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CHEMICAL TECHNOLOGIES

CHEMICAL ENGINEERING DESIGN + CONSULTING



Cambridge Chemical Technologies, Inc. was formed in 2004 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:

- ▶ PROJECT DEVELOPMENT
- ▶ TECHNOLOGY DEVELOPMENT AND COMMERCIALIZATION
- ▶ PROCESS DESIGN AND BASIC ENGINEERING
- ▶ TECHNOLOGY TRANSFER AND LICENSING

**DEVELOPMENT TO START-UP**

CCTI's expertise encompasses project and process development through detailed engineering, construction and start-up. Our engineers have a broad experience in a range of technologies in the chemical and energy sectors and are recognized leaders in the design of fluid bed reactor systems and their application to these industries.

Although CCTI is a young company, our senior engineers have extensive experience acquired through previous positions with major international technology and engineering companies. Thus we are able to take on difficult assignments for industry-leading companies. Using a cross-discipline approach, we complete these challenges faster and more efficiently than larger engineering companies. Our track record brings repeat business.

TECHNOLOGY 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. We specialize in:

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

TECHNOLOGY DEVELOPMENT AND COMMERCIALIZATION

Our focus throughout the development of a new technology is on the full-scale plant. CCTI will:

- Define the performance goals
- Complete a conceptual design and cost estimate
- Identify the key risks

This enables us to identify the drivers and key challenges early in the process in order to:

- Minimize testing requirements in the research/development phase
- Define optimum design data
- Design development requirements as necessary
- Maximize return on investment in process development

The result is a clear commercialization roadmap.

PROCESS AND BASIC ENGINEERING

Our clients come to us with difficult design problems because we have earned a reputation as an industry leader in providing effective solutions to technical challenges.

Our basic design philosophy is to provide a robust design with high reliability. We can apply solutions we've developed for other industries to the client's design needs.



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SENIOR ENGINEERS:

WAHEED MUKADDAM *PRINCIPAL*

Previously Vice President of Engineering for Molten Metals Technology and Vice President of R&D for Badger Technology Center. Directed the design and commercialization of a number of first-of-a-kind processes.

BARRY GIFFORD *PRINCIPAL*

Formerly Vice President and General Manager for the Badger Technology Center and Vice President of Polymers and Chemicals at Raytheon Engineers and Constructors. Mergers and Acquisitions experience.

CHARLES BOLTHRUNIS

Recognized expert in fluid bed reactors. Led development teams for a broad array of technologies. Formerly member of the board of directors for the Particulate Solids Research Institute.

SUBHAS PAL

Well-known expert in refinery configuration and designs. Consultant to major energy companies.

DOMENIC FERRARI

Previously Vice President of Technology for Badger Technology Center. Developed a number of unique fluid bed reactors for the production of commodity chemicals.

MICHAEL HAGAN

Extensive experience in process development and design of large gas-to-liquid facilities, with emphasis on unique fluid bed reactor designs.

Y.B. RAO

Process design experience in wide areas of petrochemical, energy, and environmental projects.

PETER DANCE

Formerly Managing Director of Davy Process Technology. Expert in Syngas and related technologies. Senior advisor on technical and commercial matters.



PEOPLE

AN ENTERPRISING TEAM

CCTI is a small, dynamic company composed of senior staff, each with over 35 years experience, and a cadre very talented young engineers. Our younger engineers are assigned challenges typically reserved for more senior personnel. Under the guidance of our senior staff they have developed innovative solutions and gained valuable experience quickly and contributed greatly to the success of the company. The engineering group combines classical engineering rigor and experience with modern computational methods and modeling.

The 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 can thus assume responsibility as a system integrator for relatively 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.

FULL SCALE PLANT DESIGN.
EARLY DETAILED CAPITAL COST ESTIMATE.
RISK ANALYSIS.
COMMERCIALIZATION ROADMAP.

EXPERTISE YOU CAN TRUST



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CHEMICALS AND OLEOCHEMICALS

- Process Design Package for a worldscale 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
- Technology development for a new chemical product
- Crystallization for a specialty chemical
- Design of a new reactor system for specialty chemicals
- Process design for a new Omega-3 fatty acid facility
- Basic Engineering Package for a 100 TPD glycerin plant based on CCTI technology
- Basic engineering for an expansion of the glycerin plant

GOVERNMENT CONSULTING

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

MINIMUM TIME FROM CONCEPT TO COMMERCIAL PRODUCTION.

RELIABLE PLANT DESIGN MEETING REFINERY AND ENERGY INDUSTRY STANDARDS.

SINGLE POINT RESPONSIBILITY FOR TECHNICAL SYSTEM INTEGRATION.

PROVEN RESULTS

ENERGY AND SOLAR

- Gas to Liquids consulting
- Process design and commercialization for a slurry recovery system for the solar industry
- Basic engineering packages for trichlorosilane and polysilicon plants
- Process development and commercialization for the solar industry
- LNG transfer facility
- Biodiesel plant design
- Power recovery cycle using critical fluids



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