

Energy – Conservation

Overview: Computes for the unknowns in the collision using Conservation of Energy.

Entry into Module:

This module of the program is normally entered by clicking on the **REC-TEC** block in the upper left of the **REC-TEC Window** causing the drop-down menu to appear. Place the cursor on the **Energy** block and click on **Conservation** on the sub-menu to initiate this module.

Under certain circumstances, the user may choose to use the **Files** block instead of the drop-down menu approach. Selecting any file with a **.COE** extension in the **Dialog box** accessed from either the **Open Single File** or **Open Multiple Files** block opens this module.

Selecting **AutoLoad [ON]** from either the **Setup Menu** or the **AutoLoad Icon** on the upper right side (third line) of the **REC-TEC Window** automatically loads the scenario that was on the screen when the module was closed, either individually, or when the program was closed. With **AutoLoad [OFF]** on the main **REC-TEC Window**, modules will start without loading a file.

Data Entry:

Checkbox for Collinear (Head On) Collision – Check if Collinear Head-On Collision
Checkbox for Collinear (Rear End) Collision – Check if Collinear Rear-End Collision

- Checking one of these boxes sets up the Approach and Departure Angles for both units.

Angles

- **Angle (A1)** – Approach Angle for Unit 1 (Enter appropriate angle for Left or Right Hand Coordinate System / Heading or Radial configuration)
- **Angle (A2)** – Approach Angle for Unit 2 (Enter appropriate angle for Left or Right Hand Coordinate System / Heading or Radial configuration)
- **Angle (A3)** – Departure Angle for Unit 1 (Enter appropriate angle for Left or Right Hand Coordinate System / Heading or Radial configuration)
- **Angle (A4)** – Departure Angle for Unit 2 (Enter appropriate angle for Left or Right Hand Coordinate System / Heading or Radial configuration)

Weights

- **Weight (V1)** – Weight of Unit 1

- **Weight (V2)** – Weight of Unit 2

Speeds (2 Unknowns Allowed)

- **Speed (V1)** – Approach Speed of Unit 1 – Use X if Unknown
- **Speed (V2)** – Approach Speed of Unit 2 – Use X if Unknown
- **Speed (V3)** – Departure Speed of Unit 1 – Use X if Unknown
- **Speed (V4)** – Departure Speed of Unit 2 – Use X if Unknown

Equivalent Barrier Speeds (1 Unknown allowed)

- **EBSpeed 1** – Equivalent Barrier Speed of Unit 1 – Use X if Unknown
- **EBSpeed 2** – Equivalent Barrier Speed of Unit 2 – Use X if Unknown

Output:

Module uses **Energy / Momentum** or **Simultaneous Energy/Momentum Equations** based on Inputs to arrive at a solution. The two frames on the right side of the screen show the **Output – Unit (1 or 2)** information as follows:

- **PDOF(A-Number)** – Direction of Impulse Vector relative to heading of Vehicle
- **Impulse:** Change of Momentum
- **DeltaV:** Change of Velocity (Primary)
- **DeltaV:** Change of Velocity (Secondary)

Post Impact

- **Speed:** Impact Speed (Primary) – Input or Computed
- **Speed:** Impact Speed (Secondary) – Input or Computed

Intercept (Pre-Impact) and Separation (Post-Impact)

- **Angle:** Intercept (Closure) / Separation
- **Momentum:** Pre-Impact / Post-Impact
- **Energy:** Kinetic at Impact / Kinetic after Impact
- **Energy:** Actual / Maximum for Damage including Rotation
- **Speed:** Speed (Primary) – Closure / Separation
- **Speed:** Speed (Secondary) – Closure / Separation

Impact

- **Speed:** Impact Speed (Primary)
- **Speed:** Impact Speed (Secondary)

- **eVelocity:** Coefficient of Restored System Velocity (**Restitution**)
- **rVelocity:** Coefficient of Retained System Velocity (**Vs/Vc**)

Options:

Several **Command Buttons** appear in a frame located at the lower right corner of the module Window. The **Command Buttons** allow the user to engage options including the option to **Open** and **Save** the data required to generate the scenario shown on the screen at the time the file was saved.

- **Open .COE File** – Calls up a **Dialog box**, which **Opens** any pre-existing **.COE** file and displays the output results.
- **Save .COE File** – Calls up a **Dialog box**, which **Saves** data on the screen to files with any user-selectable filenames. This is independent of the automatic saving as “**LastFile.COE**” of the data at the close of this module or the close of the program.
- **Click for Energy Solution** – Uses Energy Equation.
- **Click for Momentum Solution** – Uses Momentum Equation.
- **Formulae** – Opens a word processor (set by the user in **Setup**) with a file showing the basic formulae used in this module of the program. While the user may add to or modify the information in this file, it does not change the formulae imbedded into the program.
- **Graphics** – Displays the Linear Momentum graphics along with LM data on the sight side of the screen. Clicking on the right mouse button brings the graphics for calculating the Line of Impact and Restitution. [**Esc**] to Exit
- **N** – This button toggles a graphical number pad on the screen that can be used to enter data into the input boxes without using your keyboard number pad. This may be useful for presentations as data entry can be accomplished using a wired/wireless mouse.