

“How Injuries Happen” On the Road to Zero

MSD Prevention Strategies in the
Transportation Sector

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On the Road to Zero

MSD Prevention Strategies in the Transportation Sector

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Wednesday February 18, 2009

How Do Injuries Happen?



Tissue Injury

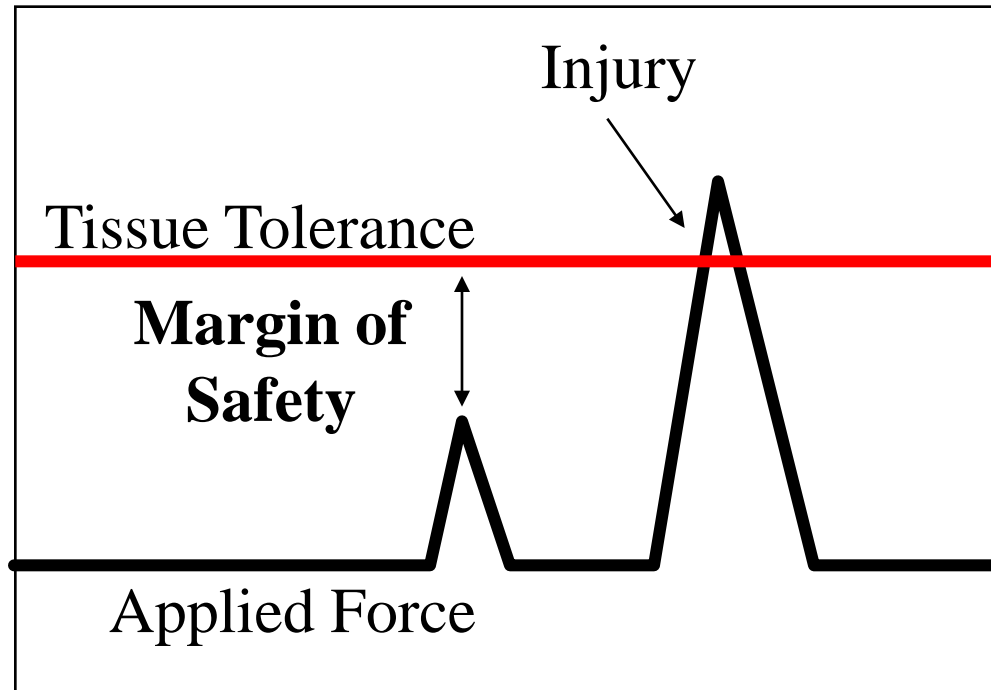
Q: How does a tissue get injured?

