



## FCC Technology Center Mechanical Engineering Services

### Refining

#### Introduction

UOP has been an active developer and licensor of fluid catalytic cracking (FCC) technology since the early 1940s, and has licensed several hundred FCC units around the world. Since the first FCC unit was brought on stream more than 50 years ago, UOP has participated in nearly every aspect of the basic design, detailed design, procurement and fabrication of FCC units. As a result, UOP has developed a wealth of mechanical experience and expertise in the design, operation and maintenance of FCC units, and UOP has continually improved and enhanced the content of its Schedule A design package.

It is impossible to convey all of UOP's mechanical expertise in the context and scope of the Schedule A package. The detailed design contractor must become familiar with all aspects of start-up, operation and maintenance of the unit in order to produce a functional, efficient design. Often this is neither possible nor practical within the constraints of the project schedule.

To bridge the gap, UOP can provide Post Schedule A Services, Enhanced Schedule A Services or Detailed Mechanical Engineering Services tailored to assist and instruct the detailed design contractor in the execution of the project. The intent of these services is to have UOP share its years of FCC experience and expertise with the detailed design contractor. In conjunction with the Schedule A package, these services will complement the detailed design contractor's work to produce a reliable, functional unit brought on stream in a shorter span of time.

Additionally, UOP can offer Mechanical Troubleshooting Services and Studies to provide the refiner with valuable insight into current or developing problems.

#### Post Schedule A Services

Post Schedule A Services are provided in the form of consultation and are beneficial for new units and major revamps. These services are tailored to assist the selected detailed design contractor in execution of the project and provide a smooth transition between the Schedule A package and detailed design activities. There are numerous areas where UOP can assist with detailed

design. Each service can be provided independently of others, allowing the refiner to select only those that are needed for his project. UOP can provide the following services:

- **General arrangement** - Participation in the development of the layout and conceptual structural design.
- **System analysis** - Assistance with establishing load combinations, dynamic seismic analysis and catalyst transfer line loads.
- **Vessel design** - Assistance with large diameter connections, vessel internals, thermal transitions and higher level finite element analysis.
- **Catalyst transfer line design** - Assistance with the detailed design of expansion joints, slide valves and other special components.
- **Reactor vapor and flue gas systems** - Assistance with the general arrangement, stress/flexibility analyses and design of integral components.
- **Equipment procurement** - Perform technical reviews of contractor requisitions, vendor proposals and fabrication documents, and offer assistance with vendor qualification and selection.

#### Enhanced Schedule A Services

Enhanced Schedule A Services provide a final detailed design, rather than consultation on the detailed design phase. These services are advantageous with new units and major revamps. These services usually benefit the project schedule with early designs of long delivery items.

UOP offers the following Enhanced Schedule A Services:

- **Reactor/regenerator design** - Provide detailed design of the reactor and regenerator vessels equal to the level of major engineering contractors.
- **Catalyst cooler system** - Provide detailed design of catalyst cooler including catalyst transfer lines.
- **Flue gas line design** - Provide detailed design of the flue gas system including valves, orifice chamber and heat exchange equipment.
- **Catalyst transfer line design** - Provide detailed design of catalyst standpipes and risers equal to the level of major engineering contractors.

## Detailed mechanical engineering

Detailed Mechanical Engineering Services provide final detailed designs for small- to medium-sized revamps, and many times do not require a Schedule A package. Ideal projects for this service are mechanically intensive projects that are prompted by maintenance and reliability issues.

The size and variety of applications in this area is immense. Recent projects range from redesign of a single standpipe expansion joint to upgrade and replacement of an entire reactor. Deliverables are very similar to that provided by mechanical engineering departments of major engineering contractors.

This option provides the refiner the benefit of obtaining detailed mechanical design of critical FCC equipment from a highly qualified source, UOP, while allowing the refiner to obtain designs in civil/structural, piping and other support areas from a low-cost regional source.

## Mechanical troubleshooting services and studies

Mechanical Troubleshooting Services and Studies provide the refiner with valuable insight into current or developing problems. Recent experiences include operating units, shutdown units and new units under construction. Most projects of this type start with a site visit to examine the system, discuss issues with the refiner and collect necessary reference data. This is followed by performance of analytical tasks by one or more engineers. The typical deliverable is a report that states observations, conclusions and recommendations.

Mechanical studies are similar in scope to troubleshooting services, but attention is usually focused on mechanical feasibility of proposed modifications. Some studies also include a significant degree of basic engineering. The end result is justification or support to proceed to detailed engineering.

## For more information

For more information, contact your local UOP representative or our Des Plaines sales office:

e-mail: [info@uop.com](mailto:info@uop.com)

fax: +1-847-391-2253

phone: +1-847-391-2000

### UOP LLC

25 East Algonquin Road  
Des Plaines, IL 60017-5017  
U.S.A.  
[www.uop.com](http://www.uop.com)

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