



UHMW vs. HDPE

Key Differences Explained

Properties

Ultra-High Molecular Weight Polyethylene (UHMW) and High-Density Polyethylene (HDPE) are two of the most versatile plastics used today, with differences in performance, cost-effectiveness, and lifespan.

Machinability & Fabrication

- HDPE cuts cleanly, thermoforms, and holds tolerances better than UHMW.
- UHMW is more difficult to machine due to its toughness.

Strength & Stiffness

- HDPE has higher tensile strength and greater rigidity than UHMW.
- UHMW is softer - absorbs impact without cracking.

Impact Resistance

- UHMW withstands repeated hard blows.
- HDPE performs well but can't match UHMW in extreme impact scenarios.

Wear Resistance

- UHMW has an extremely low coefficient of friction - ideal for sliding or abrasive conditions.
- HDPE resists wear, but UHMW can last up to 10 times longer in high-friction applications.

Temperature Range

- UHMW tolerates cryogenic use and slightly higher continuous service temperatures.
- Both soften under heat, but perform well in freezing conditions.

Chemical & Moisture Resistance

- Both are nearly inert to chemicals and absorb little to no water.

Cost

- HDPE is 2 to 4 times less expensive than UHMW.

Applications and Uses



Selecting between UHMW and HDPE requires balancing performance, cost, and fabrication needs.

Choose UHMW if your application needs maximum durability for abrasion, friction, or strong impacts.

Choose HDPE if you need a cost-effective plastic that balances strength with easy fabrication.

Both UHMW and HDPE meet FDA, USDA, and NSF requirements for food contact in their virgin, unmodified forms.

UHMW

- **Food Processing:** guide rails & scraper blades
- **Conveyor & Material Handling:** conveyor wear strips, chain guides, & rollers
- **Lumber Processing:** extends equipment life
- **Automotive:** wear plates, pads, & bushings
- **Industrial Machinery:** guide rails, bushings
- **Marine:** Dock fenders & bumpers
- **Mining:** hopper, chute, & truck bed liners

HDPE

- **Food Processing:** cutting boards & containers
- **Conveyor & Material Handling:** lighter-duty conveyors
- **Automotive:** thermoformed tanks, housings, & covers
- **Industrial Machinery:** guards, panels, & enclosures
- **Marine:** docks, marine boards, & cabinetry
- **Mining:** Piping & containment

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FAQs: UHMW vs HDPE

What is the difference between UHMW and HDPE?

UHMW offers higher toughness and wear resistance, while HDPE is stiffer, easier to fabricate, and more cost-efficient.

Can HDPE and UHMW be cut with woodworking tools?

Yes. HDPE machines much like wood and can be cut, drilled, or routed with standard woodworking tools. UHMW's toughness makes it harder to machine cleanly.

Is UHMW stronger than HDPE?

UHMW is tougher and more abrasion-resistant, but HDPE has greater stiffness and tensile strength.

Can HDPE replace UHMW?

HDPE can substitute UHMW in low-wear scenarios, but with shorter service life.

Are UHMW and HDPE food safe?

Both UHMW and HDPE are available in FDA-compliant virgin grades for food and beverage use, but recycled or filled grades may not be food safe.

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