MODULE OVERVIEW
This module covers the function and operation of vessels and towers, especially those used in refineries. Information is provided about safety issues associated with the refinery process. The use of hydraulic torquing and tensioning equipment is also covered.

PREREQUISITES
Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum; Industrial Maintenance Mechanic Level One; Industrial Maintenance Mechanic Level Two; Industrial Maintenance Mechanic Level Three; and Industrial Maintenance Mechanic Level Four.

OBJECTIVES
Upon completion of this module, the trainee will be able to do the following:
1. Describe basic reactor mechanics and functions, including vacuum distillation towers and stripper towers.
2. Demonstrate hydraulic torquing and tensioning.

PERFORMANCE TASK
Under the supervision of the instructor, the trainee should be able to do the following:
1. Using equipment provided by your instructor, demonstrate hydraulic torquing and tensioning.

MATERIALS AND EQUIPMENT LIST
- Overhead projector and screen
- Transparencies
- Blank acetate sheets
- Transparency pens
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Pictures of various types of towers and vessels
- Pictures of refinery fires or explosions
- Hydraulic torquing and tensioning equipment
- Examples of manual ratcheting wrenches
- Appropriate nuts, bolts, and tensioning discs
- Hydraulic hose connectors
- Copies of the Quick Quizzes*
- Module Examinations**
- Performance Profile Sheets**

*Located at the back of this module.
**Located in the Test Booklet.

SAFETY CONSIDERATIONS
Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees will be required to perform hydraulic torquing and tensioning. Ensure that they are properly briefed on the safe use of hydraulic torquing and tensioning tools and are familiar with all appropriate safety precautions and procedures.
ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.


TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover Advanced Towers and Vessels. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions I-II. Introduction; Separation Processes</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Separation Processes</td>
<td></td>
</tr>
<tr>
<td>1. Desalting</td>
<td></td>
</tr>
<tr>
<td>2. Atmospheric Distillation</td>
<td></td>
</tr>
<tr>
<td>3. Vacuum Distillation</td>
<td></td>
</tr>
<tr>
<td>4. Distillation Tower Hazards</td>
<td></td>
</tr>
<tr>
<td>Sessions III-IV. Conversion and Other Refining Processes</td>
<td></td>
</tr>
<tr>
<td>A. Conversion Processes</td>
<td></td>
</tr>
<tr>
<td>1. Solvent Extraction and Dewaxing</td>
<td></td>
</tr>
<tr>
<td>2. Cracking Processes and Hazards</td>
<td></td>
</tr>
<tr>
<td>B. Treatment, Formulating, and Blending Processes</td>
<td></td>
</tr>
<tr>
<td>C. Other Refining Processes</td>
<td></td>
</tr>
<tr>
<td>1. Heating and Cooling</td>
<td></td>
</tr>
<tr>
<td>2. Steam</td>
<td></td>
</tr>
<tr>
<td>3. Recovery</td>
<td></td>
</tr>
<tr>
<td>4. Discharge Management</td>
<td></td>
</tr>
<tr>
<td>Session V. Hydraulic Torquing and Tensioning</td>
<td></td>
</tr>
<tr>
<td>A. Torquing and Tensioning Basics</td>
<td></td>
</tr>
<tr>
<td>B. Torquing Devices</td>
<td></td>
</tr>
<tr>
<td>1. Laboratory</td>
<td>Have trainees practice hydraulic torquing. This laboratory corresponds to Performance Task 1.</td>
</tr>
<tr>
<td>C. Tensioning Devices</td>
<td></td>
</tr>
<tr>
<td>1. Laboratory</td>
<td>Have trainees practice hydraulic tensioning. This laboratory corresponds to Performance Task 1.</td>
</tr>
<tr>
<td>D. Torquing and Tensioning Hazards; Tool Maintenance</td>
<td></td>
</tr>
</tbody>
</table>
Session VI. Review and Testing

A. Trade Terms Quick Quiz
B. Module Review
C. Module Examination

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

D. Performance Testing

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
MODULE OVERVIEW
This module explains how to maintain, troubleshoot, and repair conveyors, including how to splice belts and replace sprockets, bearings, and conveying devices.

PREREQUISITES
Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum; Industrial Maintenance Mechanic Level One; Industrial Maintenance Mechanic Level Two; Industrial Maintenance Mechanic Level Three; Industrial Maintenance Mechanic Level Four, and Industrial Maintenance Mechanic Level Five, Module 32501-09.

OBJECTIVES
Upon completion of this module, the trainee will be able to do the following:
1. Maintain, troubleshoot, and repair belt and roller conveyors.

PERFORMANCE TASKS
Under the supervision of the instructor, the trainee should be able to do the following:
1. Simulate splicing a belt.
2. Repair one of the following:
   • Belt conveyor
   • Chain conveyor
   • Screw conveyor
   • Pneumatic conveyor

MATERIALS AND EQUIPMENT LIST
Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Gloves
Straightedge
Tape measures
Plywood or other suitable surface on which to cut and repair belts
Mechanical belt fasteners or other splicing materials
Conveyor setups or broken or damaged conveyors for the repair of belt, chain, screw, or pneumatic conveyors
Damaged drive rollers, sprockets, and bearings
Damaged chains, sprockets, and carrying devices
Maintenance manuals for belt, chain, screw, and pneumatic conveyors
Replacement links for chain conveyors
Replacement belt materials
Sling and hardware for rigging
Tools for marking, measuring, cutting, and splicing conveyor belts
Tools for installing replacement links
Allen wrenches
Arbor press or length of pipe to install bearings

continued
SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to repair conveyors. Ensure that all trainees are briefed on appropriate shop safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Rexnord Power Transmission and Conveying Components, Catalog #R85, 1984. Atlanta, GA: Rexnord Inc.


TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 12½ hours are suggested to cover Troubleshooting and Repairing Conveyors. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions I-II. Introduction; Maintaining, Troubleshooting, and Repairing Belt and Roller Conveyors</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Maintaining and Repairing Belt and Roller Conveyors</td>
<td></td>
</tr>
<tr>
<td>C. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Have trainees simulate splicing a belt. This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Have trainees practice repairing a belt conveyor. This laboratory corresponds to Performance Task 2.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assorted screwdrivers</th>
<th>Torque wrenches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing pullers</td>
<td>Copies of the Quick Quizzes*</td>
</tr>
<tr>
<td>Grease gun and lubricant</td>
<td>Module Examinations**</td>
</tr>
<tr>
<td>Needle-nose pliers</td>
<td>Performance Profile Sheets**</td>
</tr>
</tbody>
</table>

* Located at the back of this module
** Located in the Test Booklet
Sessions III-IV. Maintaining, Troubleshooting, and Repairing Chain, Screw, and Pneumatic Conveyors

A. Chain Conveyors
B. Laboratory
   Have trainees practice repairing a chain conveyor. This laboratory corresponds to Performance Task 2.

C. Screw Conveyors
D. Laboratory
   Have trainees practice repairing a screw conveyor. This laboratory corresponds to Performance Task 2.

E. Pneumatic Conveyors
F. Laboratory
   Have trainees practice repairing a pneumatic conveyor. This laboratory corresponds to Performance Task 2.

Session V. Review and Testing

A. Module Review
B. Module Examination
   1. Trainees must score 70% or higher to receive recognition from NCCER.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.