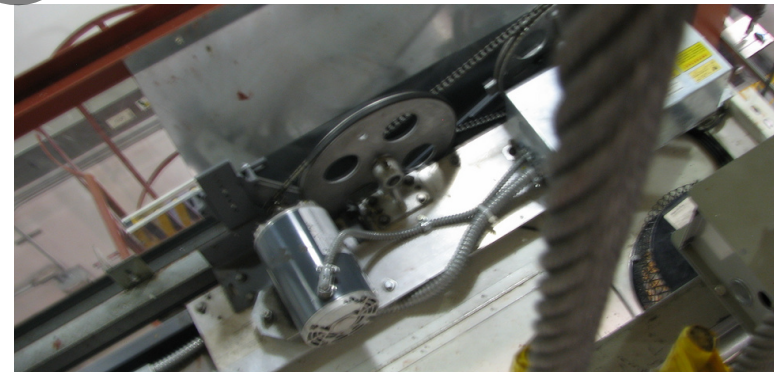
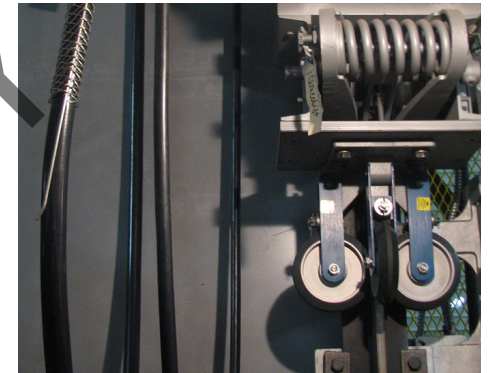
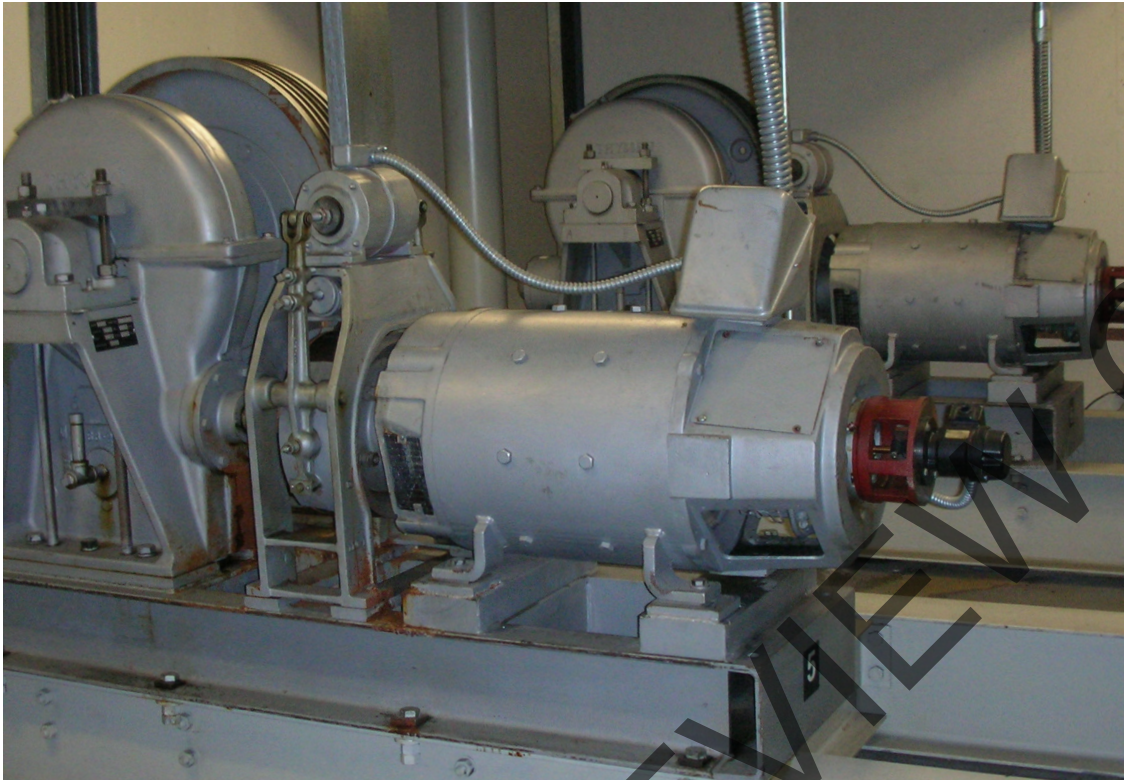


