



# RELIABILITY & MAINTENANCE/ TURNAROUND (T/A) IMPROVEMENT CONSULTING

<p><b>APPROACH:</b></p>	<ul style="list-style-type: none"> <li>• Joint Carmagen/Refinery Team assesses current maintenance practices and identifies improvements</li> <li>• Practices are compared with those employed by refineries with a demonstrated track record of excellence in maintenance</li> <li>• Prioritized opportunities of modified practices are identified and a phased action plan is developed to assist the refinery in implementing the agreed changes</li> <li>• Expected improvements include lower maintenance and increased reliability through fewer unplanned shutdown/extended T/A intervals</li> </ul>							
<p><b>TYPICAL PARAMETERS:</b></p>	<table border="0"> <tr> <td>• Duration (elapsed), weeks</td> <td>2-8</td> <td rowspan="3">} <b>DEPENDENT ON SCOPE/PLANT COMPLEXITY</b></td> </tr> <tr> <td>• Cost, k\$ (plus travel)</td> <td>20-150</td> </tr> <tr> <td>• Number of Consultants</td> <td>2-4</td> </tr> </table>	• Duration (elapsed), weeks	2-8	} <b>DEPENDENT ON SCOPE/PLANT COMPLEXITY</b>	• Cost, k\$ (plus travel)	20-150	• Number of Consultants	2-4
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<p><b>CONSULTING TEAM MAKEUP/ CREDENTIALS:</b></p>	<ul style="list-style-type: none"> <li>• Senior R&amp;M Specialist (Lead Role)</li> <li>• Process Operations Specialist</li> <li>• Materials/Corrosion/Inspection Specialist</li> <li>• Equipment Reliability Specialist</li> </ul> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;"> <p><b>30 + YEARS OF EXPERIENCE WITH MAJOR INTEGRATED REFINERS</b></p> </div>							
<p><b>BENEFITS:</b></p>	<ul style="list-style-type: none"> <li>• One quartile improvement in mechanical availability</li> <li>• Savings of 25-30% of Maintenance Costs</li> <li>• Increase of 2 years between T/A</li> <li>• Increase of 1-2% in plant availability</li> </ul>							

**INTERESTED?**

Carmagen's staff of over 180 skilled specialists in all Process, Non-Process (Equipment), and Project Management disciplines is available to support client's implementation plans.

Contact Jerry Lacatena at Carmagen Engineering, Inc. to discuss your needs.

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**Profit Improvement**

**Turnaround Planning**



# TURNAROUND IMPROVEMENT PROGRAMS



*Carmagen Engineering – Where Experience Counts*

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# TURNAROUND IMPROVEMENT PROGRAMS

## Our Approach to Conducting Effective Turnarounds (T/As)

<p><b>ASSESS T/A PLANNING AND EXECUTION EFFECTIVENESS:</b></p>	<ul style="list-style-type: none"> <li>• Define parameters to measure T/A performance</li> <li>• Identify organizational barriers that exist</li> <li>• Establish the incentives for change</li> <li>• Pinpoint the procedures that need to be upgraded</li> </ul>
<p><b>BENCHMARK THE COMPETITION:</b></p>	<ul style="list-style-type: none"> <li>• Cost and schedule indices</li> <li>• Run length predictability</li> <li>• T/A planning milestones</li> <li>• Accuracy in predicting work to be done</li> <li>• Critical path optimization</li> </ul>
<p><b>ESTABLISH IMPROVEMENT OBJECTIVES:</b></p>	<ul style="list-style-type: none"> <li>• Develop a T/A milestone plan consistent with Pacesetter practices</li> <li>• Define the organizational and procedural improvements required</li> <li>• Set up an action plan to implement T/A planning improvements</li> <li>• Conduct follow-up reviews to assess implementation of changes</li> </ul>



## Carmagen Engineering, Inc. Assistance

**Conduct an initial assessment of the client's current T/A effectiveness. This would consist of a one to two-week visit by two or three of our consultants.**

- Estimate the competitive position
- Review critical organizational procedures. This includes:
  - Management role
  - Plant monitoring: inspection and process performance
  - T/A planning procedures
  - Budgeting and work progress assessment
- Define preliminary opportunities for improvement
- Identify highest pay-out organizational and procedural changes

**Work with the client's personnel to develop improvement plans.**

- Action steps to improve procedures
- Timing and resources needed
- Training needs

**Subsequently, we assist with implementation of selected improvements, such as:**

- Communication and team building
- Redefining roles/responsibilities
- Developing improved procedures
  - Budgeting
  - T/A milestone plan
  - Planning tools
  - Critical path development



**Alternatively, Carmagen Engineering, Inc. works with the client's organization in applying the principles of T/A Excellence to a specific T/A. At critical stages during T/A preparation, we work with client personnel to implement improvements. We recommend the following series of consulting visits:**

- 15 months prior to the T/A – establish the T/A planning objectives
  - Two day visit by one of our consultants to interview key management and T/A planning personnel
  - Define the major work item that requires the shutdown
  - Set the expectations on duration and cost for the T/A
  - Define the margin cost for each day of lost production
  - Establish the run length and reliability objectives for the ensuing run
- Work list review – justify the major work activities of the T/A plan
  - One week visit by two or three of our consultants, depending on the nature of the unit and work anticipated – 12 months prior to the T/A
  - Review reason for each work activity
  - Establish the cost and benefit for work requests
  - Conduct justification reviews
  - Define work which can be eliminated from the T/A
  - Preparation work required by the client
    - + Preliminary T/A cost estimate
    - + Identify the personnel responsible for finalizing the work list
    - + Organization charts for the refinery and the T/A Planning Team
    - + Consolidated preliminary work lists for the units involved
    - + Summary of the prior inspection findings for the equipment
    - + P&IDs showing blocks and by-passes
  - Preliminary review schedule with operations, inspection, and process technical service personnel
- Work planning review – Analyze the quality of the planning preparation
  - One week visit by two or three of our consultants – six months prior to the T/A
  - Assess the critical path work execution plan
  - Review the T/A execution organization
  - Evaluate the contracting approach
  - Review the plans for executing the work in a safe manner
  - Review materials procurement
  - Preparation work required by the client
    - + T/A Budget
    - + Expected Oil-out to Oil-in schedule
    - + Define work and shift schedules to be used during the T/A
    - + Prepare preliminary Gantt charts for critical/sub-critical activities
    - + Summary of the contract development and bid status
    - + Define critical crane lists
    - + Plans for evaluating work risks
    - + Summary of delivery on critical materials
    - + T/A communication plan

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