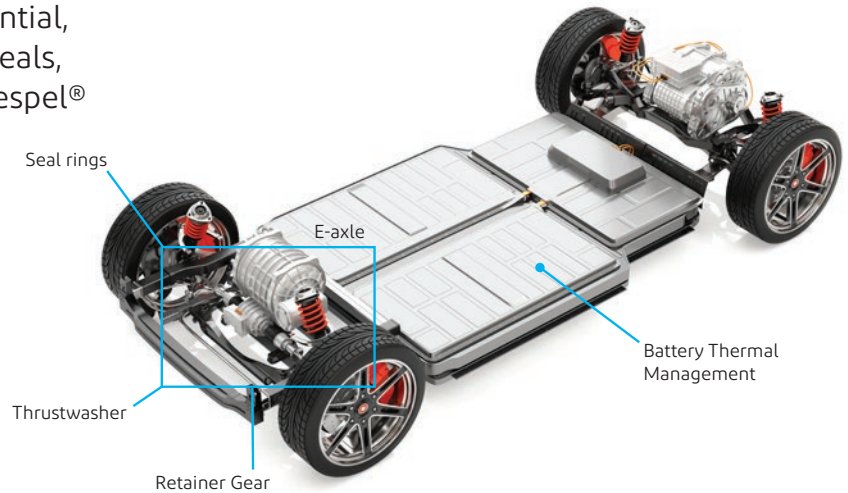


# DuPont™ Vespel® Parts and Shapes

Electrical Vehicle Applications (PHEV, BEV, FCEV)

Primarily used in the transmission, differential, and motors in the form of wear rings, H<sub>2</sub> seals, bushings, and thrust washers, DuPont™ Vespel® parts and shapes enable specific performance in EVs, including:

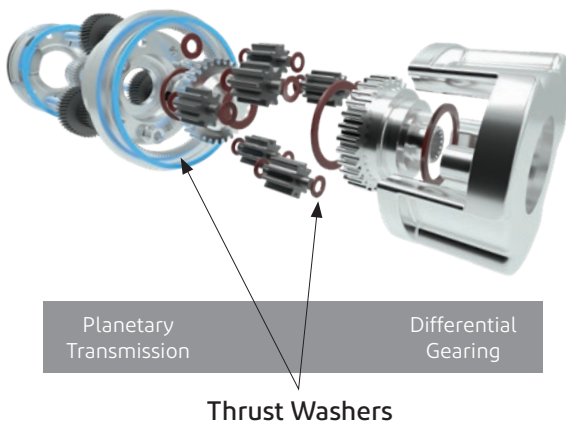
- Improved efficiency
- Reduced wear under high loads
- Lightweighting
- Improved Noise, Vibration and Harshness (NVH)



## Vespel® Parts and Shapes in E-Mobility: Thrust Washers for demanding conditions

Used in e-Axles, differentials, torque vectoring, disconnect systems

Challenges of electrification within the drivetrain



Higher torque & instant acceleration



Compact design & light weight



Higher rotational speed = high V



Lean lubricating conditions



The most demanding NVH<sup>1</sup> requirements

**Vespel® thrust washer meets and exceeds those challenges**

### Thrust Washer Application Requirements

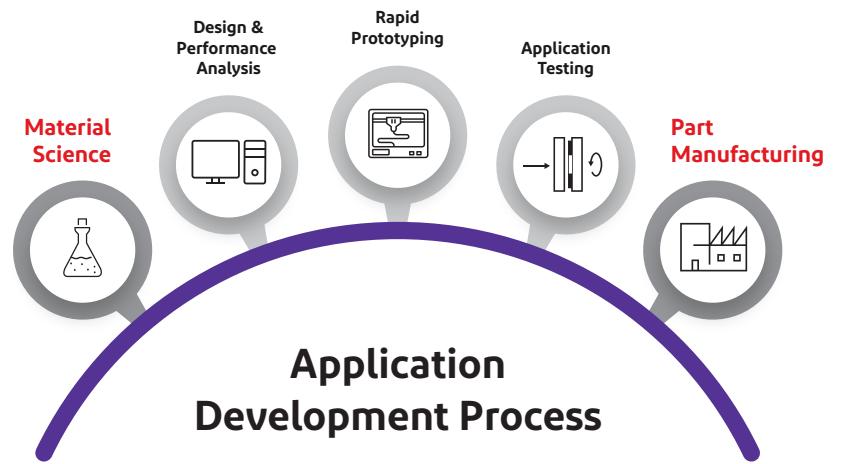
- Absorb axial forces
- Act as spacers between rotary and static components
- Prevent wear and minimize seizing to reduce torque loss
- Resist Pressure (P) and Velocity (v), (PV condition)

- Minimizes wear and reduces friction
- Prevents seizure / fretting, low COF<sup>2</sup> @ high rpm
- High damping performance vs. metal ( $\tan(\delta)$ )
- Lighter than metal and thinner than competitive plastics
- Self lubricating, operating under lean lubricating levels with optimized oil groove design

<sup>1</sup> Noise Vibration Harshness; <sup>2</sup> Coefficient of Friction

## DuPont Application Development: From Material Science to High Performance Parts

DuPont has a long history of collaborative innovation in material science and part manufacturing to help customers develop solutions for the industry's most stringent challenges. The DuPont™ Vespel® portfolio offers a range of high performance polyimide parts and application testing capabilities that can enable customers to meet the most stringent industry regulations in terms of emissions, reliability and efficiency for these critical applications.



### Application testing capabilities include:

- Planetary Gear Washer Testing
- Vertical & Horizontal Thrust Washer Testing
- Seal Ring Wear and Friction Testing
- Low and High Temperature Testing
- Chemical Aging
- Dry and Lubricated Wear and Friction Testing
- Mechanical Property Testing
- Linear & Rotational Wear Testing
- Global Network of Application Testing Centers of Excellence

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