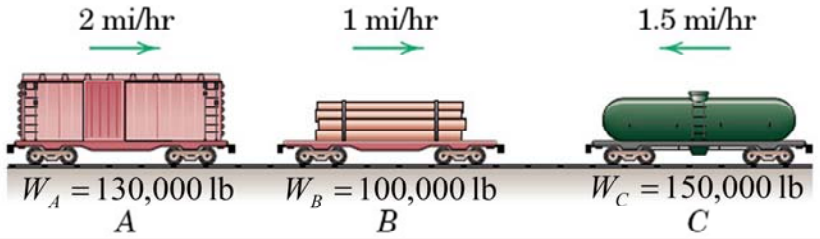
Question of the Day

Three freight cars with ***weights*** and ***velocities*** shown impact each other and become coupled together with a common ***velocity v = 0.355 mph***.

Determine the percentage loss of ***energy*** due to coupling.



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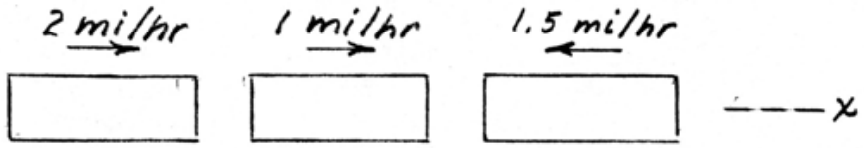

$\Sigma F_x = 0$ for system so $\Delta G_x = 0$

$$(130\times 2 + 100\times 1 - 150\times 1.5)\frac{44}{30}\frac{10^3}{32.2} - (130+100+150)v\frac{44}{30}\frac{10^3}{32.2} = 0$$

$$v = \frac{260+100-225}{130+100+150} = 0.355 \text{ mi/hr}$$

$$\%\text{ loss of energy} = \frac{T_i - T_f}{T_i}100 = 100\left(1-\frac{T_f}{T_i}\right) = n$$

$$n = 100\left\{1 - \frac{\frac{1}{29}(130+100+150)(0.355)^2}{\frac{1}{29}(130\times 2^2 + 100\times 1^2 + 150\times 1.5^2)}\right\} = 100\left(1-\frac{47.96}{957.5}\right)$$

$$n = 95.0\,\%$$