You benefit from these advantages

- Compact, reliable and economically efficient design
- Individual customer adaptations possible at any time
- Complete after-sales service with original components from the manufacturer
- Lower costs and guaranteed access to key components
- Smart monitoring and fail-safe design

Specially Developed and Integrated Electric Cylinder

Customized solutions for retrofitting existing systems with integrated electric cylinder





Reliable Lifting Spring & Damping Strips

Locally developed and engineered to meet assembling and pantograph – catenary performance requirements, with provision of customized solutions for retrofitting existing systems with locally manufactured spring or spring strips.







Advisory Organization

交通部鐵道局
Railway Bureau, MOTC

Development Team

TAIPEI TECH

KENMEC 廣運 AUTOMATION TECHNOLOGY

Collaborating Partners

RTRCC

TÜVRheinland

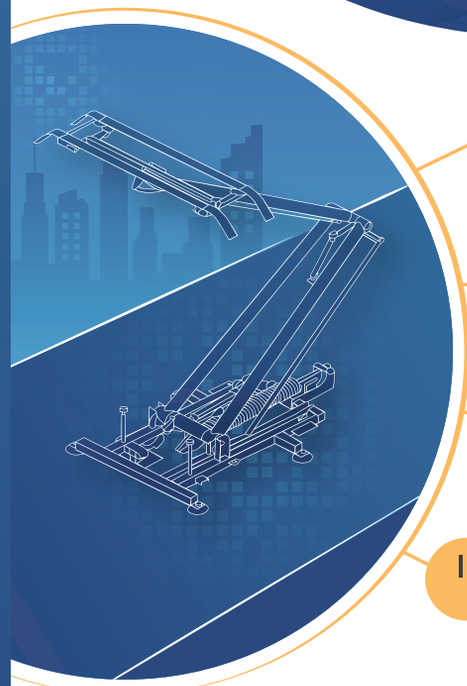
TRSC 台灣車輛 Taiwan Rolling Stock Co., Ltd.

新北捷運

Energywell

UMU Innovation

Pantograph for Light Rail System



- Reliability
- Safety
- Customization
- International Standards

智慧鐵道產業人才學院
Smart Railway School

Complies with International Standards




Rigorous testing is conducted in accordance with applicable international standards to ensure availability, reliability, and safety. The development results are independently verified and validated by TÜV Rheinland Taiwan, with third-party witnessing of the relevant tests, demonstrating compliance with international standards.

- **EN 50206-2**
  Uplift force, impact resistance, durability, raising and lowering performance, and environmental testing
- **IEC 62236-3-2**
  Electromagnetic compatibility (EMC) testing
- **CNS 8886**
  Neutral salt spray testing
- **IEC 62278**
  Reliability, availability, maintainability (RAM) analysis
- **EN 50317**
  On - track testing, current collection, temperature rise, and pantograph – catenary contact performance
- **IV & V**
  Rigorous Independent verification & validation by TÜV Rheinland Taiwan


EMI testing

Current-collect testing

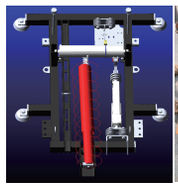
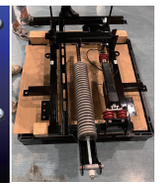


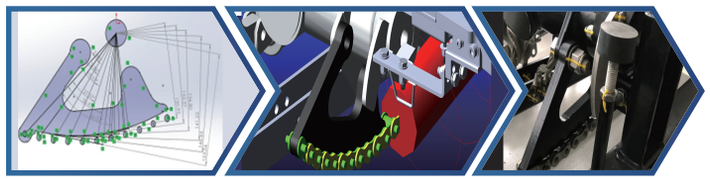
Contact wear inspection

Precise Analysis and Design

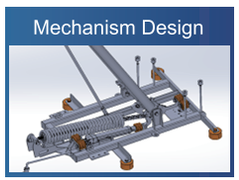
Based on the pantograph – catenary interaction characteristics of light rail vehicles, the pantograph is indigenously developed in accordance with the V-cycle development process defined in EN 50126. Rigorous analysis and design are conducted throughout the development process to ensure that the design meets operational requirements and initial development objectives, with third-party witnessing and independent verification by TÜV Rheinland Taiwan.

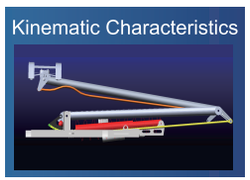
- **Pantograph mechanism design**
  Mechanism design and configuration of pantograph's degrees-of-freedom
- **Structural strength analysis**
  Pantograph stiffness, natural frequency, deformation, and fatigue endurance
- **Aerodynamic analysis**
  Stabilization of uplift force during operation to prevent abnormal wear
- **Pantograph – catenary interaction**
  Contact force, loss-of-contact rate, and percentage of arcing
- **Kinematic characteristics**
  Interference checks, driving output of pantograph mechanism, and electric cylinder control logic

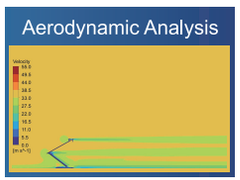



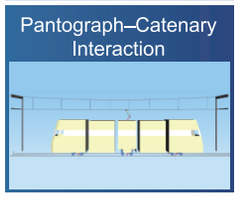


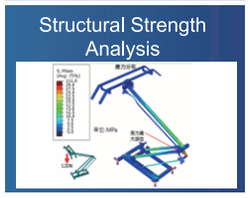
Component Design ▶ System Analysis ▶ Manufacturing & Testing


Mechanism Design


Kinematic Characteristics


Aerodynamic Analysis

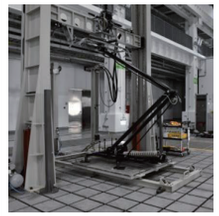

Pantograph–Catenary Interaction


Structural Strength Analysis


Carbon Strip Wear Prediction

ISO/IEC 17025 Accredited Laboratory Testing

Mean Uplift Force Testing (EN 50206-2)



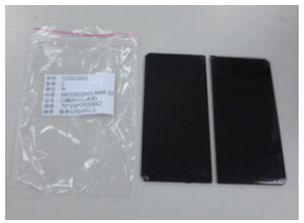
Adjustable pantograph uplift force design ensures stable pantograph – catenary contact while minimizing abnormal contact wear.

Vibration & Shock Testing (EN 50206-2)




10 million-cycle transverse vibration endurance testing, random vibration testing, and shock testing are conducted to the most stringent standards, ensuring reliable performance and availability under actual operating conditions.

Environmental Testing (EN 50206-2、CNS 8886)

All pantograph functions are verified under strictly controlled temperatures ranging from −25°C to 40°C. Salt spray corrosion testing is also conducted to ensure reliable performance and protection, even in demanding coastal environments.