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CHEMICAL TECHNOLOGIES

CHEMICAL ENGINEERING PROCESS DESIGN



Cambridge Chemical Technologies, Inc. was formed to provide the process and energy industries with the expertise to commercialize new technologies, especially those with difficult reactor and separation challenges.

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EXCELLENCE IN:

- ▶ *Process design and basic engineering*
- ▶ *Technology transfer and licensing*
- ▶ *Process development and commercialization*



DEVELOPMENT TO START-UP

CCTI's expertise in process engineering and development allows us to manage the commercialization of new process technologies from concept to commercial operation. Our engineers have a broad experience in the chemical and energy production sectors acquired through previous positions with major technology and engineering companies. Our senior engineers are recognized leaders in the design of reaction and separation systems and their application to these industries.

CCTI's experience in every phase of novel technology development allows us to anticipate potential technical challenges in scale-up and focus on technical solutions early in the development process. We create engineering packages to effectively communicate design solutions faster and more efficiently than larger engineering companies.

TECHNOLOGY TRANSFER AND LICENSING

Technology development and licensing form the basis of many of our projects. Our experience in these areas helps our clients negotiate fair and equitable licensing agreements and ensures that the technology parameters are successfully incorporated into detailed engineering, procurement, and construction, while protecting intellectual property. We specialize in:

- Management of licensing programs
- Negotiation of license agreements
- Formation of technology partnerships and alliances
- Cost benefit analysis of licensing alternatives

PROCESS AND BASIC ENGINEERING

We develop basic engineering or pre-FEED packages with a focus on downstream activities so that the client's technology intent is met and the detailed engineering, construction and startup are smooth, while protecting the client's IP. Because of the way we work, our process packages are completed with savings in time and cost to the client. For example, a typical 100 – 150 equipment count process package is delivered in 12 - 20 weeks, at a cost of 2 - 3% of total capital investment, rather than the industry standard of 5 – 6%.

FULL SCALE PROCESS DESIGN

CAPITAL COST ESTIMATES AND RISK ANALYSIS

TECHNOLOGY COMMERCIALIZATION

EXPERIMENTAL AND PILOT SCALE DESIGN

PROCESS TROUBLESHOOTING AND REVAMP

EXPERTISE YOU CAN TRUST



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TECHNOLOGY DEVELOPMENT AND COMMERCIALIZATION

CCTI's unique approach to process technology development starts with a preliminary full scale plant process design and works backwards to:

- ▶ *Define the performance goals*
- ▶ *Complete a conceptual design and cost estimate*
- ▶ *Identify key technical challenges and risks*

Key challenges and market drivers are identified early in the process in order to:

- ▶ *Determine decision points for process technical and economic feasibility*
- ▶ *Assist market and cost feasibility studies*
- ▶ *Minimize testing requirements in the research/development phase*
- ▶ *Optimize schedule and ROI for process technology development*

The result is a clear and cost-effective commercialization roadmap and execution framework.



PEOPLE

AN ENTREPRENEURIAL APPROACH AT YOUR SERVICE

CCTI is a dynamic company composed of senior staff, each with over 35 years' experience, and a cadre of very talented young engineers. Classical engineering rigor and experience are augmented by modern computational methods and modeling. This team approach develops innovative solutions to process problems with extraordinary efficiency.

Our in-house team works with two allied companies: an offshore company with a total staff of 1100 and an U.S. alliance partner with a total staff of 100. CCTI's alliances allow us to supply a project team that is scalable to our clients' needs, allowing us to assume responsibility for delivery and integration of large projects.

PARTNERSHIP

FILLING IN THE GAPS

Our commercialization work is done in partnership with catalyst companies, specialized equipment suppliers and operating companies.

CCTI has the broad skills that enable us to complement our partners' expertise. Our clients benefit with timely completion of a quality project.



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SELECTED **EXPERIENCE**

CHEMICALS AND OLEOCHEMICALS

- Process Design Package for an Asian world-scale pyridine plant, designed from first principles
- Process and detailed design for a second pyridine plant, the world's largest, for the same customer
- Process and detailed design of a cyanopyridine plant from first principles
- Fluid bed catalytic reactor for a heterocyclic compound
- Oleochemicals distillation design and troubleshooting
- Crystallization process development for an isomeric separation
- Design and validation of fixed bed catalyst and reactor system
- Process design for a new Omega-3 fatty acid facility
- Basic Engineering Package for a 100 TPD glycerin plant based on CCTI technology and related plant expansions

GOVERNMENT CONSULTING

- Safety and process consulting for a nuclear fuel facility
- Design of chemical demilitarization facility for U.S. Army

ENERGY AND SOLAR

- Gas to Liquids consulting
- LNG transfer facility
- Biodiesel plant process design
- Basic engineering packages for trichlorosilane and polysilicon plants
- Process development and commercialization for the solar industry, including world-leading chlorination reactors and integrated recovery systems

MINIMUM TIME FROM CONCEPT TO
COMMERCIAL PRODUCTION

RELIABLE PLANT DESIGN MEETING
HIGHEST INDUSTRY STANDARDS

SINGLE POINT RESPONSIBILITY FOR
TECHNICAL SYSTEM INTEGRATION

PROVEN RESULTS



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