Precision Measuring Instrument Solution Introduction

New Energy Vehicle Industry Article

Mitutoyo

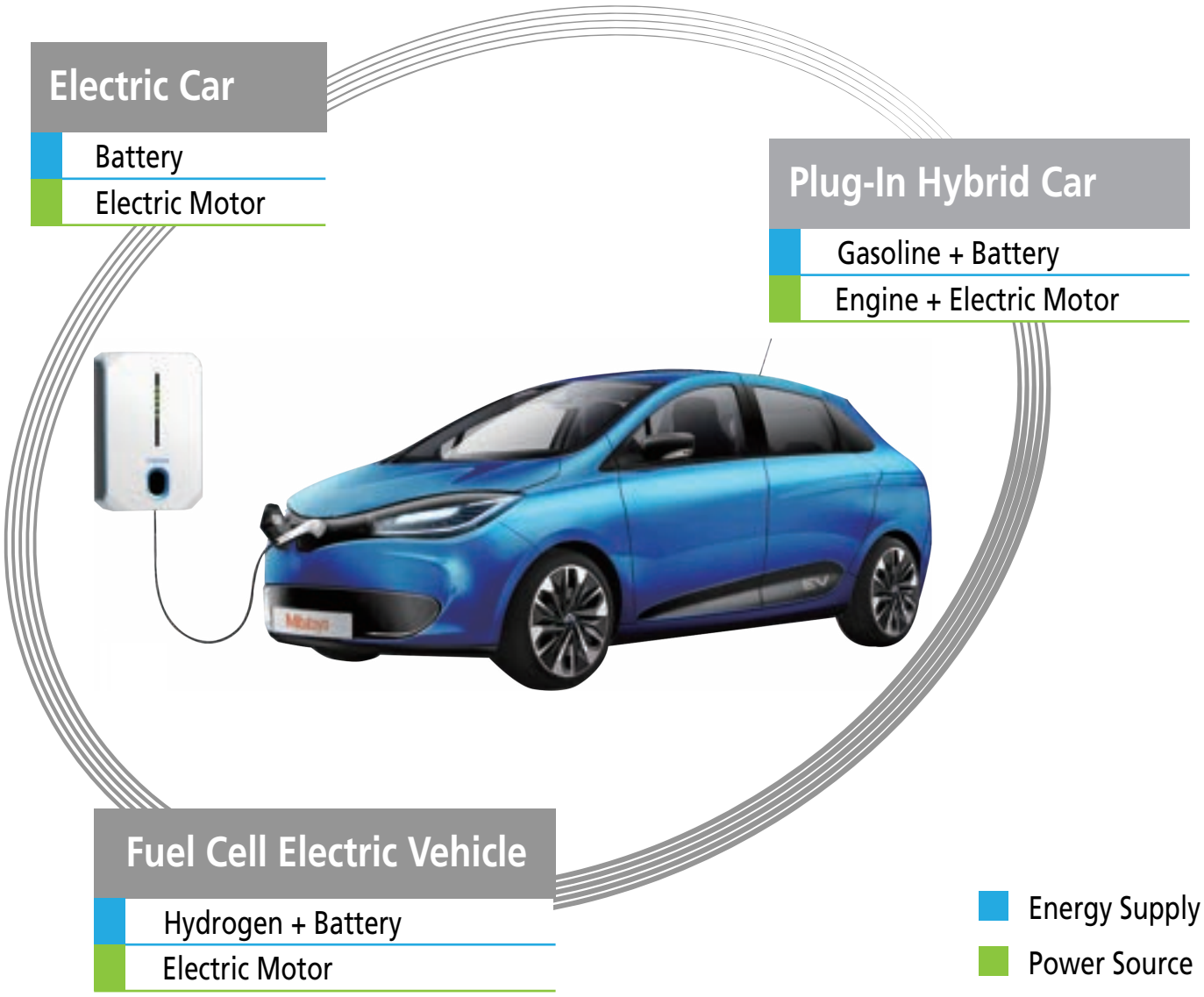
New Energy Vehicles Use Measurement Solutions

As the trump card for solving environmental pollution and energy supply issues, the global automotive industry is accelerating the transition towards new energy vehicles represented by electric vehicles.

This drive led to an increase in the development and manufacture of new devices and parts that were non-existent in gasoline and diesel vehicles. The importance of accurate measurement of these devices and parts has also become increasingly evident in the industry.

In this context, the following will present some of the technologies and measuring solutions for the manufacture of new energy vehicles with about 5,000 Mitutoyo precision measuring equipment models.

