency production concept

Knowledge and Collaboration

University of Graz – research partner:

Smart technologies for the production of medicine

University of Graz – study partner:

NAWI Graz Master's programme in Chemical and Pharmaceutical Engineering

uni-graz.at

Who designs personalized medicine?

We work for tomorrow



Green and Sustainable Pharma

RCPE is shaping a greener, more sustainable future for pharmaceutical manufacturing – from digital process innovation to circular concepts for medicines.

Together with partners from industry and academia, Twin4Pharma advances digitally enabled, more sustainable development and manufacturing routes, while the large-scale EU project PharmECO builds sustainable-by-design platforms and green processes for substance and drug manufacturing.

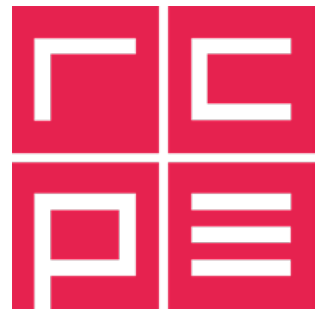
RCPE also pioneers pharma recycling, recovering high-value active ingredients from production rejects and returned medicines to reduce environmental impact and ease pressure on scarce or complex APIs.

Together, these initiatives support the United Nations Sustainable Development Goals 3, 9 and 12.



Discover our green
pharma initiatives





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Our Shareholders



Our Public Funding Partners

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