



# UOP Turnaround Services

Turnarounds can be costly events due to lost production. However, they can present an opportunity to implement upgrades that will improve operations. The key is to be prepared. Sufficient lead time will give your team the opportunity to confer with third party experts, align business objectives and implement the solutions that will result in optimal performance.

UOP turnaround services are focused on turning opportunities into reality by tapping into the combined capabilities of the refiner, UOP and third party contractors. Our workshops provide a special forum for complete alignment to ensure that no opportunities are lost and that potential projects will get full consideration based upon the benefit and cost reduction potential.

During every turnaround there are lessons learned, unexpected problems found and new questions that need to be addressed to ensure that the next turnaround is more successful and captures more value. It is essential to be prepared and it often takes the support of specialists to be able to truly analyze issues and identify state-of-the-art solutions.

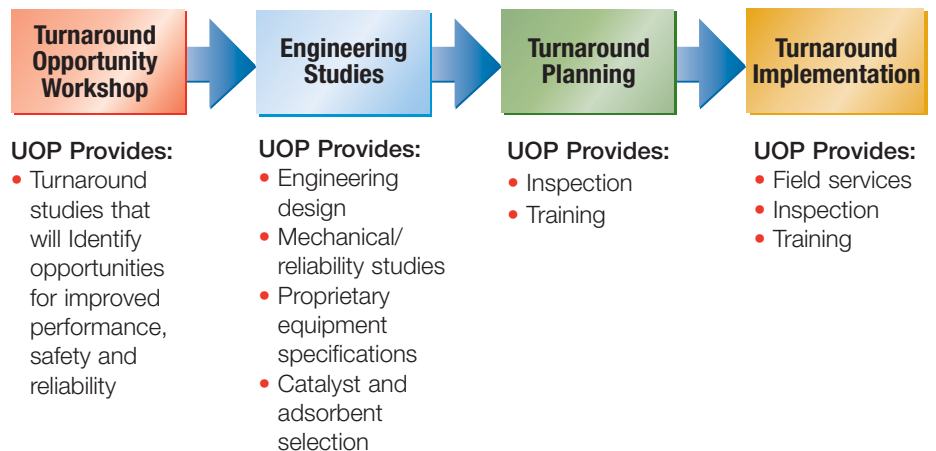
This is where UOP technical expertise can be an important tool for refiners. With access to engineering, research and development and operations support, UOP looks at lessons learned from previous turnarounds, current performance and root causes of unplanned shutdowns to truly analyze the unit and ensure that problems are addressed rather than just patched up during upcoming turnarounds. Additionally, as equipment designs are constantly changing, can mean less unplanned shutdowns, increased safety or reliability, better performance and easier turnarounds. UOP can offer insight into where these opportunities exist and help develop the best plan for implementation.

The objective of a UOP turnaround workshop is to help you be well prepared for your next turnaround. We can help you to strategically focus on repairs and upgrades to your process equipment that will lead to safer, more reliable operations with improved performance. Workshops may also lead to recommendations for further studies, inspection and training that can mitigate problems and provide design enhancements.

### Key Features:

In a turnaround workshop audit , experienced UOP engineers and process specialists:

- Interview stake-holders
- Review operating procedures
- Review operating envelopes
- Identify weak links
- Conduct unit performance benchmarking
- Define existing process and equipment constraints
- Assess strategic feedstock and product slate changes
- Evaluate causes for unplanned shutdowns
- Conduct economic analysis



## UOP Turnaround Services Examples

UOP turnaround services have helped refiners reduce unit upsets, optimize performance and increase profitability.

FCC	Background	Approach	Resolution
<b>Reactor Cyclones Reliability</b>	The refiner noticed progressive damage to the FCC reactor cyclones during the second turnaround after installation. They requested UOP assistance to determine the root cause and judge whether to repair or replace in kind at the next turnaround.	UOP reviewed operating data and discovered that the refiner was operating the cyclones at significantly higher velocity than design. Options were reviewed with the refiner for adjustment of operating conditions or resizing of cyclones.	The refiner rejected any constraints to operation and elected to take a revised specification for increased capacity. UOP, at short notice, prepared revised specifications for the purchase replacement of cyclones.
<b>Internals Reliability Improvement</b>	The refiner's mid-1980s FCC required extensive repairs to regenerator cyclones and separator arms. UOP provided designs and operating review to improve reliability.	UOP's review identified capacity optimization by the refiner had inadvertently increased cyclone gas velocities way beyond recommended region of operation. Review of the cyclone and separator design showed that improvements could be made to the old designs.	UOP provided a quick-fix solution to be adopted during the next turnaround to improve the cyclone reliability. Further study to identify the future requirements for design of new separator and cyclones was completed in preparation for the next shutdown.
<b>Turnaround Workshop</b>	As part of reliability improvement process with the refiner, UOP conducted a pre-turnaround workshop for the FCC unit. The workshop focused on peer review for operational and reliability improvements.	The workshop reviewed past problems of performance and reliability with overall processing changes and future plans. UOP identified a potential heat balance problem with the future use of severely hydrotreated feed and offered a number of options to alleviate the problem.	The refiner revisited the future operating plans for the FCC with their planners to ensure that unit operation was feasible post turnaround.
CCR	Background	Approach	Resolution
<b>Reactor Loss of Containment</b>	The refiner reported a loss of containment in Rx 1 due to the shift of the downflow centerpipe in the socket during a unit emergency trip. This resulted in unplanned unit shut-down for maintenance. A UOP technology specialist was dispatched to the site for investigation	It was determined that the shift of the aged centerpipe occurred due to an excessive gap in the centerpipe base socket where the centerpipe had greater freedom to move than intended. In parallel it was noted that deformation and damage of the existing outer screen could have contributed to centerpipe shift. The refinery had already planned to replace the aged internals which had been a source of reliability concerns and required time-consuming maintenance but needed a potential upgrade to improve reliability.	Based on the feedback obtained during the emergency inspection of the Rx 1 as well as a review of the history of previous mechanical issues in Rx 1, UOP proposed to implement a commercially proven retrofit of Rx 1 with scallops that would be easier to maintain and, in event of failure, would have limited process impact. In order to keep the centerpipe firmly in place with the older socket design and prevent any unintended movements, UOP designed a special clamping device in the base of the centerpipe and support braces in the top. New Rx 1 internals are designed and supplied by UOP as turn-key project in the next turnaround.
<b>Interlock System for Added Safety and Onstream Efficiency</b>	The refiner operates CCR Platforming unit built in the early 1980s which does not have modern UOP interlock systems. On several occasions delays with operator actions during emergency situations led to potentially harmful unit conditions. For their next turnaround the refiner was looking into implementing the latest UOP interlock and safety features to minimize chances of human error during emergency situations.	UOP reviewed the existing operable interlock systems and identified several gaps vs. current UOP design practices. For example, a missing feed cut-off system in events of recycle gas and heater trip that resulted in liquid filling of the CFE and the charge heater and represented concerns for heater misoperation during restart.	UOP worked with the refiner and explained how each modern interlock feature in addition to the existing ones can benefit safety of unit operation. refinery was provided with recent interlock specifications including software and hardware specs. With new interlock system in place, incidents like filling the CFE and charge heater with naphtha feed can be avoided.

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