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SAVING BACKS AND BUCKS:
THE IMPORTANCE OF ERGONOMIC CASTERS

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ABOUT US

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Caster Concepts:

- In business since 1987
- Manufactured with pride in Albion, MI
- Specialize in Solving Difficult Material Handling Problems

Doug Backinger:

- 17+ years of Caster Experience
- BSE in Mechanical Engineering
- MS in Manufacturing Engineering

WHAT IS ERGONOMICS

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Definition:

Ergonomics is the science that seeks to adapt work or working conditions to suit the abilities of the worker.

- Equipment should be selected that eliminates repetitive and strenuous manual labor and which effectively interacts with human operators and users

- The material handling workplace and the equipment employed to assist in that work must be designed so they are safe for people

MHI®

▶ *See the Material Handling Institute for The Ten Principles of Material Handling*

OVEREXERTION COSTS COMPANIES BILLIONS

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Overexertion Injuries are Caused by Repetitive Motions:

Lifting, Pushing, Pulling, Carrying, and Holding

This will only get worse…

- Electric Vehicles = Heavier Components
- Labor Shortages

Many problems can be solved with the **RIGHT** casters

ECONOMICS OF PROPER ERGONOMICS

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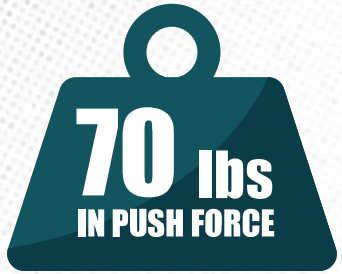

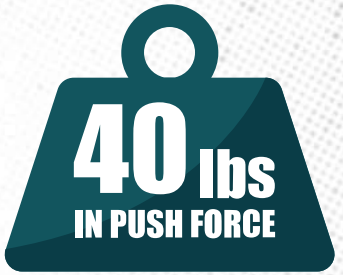

OUT OF 100 EMPLOYEES
62 ARE AT RISK OF INJURY

OUT OF 100 EMPLOYEES
18 ARE AT RISK OF INJURY

OUT OF 100
EMPLOYEES, LESS THAN
10 ARE AT RISK OF INJURY

See Liberty Mutual Manual Materials Handling Calculator for More Information

WHAT IMPACTS A CASTER'S EASE OF MOVEMENT

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Design Considerations:

- Caster Rig Design
- Wheel Design
- Wheel Material
- Caster Placement

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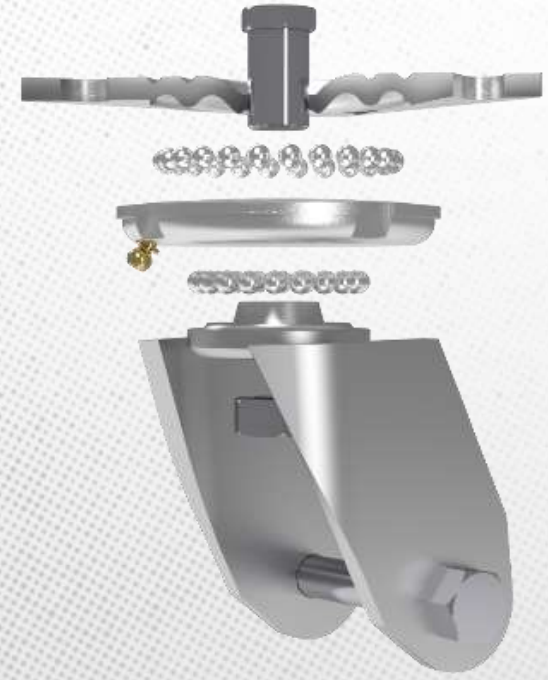
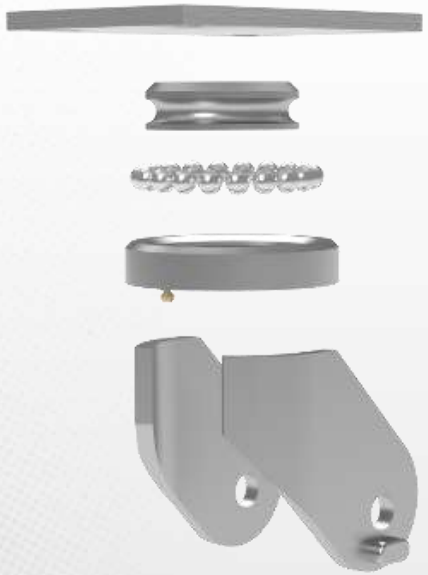
Caster Design