Instructor Guide



215: Elevator: Mechanical Drive Systems Module 3: Gearless Drive Systems



Table of Contents

Overview.....4
Gearless Drive Operation.....8
Geared Vs. Gearless.....22
Summary.....29

PREVIEW ONLY

Elevator – Instructor's Guide



Icons Used In This Guide



REVIEW slides



ASK



CLASSROOM ACTIVITY



SMALL GROUP ACTIVITY



INDIVIDUAL ACTIVITY



WRITE



Multimedia



REFER participants to

Agenda

Topic #	Topic Title	Duration
1	Overview	30 minutes
2	Gearless Operation	40 minutes
3	Field Trip	60 minutes
4	Geared vs. Gearless	40 minutes
5	Field Trip	60 minutes
6	Summary	30 minutes
	Total Time:	260 minutes

Elevator – Instructor's Guide



Overview

Purpose The purpose of this module is to:

Provide the participant with an overview of gearless drive systems for elevators in use in a public transit environment

Objectives

At the end of this lesson, the transit elevator/escalator trainee will be able to:

- Explain how a gearless drive system operates
- Identify major components of the gearless drive systems
- List methods of controlling gearless drive systems
- Identify the speed specifications of a gearless drive system
- Explain difference between geared and gearless drive systems

Materials

Mandatory Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Pencils
- Brochure: **Modernization Solutions – ThyssenKrupp Elevator's Geared to Gearless**

Optional

You may also want the following for optional activities:

- Chalk board with chalk, large paper with marker, etc.
- Internet connection
- Lab, simulator or out of service elevator

Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 260 min This section: 30 min (5 slides) Section start time: _____ Section End Time: _____

DO



REVIEW introduction slides

Instructor's Notes

SAY

In your own words:

Welcome to the course on Elevator Mechanical Gearless Drive Systems.

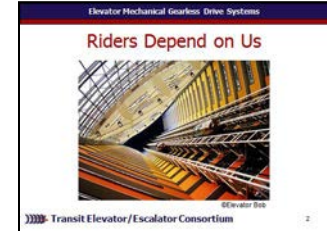
Advance

Electric traction elevators can be either geared or gearless. In the previous module, the participant learned that in geared elevators the motor turns a gear train that rotates the sheave. In gearless elevators, the motor rotates the sheaves directly. Geared elevators cost less but they cannot travel as fast as gearless elevators which can travel as fast as 1,200 fpm. In this module the participant will explore how a gearless drive system operates as well as explore further differences between geared and gearless drive systems.

Advance

Materials Needed

✓ PPT slides 1, 2



Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 260 min This section: 30 min (5 slides) Section start time: _____ Section End Time: _____

DO



REVIEW key terms

Instructor's Notes

SAY

In your own words:

Lets take a look at some of the key words we will be defining as move through this module:

- Armature
- Armature shaft
- Brake drum
- Brushes
- Commutator
- Field windings

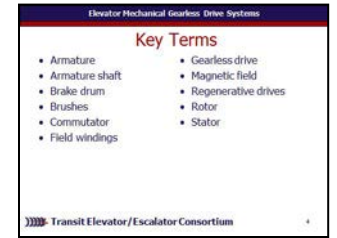
Advance

- As well as
- Gearless drive
- Magnetic field
- Regenerative drives
- Rotor
- Stator

Advance

Materials Needed

✓ PPT slide 4



Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed



REVIEW slide

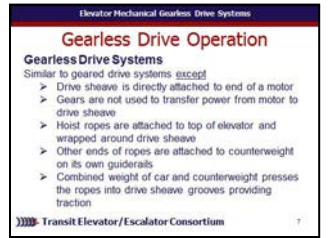
In your own words:

Gearless drive systems work in the same way as geared drive systems except **Advance** that the drive sheave is directly attached to the end of a motor and **Advance** gears are not used to transfer power from motor to drive sheave. **Advance**

The hoist ropes are attached to the top of the elevator and wrapped around the drive sheave while **Advance** the other ends of the ropes are attached to a counterweight that moves up and down in the hoistway on its own guiderails. **Advance** The combined weight of the elevator car and the counterweight presses the ropes into the drive sheave grooves, providing the necessary traction as the sheave turns.

