



# TRAINING COURSES

## HOW CARMAGEN ENGINEERING CAN HELP:

All portions of the hydrocarbon processing industry have undergone tremendous change in recent years. The departure of experienced personnel in combination with an influx of new engineers and continued work demands increases a company's training needs. However, companies often do not have the time to develop and present training courses.

Carmagen Engineering develops and presents training courses, workshops and seminars that are tailored to the specific needs of our clients. These are based on first performing a needs analysis to identify the target audience, then developing a mutually agreed upon outline to tailor the course to cover only the necessary topics. Carmagen Engineering is actively involved in providing engineering consulting services to the process industries and is not only a training company. Therefore, the courses are developed and presented by engineers who are both active in the industry, and have the training experience to achieve an effective course.

## WORK EXAMPLES:

- One day course covering atmospheric storage tank inspection and maintenance, emphasizing API-653 requirements.
- Three day course developed for a domestic petroleum products marketing company. The course scope included piping system and storage tank design and maintenance.
- Five day course developed for an international petroleum refining company. The course scope included the fundamentals of materials selection, and the design requirements for piping systems, pressure vessels, heat exchangers and storage tanks.
- Five day course developed for an oil production and refining company in the Middle East. The course focus was the mechanical design, fabrication and maintenance of piping systems. Additional courses either developed or under development for the same company include:
  - Five day course covering the design and maintenance of storage tanks.
  - Five day course covering pressure vessel mechanical design, maintenance and repair.
  - Five day course covering heat exchanger mechanical design, maintenance and repair.
- Three day course available that focuses on the design and maintenance requirements for API-650 storage tanks.

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Technical Training



# TECHNICAL TRAINING

<b>BACKGROUND:</b>	<p>All portions of the oil and gas industry have undergone tremendous change in recent years. The departure of experienced personnel, in combination with an influx of new engineers and continued work demands, has increased the training needs of owner and contractor companies. However, these companies often do not have the time to develop and present training courses with their own resources.</p> <p>Carmagen Engineering, Inc. develops and presents training courses, workshops, and seminars that are tailored to the specific needs of our clients. While most of our courses to date have dealt with engineering technology disciplines, we can also prepare and deliver courses on process technology.</p> <p>But we do more than just training. We are actively involved in providing a broad range of engineering consulting services to the oil &amp; gas and related industries. Accordingly, our technical training presentations are made by engineers who are both active in the industry and have the training and experience to effectively deliver the content of the courses.</p>
<b>EFFECTIVE TRAINING:</b>	<p>In an ideal world, we could provide training to match the need of each member of a client's professional staff, according to the range of technical responsibilities assigned to the individual. While real-world limitations of cost and time make classroom training the norm, we nonetheless strive to give the best possible balance between "standardized" and "customized" course content.</p> <p>An essential part of every presentation is the material prepared prior to the classroom sessions, and we take great care to make this material clear, comprehensive, and useful. We have created "standardized" text for each course in our catalog to ensure accuracy; we don't "wing it" in the classroom. That said, however, we are willing and able to modify course content to the extent required to fit the particulars of a client's situation.</p>



**COURSE FORMATS:**

These two course formats form the basis of our technical training work:

- Full-length courses
  - Typically one to five days in length, depending on topic
  - Topics cover a broad range of technologies, as listed on our website
  - Each course has a comprehensive course manual, which can be customized by advance arrangement
- Shorter courses – our Carmagen à la Carte© programs
  - Emphasis on current topics in our fast-moving industry
  - Each course given in a short block of time (many one-half day, maximum three days), and courses are often arranged in a back-to-back schedule

**CUSTOMIZED FULL-LENGTH COURSES:**

Here are a few examples of technical training assignments that we have successfully completed by customizing our full-length courses to client particulars:

- Five-day course developed for an international petroleum refining company. The course scope included the fundamentals of materials selection and design requirements for piping systems, pressure vessels, heat exchangers, and storage tanks.
- One-day course covering atmospheric storage tank inspection and maintenance, emphasizing API-653 requirements.
- Three-day course developed for a domestic petroleum products marketing company. The course scope included piping system and storage tank design and maintenance.
- Five-day course developed for an oil production and refining company in the Middle East. The course focus was the mechanical design, fabrication and maintenance of piping systems. Additional courses either developed or under development for the same company include:
  - Five-day course covering the design and maintenance of storage tanks
  - Five-day course covering pressure vessel mechanical design, maintenance, and repair
  - Five-day course covering heat exchanger mechanical design, maintenance, and repair
- Three-day course prepared to focus on design and maintenance requirements for API-650 storage tanks.