Applied Force > Tissue Tolerance



High Force Injury

Force

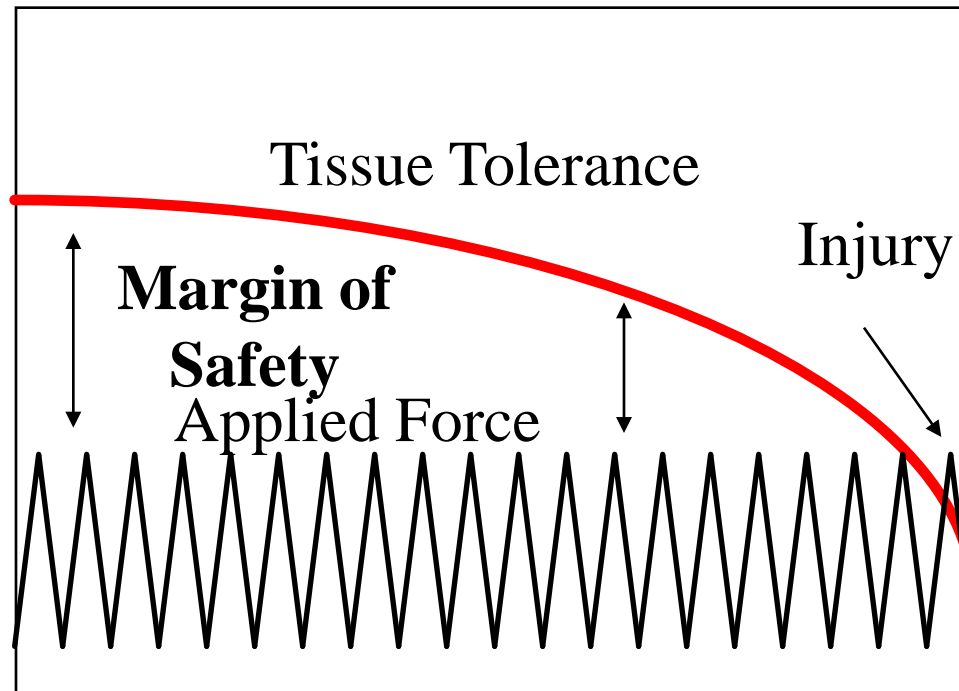


Time



Low, Repetitive Force Injury

Force

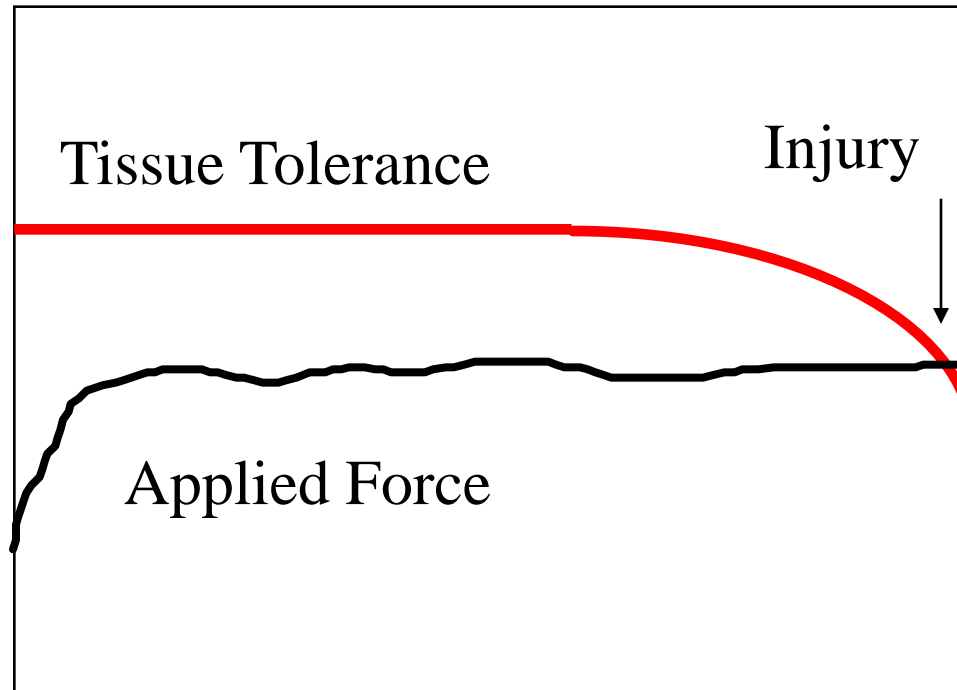


Time



Low, Constant Force Injury

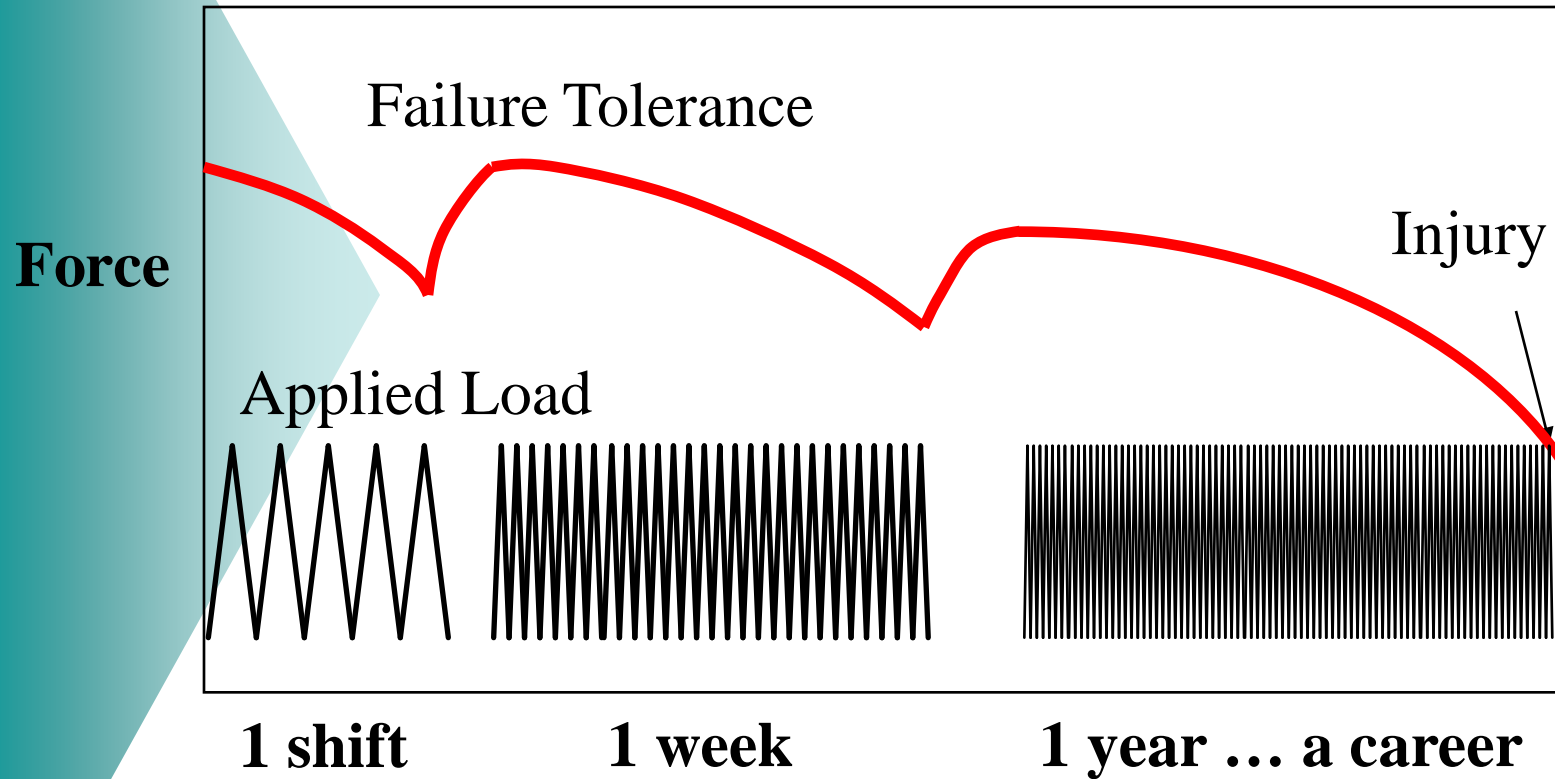
Force



Time



Failure Tolerance



Tissue Injury

1 Mechanism: Applied Force $>$ Tissue Tolerance

4 Modes of Injury:

- High Force
- Low, Repetitive Force
- Low, Constant Force
- Cumulative Loading (day, week, lifetime)



Tissue Injury

Q: How can this risk be (easily and practically) assessed?

A: Moment of Force



Moment of Force (Torque)

Moment of Force = **Load X Distance**
or

Moment of Force = **Force X Moment Arm**

This applies to ALL body joints:

- spine
- shoulders
- elbows
- knees ...



Moment of Force (Torque)

In the body, the external Moments of Force are resisted by:

- 1) muscles**
- 2) ligaments**
- 3) soft tissues**
- 4) bony stops**



Moment of Force - Cascade Effect

The $>$ the moment,

The $>$ the tissue forces,

The $<$ the safety margin!

∴ to decrease injury risk, via decreased tissue loads, you must decrease **Moments of Force!**



Summary

- 1) Tissue Injury
- 2) Moment Force

Two very powerful concepts

Knowledge



Know How!

Sandalwood
Ergonomics
Work Smarter. Work Safer.

Thank You!