Advance

✓ PPT slide 7



Instructor's Notes

Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed



REVIEW slides

In your own words:

Inside of the motor are the two principal electrical components of an electromechanical machine: the armature and field windings. coil.

Advance

The armature is the rotating part and is also known as the rotor. The photo you see here is an example of a motor.

Advance

Instructor's Notes

✓ PPT slides 10, 11



Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO



REVIEW slides

Instructor's Notes

SAY

In your own words:

The stator is the stationary part of an electric motor and its role is to create a magnetic field or magnetic flux for the armature to interact with and thereby rotate.

Advance The stator can comprise either permanent magnets, or electromagnets formed by a conducting coil.

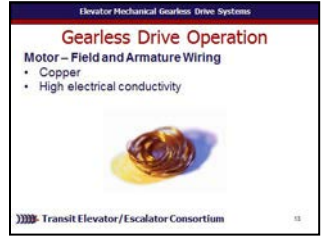
Advance

Field and armature wiring in elevator motors is typically comprised of copper because copper has a high electrical conductivity.

Advance

Materials Needed

✓ PPT slides 12, 13



Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564" data-label="Image"> </div> <div data-bbox="164 492 415 535" data-label="Text"> <p>REVIEW slide</p> </div> <div data-bbox="28 792 454 835" data-label="Section-Header"> <h2>Instructor's Notes</h2> </div> <hr/> <hr/> <hr/> <hr/> <hr/>	<div data-bbox="666 428 1033 464" data-label="Section-Header"> <p>In your own words:</p> </div> <div data-bbox="666 492 1439 1242" data-label="Text"> <p>Gearless traction elevators often use regenerative drives which are Advance designed to capture energy normally dissipated from the motor and re-route this energy back into the structure's electrical grid essentially allowing the elevator motor to act as a generator. Advance In a typical traction system, whenever the elevator slows down, energy is created and dissipated as heat by means of a heat resistor. This heat can be captured and regenerated by the use of regenerative drives. Advance Regenerative drives thereby offer significant savings to energy costs as well as reducing environmental waste. Advance However, regeneration technology is expensive and can add significant initial costs to an elevator.</p> </div> <div data-bbox="666 1256 840 1292" data-label="Text"> <p>Advance</p> </div>	<div data-bbox="1497 471 1748 506" data-label="Text"> <p>✓ PPT slide 17</p> </div> <div data-bbox="1535 528 1854 763" data-label="Image"> </div>

Elevator – Electric Traction Principles of Operation

Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 442 144 549" data-label="Image"> </div> <p>REVIEW slide</p> <div data-bbox="34 564 144 671" data-label="Image"> </div> <p>REFER participants to <u>Modernization Solutions ThyssenKrupp Elevator's Geared to Gearless</u></p> <p>Instructor's Notes</p> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words:</p> <p><i>Modernization Solutions – ThyssenKrupp Elevator's Geared to Gearless</i> is a great brochure which accompanies this module. With permission from ThyssenKrupp Elevator to use, lets take a look.</p> <p>[Refer participants to brochure <u>Modernization Solutions – ThyssenKrupp Elevator's Geared to Gearless</u> to review additional information on gearless traction machines.]</p> <p>Advance</p>	<p>✓ PPT slide 18</p> <div data-bbox="1541 535 1854 763" data-label="Image"> </div> <p>✓ <u>Modernization Solutions – ThyssenKrupp Elevator's Geared to Gearless</u></p>

Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 471 144 578" data-label="Image"> </div> <div data-bbox="173 499 270 549" data-label="Text"> <p>ASK</p> </div> <div data-bbox="28 792 454 842" data-label="Section-Header"> <h2>Instructor's Notes</h2> </div> <hr/> <hr/> <hr/> <hr/> <hr/>	<div data-bbox="666 428 1400 963" data-label="Text"> <p>In your own words: The principle components in gearless drive systems include (check all that apply)</p> <ul style="list-style-type: none"> a. Armature b. Stator c. Brake drum d. Worm gear e. Traction sheave <p>Call on participants for answers. Advance for the correct answers. Answer: a., b., c., and e. Advance.</p> </div>	<div data-bbox="1497 471 1758 514" data-label="Text"> <p>✓PPT slide 20</p> </div> <div data-bbox="1535 528 1864 763" data-label="Image"> </div>

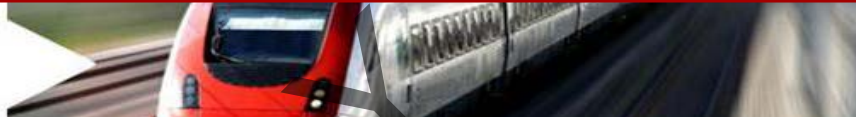
Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 471 139 571" data-label="Image"> </div> <div data-bbox="173 506 260 542" data-label="Text"> <p>ASK</p> </div> <div data-bbox="28 792 444 835" data-label="Section-Header"> <h2>Instructor's Notes</h2> </div> <hr/> <hr/> <hr/> <hr/> <hr/>	<div data-bbox="672 428 1023 464" data-label="Section-Header"> <p>In your own words:</p> </div> <div data-bbox="672 471 1449 642" data-label="Text"> <p>The _____ is the stationary part of an electric motor and its role is to create a magnetic field for the _____ to interact and thereby rotate.</p> </div> <div data-bbox="753 649 1130 735" data-label="List-Group"> <ul style="list-style-type: none"> a. stator, armature b. Armature, stator </div> <div data-bbox="672 742 1265 821" data-label="Text"> <p>Call on participants for answers. Advance for the correct answers.</p> </div> <div data-bbox="672 828 850 906" data-label="Text"> <p>Answer: a. Advance.</p> </div>	<div data-bbox="1497 471 1738 506" data-label="Text"> <p>✓PPT slide 21</p> </div> <div data-bbox="1535 528 1854 763" data-label="Image"> </div>

Elevator – Instructor's Guide






Module Length: 260 min Time remaining: 230 min This section: 40 min (17 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div data-bbox="34 468 139 574" data-label="Image"> </div> <div data-bbox="177 502 260 539" data-label="Text"> <p>ASK</p> </div> <div data-bbox="28 792 444 835" data-label="Section-Header"> <h2>Instructor's Notes</h2> </div> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words: Describe advantages and disadvantages of a regenerative drive. Call on participants for answers. Advance for the correct answers. Answer: Heat is captured and regenerated saving energy and environment waste, however this technology is expensive. Advance.</p>	<p>✓PPT slide 22</p> <div data-bbox="1541 531 1854 763" data-label="Image"> </div>

Elevator – Instructor's Guide





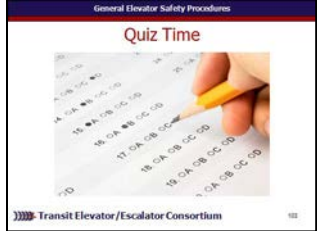
Module Length: 260 min Time remaining: 190 min This section: 60 min Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<p> ASK</p> <p> CLASSROOM ACTIVITY</p> <p>Instructor's Notes</p> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words:</p> <p><i>[At instructor's discretion, take time to visit the field and look for examples gearless drive operation and components,] Advance</i></p>	<p>✓PPT slide 23</p> 

Elevator – Instructor's Guide



Module Length: 260 min Time remaining: 30 min This section: 30 min (3 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<p> CLASSROOM ACTIVITY</p> <p> INDIVIDUAL ACTIVITY</p> <p>Instructor's Notes</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words:</p> <p><i>Administer quizzes.</i></p>	<ul style="list-style-type: none">✓ PPT slides 36✓ Quizzes✓ Pencils 

PREVIEW ONLY