BATTERY HANDLING SYSTEMS

The Force of Impact

Models Effected: All Battery Stands

Tech Tip
TT-921A

An excessive amount of force is exerted on battery stand compartment rollers when a 2800 lb battery is dropped from a height of just a few inches. This impact can cause substantial damage to the battery compartment rollers, roller shafts, and even the battery stand superstructure. Once the stand's superstructure is damaged, roller failure will occur and will continue to occur until the battery stand is repaired or replaced.

2 Inch Drop

Battery Weight:

> $W:=2800\ lb$ $\quad W: = 2800\ lb$

Force of Gravity in Inches:

> $g:=\frac{(32.2\ \cdot Ft)}{s^2}\ .\ \frac{12\ inches}{1ft}$ $\quad g: = \frac{386.4\ inches}{s^2}$

Distance Battery Drops:

> $l: = inches$ $\quad l: = 2\ inches$

Battery Mass:

> $m: = w/g$ $\quad m: = \frac{7.24638\ lb\ s^2}{inches}$

Conservation of Energy:

> **Potential Energy = Kinetic Energy**

$m \cdot g \cdot l = 1/2 \cdot m \cdot v^2$ $\quad 5600\ lb\ inches$

Velocity at Impact:

> $v:=\sqrt{(2 \cdot g \cdot l)}$ $\quad v: = 39.3141\ \sqrt{(inchs^2/s^2)}$

Impact Momentum:

> $F \cdot \Delta t = m \cdot v$ $\quad .01\ F\ s = \frac{284.885\ lb\ s^2\ \sqrt{(inchs^2/s^2)}}{inches}$

Deceleration Time (Seconds):

> $\Delta t = .01s$ $\quad \Delta t = 0.01\ s$

Force of Impact:

> $F = \frac{m \cdot V}{\Delta t}$ $\quad F: = \frac{284.885\ lb \cdot s}{.01\ s}$

Force: 28,488 lbs

4 Inch Drop

Battery Weight:

> $W:=2800\ lb$ $\quad W: = 2800\ lb$

Force of Gravity in Inches:

> $g:=\frac{(32.2\ \cdot Ft)}{s^2}\ .\ \frac{12\ inches}{1ft}$ $\quad g: = \frac{386.4\ inches}{s^2}$

Distance Battery Drops:

> $l: = inches$ $\quad l: = 4\ inches$

Battery Mass:

> $m: = w/g$ $\quad m: = \frac{7.24638\ lb\ s^2}{inches}$

Conservation of Energy:

> **Potential Energy = Kinetic Energy**

$m \cdot g \cdot l = 1/2 \cdot m \cdot v^2$ $\quad 11200\ lb\ inches$

Velocity at Impact:

> $v:=\sqrt{(2 \cdot g \cdot l)}$ $\quad v: = 55.5986\ \sqrt{(inchs^2/s^2)}$

Impact Momentum:

> $F \cdot \Delta t = m \cdot v$ $\quad .01\ F\ s = \frac{402.888\ lb\ s^2\ \sqrt{(inchs^2/s^2)}}{inches}$

Deceleration Time (Seconds):

> $\Delta t = .01s$ $\quad \Delta t = 0.01\ s$

Force of Impact:

> $F = \frac{m \cdot V}{\Delta t}$ $\quad F: = \frac{402.888\ lb \cdot s}{.01\ s}$

Force: 40,289 lbs

For more information call

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