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Technical Training



# TRAINING

Who will prepare your less experienced engineers so that they are ready to plan or design the next project, fix the next problem, identify system faults, audit the work of contractors or equipment suppliers, or prevent the next incident?

In today’s environment, companies have neither the budget nor the personnel to send their less experienced engineers to structured offsite training programs. Equally, downsizing and retirements have robbed companies of many of their most experienced personnel. Without experienced on-the-job mentors or costly training programs, how can you improve the capabilities of your engineers and remain competitive?

Take the following quiz and be honest with your answers.

Question	Yes	No
Does your company have many relatively inexperienced engineers on staff?		
Are your inexperienced engineers being asked to do work that perhaps they would not have been asked to do 10 or 15 years ago?		
Are your experienced engineers so busy that they do not have the time to provide adequate mentoring and supervision of the younger folks?		
Are more things slipping through the cracks than you would like?		
Do you think that some focused training or mentoring could help?		

If you have answered “Yes” too often, we can help.

**WHO WE ARE:** Carmagen Engineering, Inc. (CEI) is an engineering consulting company and has been in business since 1986. We have a staff of over 180 consultants with an average experience level of over 30 years. The attached chart summarizes the technical areas that we encompass.

**SEE HOW WE CAN HELP:**

Here is what we can offer to help bring your less experienced staff “up to speed”.

- CEI can provide experienced professionals who will work with your engineers, on-the-job, to enhance their technical skills and problem-solving capabilities. Using one of our professionals to support your staff with **on-the-job** training, you:
  - Free your senior resources to address issues more appropriate to their level of experience.
  - Keep your less experienced engineers on the job while improving their skills.
  - Focus training on specific, plant-related topics.
  - Have a very knowledgeable and experienced engineer at your location who can provide a wide range of support to your staff, as required.
  - Maximize learning while minimizing costs.

Our engineer may be assigned to your office or plant location for a fixed period, on a visit basis, or a combination of the two. When not physically onsite, our engineer is only a phone call or an E-Mail away from providing any guidance that might be needed. This program can be custom-designed to suit your specific needs and would typically involve a combination of engineering consulting and mentoring.

- We also currently have over 40 engineering training courses “off-the-shelf” and ready to present at your location. All these courses are applications-oriented and are taught by engineers who have years of practical, hands-on experience. These courses are presented on a fixed-fee basis for a class of up to 25-30 participants. A summary of our course offerings and complete descriptions can be found on our web site.
- If appropriate, we can develop customized courses to suit your specific training needs, and can even develop a complete training curriculum. For example, we can customize our standard courses to incorporate discussion of your engineering standards.
- Our newest training program provides “distance learning.” In partnership with Stevens Institute of Technology in Hoboken, NJ, we have begun offering several of our courses via the Internet.

Your engineering staff must be adequately trained in order for your company to be cost-effective in this very competitive world. We look forward to hearing from you to begin discussing how we can help your company achieve its training goals.

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The engineering expertise available in the petroleum refining industry is graying at an alarming rate. The average age of engineers supporting refineries today is well over 50. The decrease in refinery expertise began in the mid-1980's when the price of crude oil sank to \$8 per barrel and a number of veteran personnel elected early retirement. In previous down cycles, the oil industry was able to quickly recover with the help of a strong, talented work force, whose members served as valuable mentors. This is no longer the case; the industry is struggling with training young engineers while its remaining refinery experts are swamped with technical demands that limit their availability for mentoring. Technical consultants are being employed to fill this gap.

## Demographic Shifts

The decrease in personnel available for mentoring can be attributed to three factors:

- Rapid merger/acquisition activity since 1986 that eliminated duplication of tasks. This activity also tended to reduce the size of engineering staffs.
- Re-engineering of traditional corporate structures that reduced "careers" to "jobs" in order to reduce engineering costs.
- Increases in new technology that led companies to expect more efficient working methods so that one person could do the work previously done by several.

A combination of these factors with a perceived "old smokestack" industry inhibited hiring until after 2002 when the price of crude oil began its increase. At this point, the remaining experts who are approaching retirement are so stretched handling their work that they have little time for mentoring. It has been estimated that it takes 7-8 years for a young graduate to become fully capable in the industry. The absence of qualified mentors may extend this period. In the interim, less experienced engineers are handling tasks for which they are not necessarily qualified.

