

# Leader in White Biotech Solutions

Competence to take you ahead



[gea.com](http://gea.com)

# White Biotech – safeguarding the future of generations

From a fossil-based towards a bio-economically based industry.

The White Biotech revolution has inevitably begun to protect the environment and the lives of future generations. New bioeconomical solutions for energy, chemical production, bioplastics and pharmacy are on their way in to set new standards in mass production.

With the discovery of enzyme functions and the fermentation process over the last centuries, and the recent breathtaking progress in the decoding of microorganism genomes and in controlling the genetic mechanism, the knowledge how to reproduce known materials in sustainable ways has arrived.

#### Bio-friendly substitution of known materials

Mass products can today be produced with important functional advantages, and with greatly reduced amounts of heat, pressure and harmful by-products in the production process: Cleaning agents, biofuels, many bulk chemicals as well as fine chemical products such as food additives and nutritional supplements.

#### Research and technological process excellence

Developments have only just begun. New research must lay the foundations for a truly efficient means of production, to which biotechnology can make a decisive contribution. Technological process excellence will lay the basis, extraordinary power to drive research will create sustainable innovations. More and even greater possibilities have already been discovered and studied in tests. Biorefineries and biomass-to-fuel processes are just two technologies on the verge of becoming standard tools of modern production. And thousand of yet unexplored microbe varieties with special properties and functional opportunities remain to be studied, while, on the engineering frontier, entirely new approaches to synthetic bio-design are being developed.



Highly functional plastic materials are a key product of innovative White Biotech manufacturing processes.



Towards a bioeconomically based production: White Biotech produces high-value products from low-value plant materials (stem and leaf cells, cellulose, ...).



# No limits to your research

Overcoming technical barriers – with expertise from GEA.

Research in the developing of White Biotech applications is already a challenge in itself. Technologies need to be evaluated, selected, combined and set up in a way that production remains reliable, efficient and last, but not least, economically sound.

We at GEA offer you our global network of experts as well as our expertise in both processes and technologies, providing access to our global network of test centers, for advanced proof of your research and to grant a reliable scale-up.

## Focus on the decisive downstream phase

Our biotechnology competence covers the upstream and fermentation process stages, and to even greater extent numerous special applications in the decisive downstream phase. GEA is one of the largest system providers of machines and process technology worldwide, a market and technology leader in about 90 percent of its business areas.

## GEA – Leader in White Biotech solutions:

- Future-oriented biotech systems competence
- Specialists working hand in hand for maximum process benefits
- Customized White Biotech engineering and solutions worldwide
- Test centers for testing single process steps or process combinations at GEA or customer sites
- Corporate and financial strength to secure your investments and aftersales services



# Secure technical feasibility

Benefit from GEA as a technology leader.

We facilitate the transfer of your feasibility study to the real process plant by adding technology process know-how. Our global test centers are equipped for testing individual process steps or process combinations. Furthermore, we are prepared to test at your site. GEA country organizations are always close to you and offer to each customer the entire range of GEA products and services.

GEA offers its customers a comprehensive service concept. Experts with manufacturing know-how and up-to-date knowledge optimally care for every single GEA equipment component.

## Reliability, efficiency and budget control over the entire life cycle

Successful upscaling of test processes to industrial levels is one challenge to be met. Others are the combination of different process steps in plant designs, and reliable quality control on an industrial scale. Offering the competencies of highly experienced process technology specialists in one structured portfolio, GEA is the go-to address for producers when it comes to meeting these challenges.

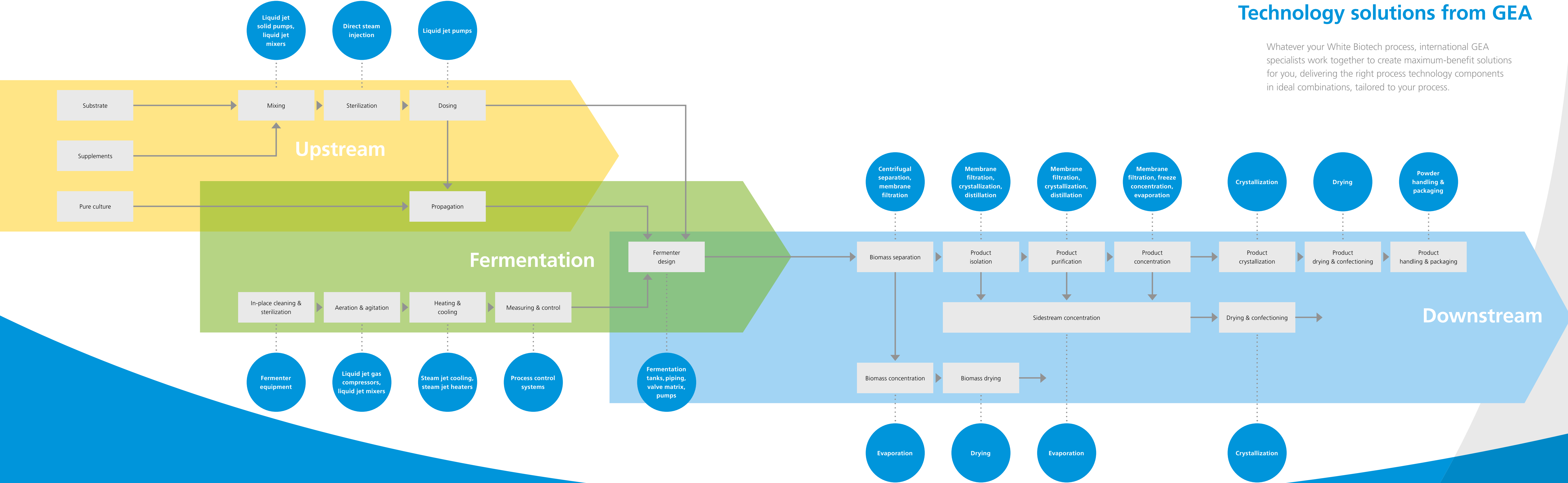
## Keys to manufacturing success

- Maximum plant availability
- Permanently high equipment and process efficiency
- Absolute budget control for optimized TCO



# Technology solutions from GEA

Whatever your White Biotech process, international GEA specialists work together to create maximum-benefit solutions for you, delivering the right process technology components in ideal combinations, tailored to your process.





# GEA key areas of White Biotech

Focusing on demanding and sophisticated production processes, GEA offers efficient and flexible solutions for customers in the White Biotech sector – advancing both environmental sustainability and economic benefit.



## Centrifugal Separation

- Disk separators
- Decanter centrifuges for biomass separation and extraction
- Customized centrifuge systems and package units



## Membrane Cross Flow Filtration

- Micro/ultra/nanofiltration & reverse osmosis
- Product-specific testing at own test lab and on site
- Skid-mounted



## Evaporation

- Falling film & forced circulation evaporation
- Vapor recompression heating concepts (MVR, TVR)
- Tubular or plate design, single- or multi-effect



## Liquid Process Solutions

- Mixing & media preparation
- Fermentation
- Automation & process integration



## Distillation

- Distillation & rectification plants
- Pressure swing adsorption
- Pressure-vacuum tray and packed multi-column systems



## Powder Handling & Packaging

- Rotary valves
- Powder handling & storage
- Retail filling & bulk packing



## Drying

- Flash & spray dryers and coolers
- Fluid bed & ring dryers and coolers
- Freeze dryers



## Crystallization

- Solution & melt crystallization, freeze concentration
- Specific requirements performable (e.g. product purities, crystal size)
- Range of crystallizers: FC, DTB, Oslo, surface cooling



## We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

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