

A Continuing Revolution in Process Technology



CDTECH[®]

CDTECH was formed in 1988 to research, develop and market process technology for the refining and petrochemical industries. At that time the partners were Lummus Crest (now ABB Lummus Global) and the Chemical Research and Licensing Co. (CR&L – then owned by Polysar, and since acquired by CRI International).

Technology Beginnings

The achievements and successes of CDTECH actually began with three men sharing the same inspiration: that the future of catalytic distillation would be greater than anyone realized. In 1977, Larry Smith conceived an idea for producing di-isobutylene from isobutylene in a distillation column. To prove his theory, he built a 2.5 cm diameter column, added acid resin catalyst, fed in Raffinate-1, and produced di-isobutylene. To commercialize the process, Larry, Ed Jones and Dennis Hearn, founded CR&L.

CR&L first developed the process to produce polygas from C₄ olefins.



Catalyst structure



Larry Smith

Unfortunately, the timing was off and there was no gasoline market for additional polygas. There was, however, a need for MTBE. So CR&L, assisted by a grant from the U.S. Department of Energy, built a 7.5 cm diameter pilot plant to develop the technology for MTBE. Charter Oil Co. in Houston licensed the first plant. The refinery is currently owned by Valero Energy, a customer who now has five CDTECH ether units.

During this period, CR&L also created an MTBE backcracking process to make very pure isobutylene for butyl rubber. With limited facilities and no corporate R&D support, the founders managed to license their new technology to Exxon.

Patents and Processes

In the period since joining forces with Lummus, CDTECH has been granted over 300 patents, developed a research center with twelve pilot and semi-commercial units, and licensed more than seventy operating plants. Successful developments have included:

- Hydrogenation (benzene, acetylenes, dienes, olefins, aromatics, linear isomerization of olefins, amines)
- Hydrodesulfurization (gasoline, kerosene, gas oil)
- Skeletal isomerization (normal olefins to iso-olefins)



Left to right: Larry Smith, Dennis Hearn and Ed Jones who started CR&L.

1988

A partnership between Chemical Research & Licensing, a Polysar Company, and Lummus Crest formed CDTECH.

Offices set up in Houston, Texas.

1989

Qilu Petrochemical starts up the first Asian CDMtbe® unit at Zibo, China.



1990

Clean Air Act Amendment signed.
Surge in MTBE/TAME demand for reformulated gasoline.
State of the art R&D center opens.



Pilot scale facilities of the R&D Center

1991

CDTECH reached 75 ether awards ranging in size from 500 to 17,500 BPD.

1992

First TAME unit comes on stream for Star Enterprise at Convent, Louisiana.

First world scale MTBE unit commissioned at Alberta Envirofuels, Canada.



Alberta Envirofuels, Canada



Star Enterprise, Louisiana

- Saturation of benzene to produce high purity cyclohexane.
- Aromatic alkylation (ethylbenzene, cumene)
- Selective dimerization of isobutylene, and saturation of DIB to IsoOctane
- Ethers (MTBE, TAME, ETBE, MTBE/TAME in combination)

Achievements

Among the many successes to CDTECH's credit:

- A world leading position in clean fuels technology licensing needed to comply with government regulations, with over 70 units operating and more on the way.



New process schemes are developed in highly flexible facilities in Pasadena, Texas.

- The CDHydro[®] hydrogenation process for hydrogenating aromatics, dienes, olefins and acetylenes. It reduces capital costs, enhances yields, and extends the catalyst life. In fact, at the Shell Norco plant, the catalyst operated over five years with the original catalyst charge.
- The CDHydro, CDHDS[®], and CDHDS+[®] hydrodesulfurization process for selective sulfur reduction in FCC gasoline blending components provides a low-cost route to cleaner burning gasoline with maximum octane retention.
- The CDTECH EB[®] process has demonstrated significantly lower product cost than competing processes in its first applications at PDVSA and Nova. This combination of CD technology with modern zeolite catalyst technology has proven extremely effective at achieving highly selective, low capital cost EB production.

Vision for the Future

CDTECH will continue to lead the way in the technology revolution with new processes that change the way refineries and petrochemical plants meet their requirements, while providing low cost solutions for the product and environmental needs of those industries.



Motiva's plant in Port Arthur, Texas uses the CDHDS process to produce low sulfur gasoline.

1993

Eight ether units brought on stream by Cosmo, Citgo, Idemitsu Kosan, Shell, Exxon, Tosco, and Valero (2).

1994

First CDTECH EB[®] plant for Mitsubishi Petrochemical at Yokkaichi, Japan.

First CDHydro plant at Shell's petrochemical complex in Norco, Louisiana.

Idemitsu Kosan utilized the first combination CDHydro/CDMtbe plant.



1995

First corporate-wide hydrotreating agreement signed with Shell.

First CDHydro depentanizer implemented at Diamond Shamrock's Sunray, Texas refinery.

Texaco commercialized the first CDHydro benzene hydrogenation application at its Bakersfield, California refinery.

1996

First CEthers[®] unit for co-production of MTBE and TAME is started up in El Palito, Venezuela by Corpoven (PDVSA).

1997

CR&L acquired by CRI International.

A new refluxed reactor version of catalytic distillation is introduced for Sasol in South Africa.

Successful start up of first in-house designed CD/B isobutylene process unit for Ciba in China.



1998

The CDHDS hydrodesulfurization process technology introduced.

Pemex, CDTECH's best repeat customer, selected CDTECH for 8 MTBE and 8 TAME units in 1998, bringing their total to 21 ether units.

2000

First CDHDS unit for Motiva at Port Arthur, Texas

