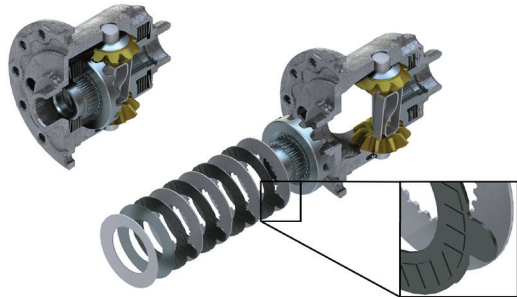


# DIFFERENTIAL BASICS

*eLearning courses designed to increase productivity and profits*



## Learning made Simple, Visual, and Interactive

The purpose of this course is to help learners understand each component in the differential, the working principles behind differentials, and the various types of differentials used in vehicles.

Credit Hours **2.5**

## Learning Objectives

- Identify the rear axle components.
- Define the purpose of each differential component.
- Explain the different driveline configurations.
- Understand the various differential operating principles.
- Summarize the various types of differentials.
- Describe the difference between an axle differential and transmission differential.

## Table of Contents

### I. Rear Axle Components

- Companion Flange
- Ring Gear and Hypoid Pinion Set
  - o Ring Gear
  - o Hypoid Pinion
  - o Types of Gear Sets
    - Spiral Bevel Gear Set
    - Hypoid Gear Set
- Differential Assembly
  - o Differential Case
  - o Differential Pinion Shaft
  - o Differential Pinions
  - o Differential Side Gears
  - o Thrust Washers
  - o Springs
    - S-Springs
    - Belleville Springs
    - Coil Springs
  - o Clutch Packs
  - o Bearings

### II. Differential Principles

- Driveline Configurations
  - o RWD
  - o FWD
  - o 4WD
  - o AWD
- Differential Operating Variables
  - o Power
  - o Torque
  - o Delta Speed
  - o Drive Ratio
  - o Surface Friction Coefficient
  - o Tractive Force
  - o Preload
  - o Bias Ratio
- Differential Kinematics

### III. Types of Differentials

- Open Differential
- Limited-Slip Differential
  - o Active Differential
    - Hydraulic Limited-Slip Differential
- Locking Differential
  - o Mechanical Locking Differential
  - o Electronic Locking Differential
- Torque Vectoring Differential
- Transmission Differential