## Engineer Mentoring

Mentoring is a learning partnership between an experienced engineer (mentor) and a new professional (protégé) for the purpose of sharing knowledge and information. It is an interpersonal relationship, outside the direct chain of command, where an individual receives advice, coaching and/or counseling that will benefit the company. Mentoring can be situational (short term, random, casual, creative, problem driven), informal (voluntary, personal, loose, responsive) or formal (institutional, information driven). Open communications (face-to-face or electronic) allow a protégé an opportunity to develop both personally and professionally. An effective mentor listens without questioning why, provides feedback without dictating, puts problems in perspective without building barriers, suggests ideas without discounting alternatives, and challenges decisions without negative criticism. Over time, a protégé may have many mentors depending on his development. While some relationships may last several years, they may last only days or months. A key to successful mentoring is management sanction and support.

## Consultants as Mentors

Consultants are hired because of well-established, long term expertise in a field that includes "institutional memory" that may be hard to access otherwise. To compensate for the loss of internal experts, organizations have created "knowledge databases" using information technology. Often, the databases have been built rapidly with little evaluation of information quality. If there is no internal expert to guide a young engineer in gathering adequate background, progress in solving refinery problems can be slow. Even with data mining technology, an inexperienced engineer may face a large body of conflicting data before moving forward. An experienced consultant, on the other hand, knows how to interrogate the database to obtain relevant, reliable data and quickly move forward.

In many ways the role of a mentor parallels that of a consultant:

For the Client, the Consultant	For the Protégé, the Mentor
<ul style="list-style-type: none"> <li>➤ Is Available</li> <li>➤ Provides Technical Expertise</li> <li>➤ Is Contracted from the Outside</li> <li>➤ Brings Broad Experience</li> <li>➤ Provides Problem Perspective</li> <li>➤ Suggests Technical Options</li> <li>➤ Identifies Other Active Experts</li> <li>➤ Listens/Shares Career Experience</li> <li>➤ Avoids Institutional Barriers</li> <li>➤ Reviews Results and Reports</li> </ul>	<ul style="list-style-type: none"> <li>➤ Is Available</li> <li>➤ Provides Technical Expertise</li> <li>➤ Comes from Outside Line Organization</li> <li>➤ Has Industry Knowledge</li> <li>➤ Puts Problems in Context</li> <li>➤ Helps Identify Approaches</li> <li>➤ Suggests Contact People</li> <li>➤ Counsels on Career Concerns</li> <li>➤ Provides Advice on Internal Systems</li> <li>➤ Reviews Results and Reports</li> </ul>

The role of consultant and mentor differ in two important ways. First and foremost, a consultant addresses problems directly while a mentor guides an individual addressing a problem. Second, a mentor can provide company career advice based on knowledge of the inner working of the organization while a consultant can only reflect on his experience to give feedback on career path options.

### Consultant Mentoring Programs

Consultant mentoring supplements company training programs for young engineers. For years, industry has used academic consultants as mentors. Professors “working at the cutting edge” are contracted to visit company sites periodically and maintain informal networking contacts with those working in their fields of expertise. Similar programs may be established with experienced (often retired) experts who remain actively engaged in their field. This requires an interest on the part of a company to sponsor a consultant and a willingness by young employees to take advantage of his availability.



There are many ways that a company may structure a consultant mentoring program once it recognizes its need for outside expertise in a specific area. One approach is to contract the consultant for a number of site visits and a number of hours of availability over the course of a year. For example, a consultant may be hired for two site visits per year and to provide up to 40 hours of on-line or phone contact. The details of the site visit (seminar, face-to-face mentoring, management contacts, etc.) and remote contacts must be structured to satisfy company requirements.

Hired as a mentor, a consultant is available as a sounding board rather than as a problem solver. While making suggestions, asking questions, or pointing to alternate options as a technical consultant would, the mentor consultant refrains from pushing decisions and often plays the role of devil’s advocate to force the protégé to defend a position. By challenging him to “look at the big picture” (e.g., cost, scale, by-products, available space, materials of construction, institutional prejudice, etc.), the mentor helps his protégé develop into a valued, experienced engineer.

A consultant mentor program is a way for a young engineer to access expertise and experience that can help in his growth personally and professionally. Such a program also clearly benefits the company by helping it to develop the technical capabilities of its staff comparable to the way it was done in the “old days.”

*Win Robbins has extensive analytical expertise in the areas of reactive sulfur/naphthenic acids characterization, HPLC-2 ring type definition technology, and polynuclear aromatic hydrocarbons (PNA) characterization. Please contact Jerry Lacatena if you'd like more information on Carmagen's expertise in this area.*

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