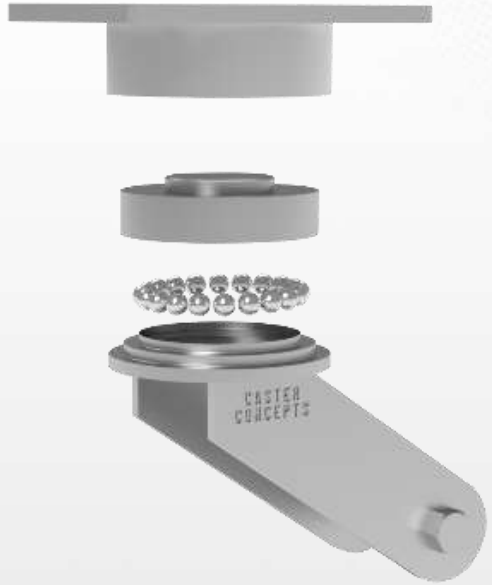
- Swivel Section Design
- Swivel Lead/Offset



Kingpin



Kingpinless



Ext. Lead Maintenance Free

WHEEL DESIGN TRADE-OFFS

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Wheel Design

- Wheel Diameter
- Wheel Width
- Wheel Style

WHEEL TREAD MATERIAL : TRADE-OFF CONT.

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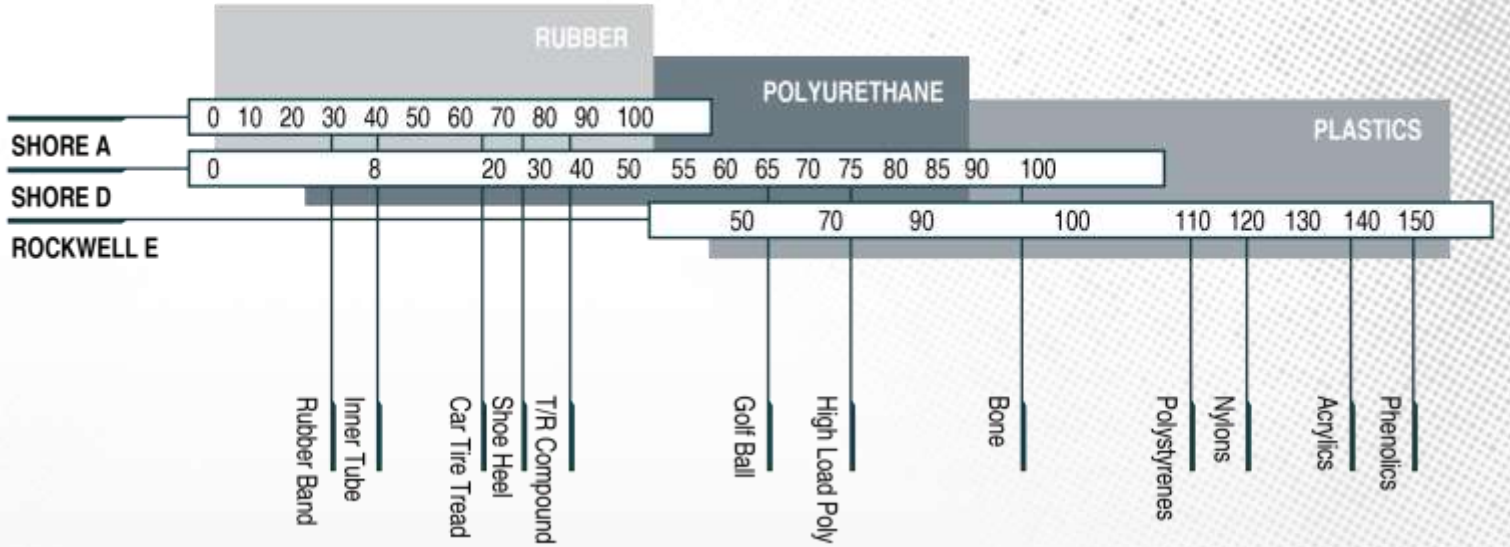
Goldilocks Principle

- Steel/Phenolics too hard
- Rubber too soft
- Urethane just right
  - Polyurethane 85-95A in hardness
  - High Rebound, High Tear Strength



CASTER PLACEMENT

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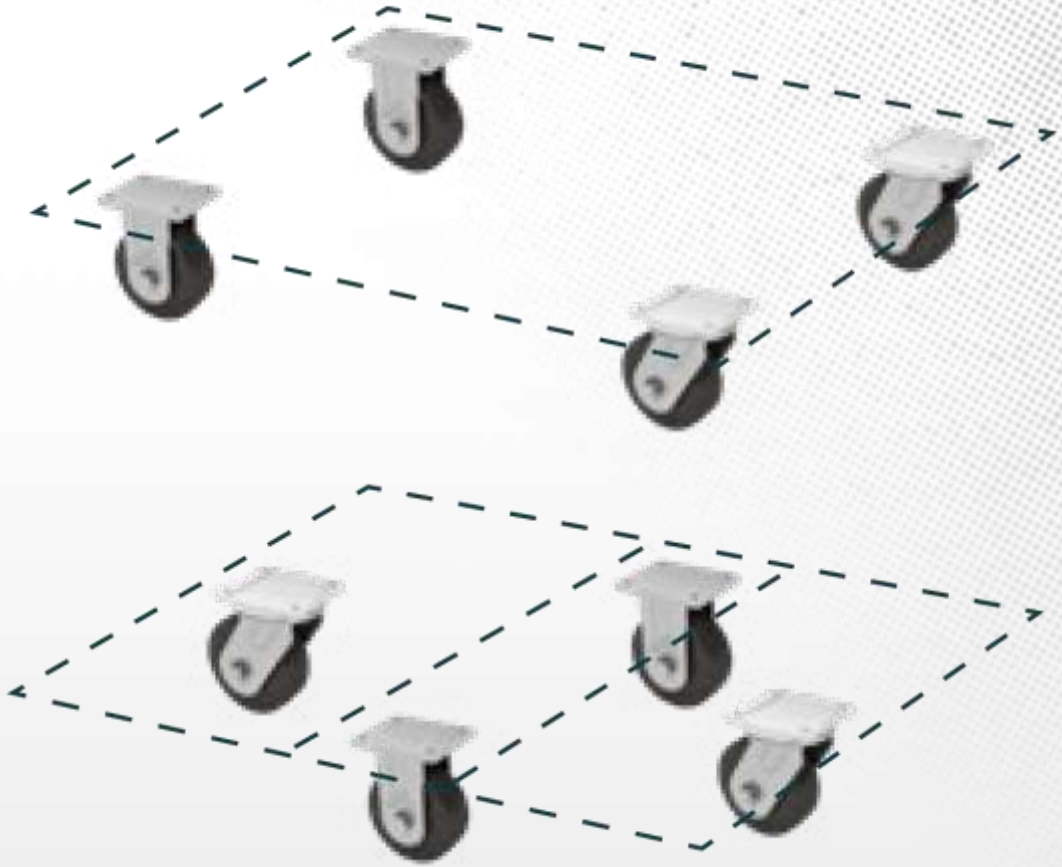
Four Wheel Caster Steer

- Two Front Swivels
- Two Rear Rigids

Two Style of Diamond Configurations

- Diamond all four in contact
- Diamond tilt



CASE STUDY

Reducing Push Force on Tread Cart

Situation:

- 3,500 pound cart – diamond tilt style
- Requires over 200 pounds of force to move
- 4 people required to move tread cart

Solution:

- Can't switch from diamond tilt design
- Utilize improvements in wheel design
  - More width to narrow contact patch
  - Split wheels to reduce scrub
- Utilize improvement in tread material
  - High rebound, high debris rejection

Result:

- Push force reduced to 40 pounds (80% improvement)
  - One person can safely push

CASE STUDY

Eliminating Injuries on Cassette Cart

Situation:

- 1,900 pound cart – diamond - all casters in contact
- Requires over 80 pounds of force to move
- Multiple injuries reported from moving carts

Solution:

- Utilize improvement in caster rig design
  - Maintenance free, extended lead
- Utilize improvement in tread material
  - High rebound, high toughness

Result:

- Push force reduced to 35 pounds (56% improvement)
  - One person can safely push
  - Eliminated injury risk

MAKE MOVING HEAVY LOADS SAFER & EFFICIENT

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The Design and Construction of a Caster has a Significant Impact On The Cart Performance and Ergonomic Factors.

Caster Design

- Extended Lead
- Correct Swivel Section

Wheel Design

- Larger is better
- Wider best for straight line push
- Split wheels reduce scrubbing

Wheel Material

- Goldilocks – Not too hard or soft
- High rebound and tear strength
- Debris rejection

LOADS UP TO 1,600 LBS.

LOADS UP TO 2,800 LBS.

LOADS UP TO 3,500 LBS.

LOADS UP TO 5,000+ LBS.

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Thank You For Listening

If you have further questions or would like to discuss ergonomic solutions for your specific application, please contact:

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