New Energy Vehicle Type

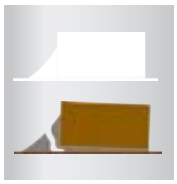


Precision Measuring Instruments that Give Support to the Development

Power Control Unit (PCU)

IGBT(Insulated Gate Bipolar Transistor)

The power transistor of the inverter core.
The main flow IGBT is a semiconductor component assembly.
The vision measuring machine can be used for the efficient measurement of fine parts such as chips and key alloy wires. The microscope can be used to effectively observe and confirm cracks in the solder connected to a chip.



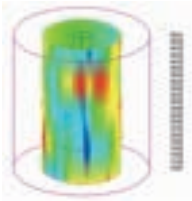
PCU Cover

For PCU covers made of cast aluminum, the CNC three dimensions coordinate measuring machine can perform contact automatic measurement on complex three-dimensional shapes.

Electric Motor

Motor Core

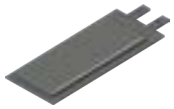
The use of an vision measuring machine with a touch probe allows for the efficient measurement of pre-lamination stampings and laminates. The image measurement mode can be used for thin and flat pre-lamination items. A three-dimensional evaluation of the distortion and offset after lamination can be performed using the touch probe mode. In addition, the cylindricity measurement of the outer diameter of the rotor and the inner diameter of the stator can be measured using a roundness measuring instrument.



Coil

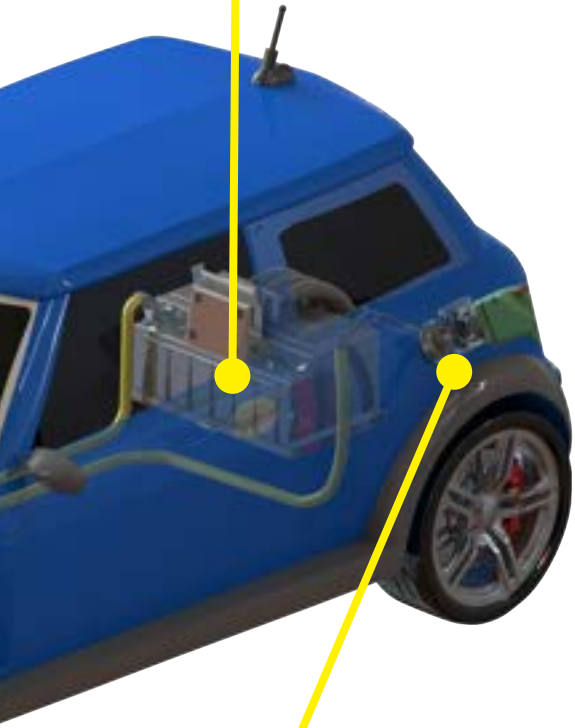
A laser scan micrometer that can measure at a high speed and high resolution can effectively measure the outer diameter of the winding used in the motor core.

Battery



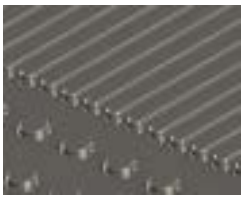
Lithium Ion Battery

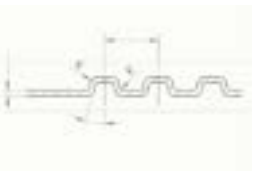
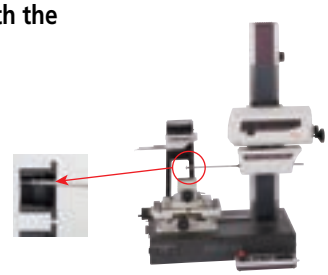
Thickness management of the separator for the positive and negative electrode insulation is indispensable for the manufacturing process of lithium ion batteries that are prone to cracking and combustion. A litematic that is capable of minimizing the impact on materials with low force is the most suitable.In addition, a measuring microscope can inspect the presence or absence of foreign matter inside the laminated lithium ion battery (requires cutting).



Hydrogen-Oxygen Fuel Cell Separator

In order to form a flow path for diffusing gas, the fuel cell separator is processed into a small concave-convex shape. Using the micro-form measuring system UMAP with an ultra-low force measuring stylus with a minimum diameter of 15 μm and a minimum of 1 μN, high-reliability measurement is achieved in terms of R angle, spacing, degree, etc. In addition, in terms of thickness measurement, a surface roughness and contour measuring machine that achieves continuous measurement of the upper and lower surfaces through a combination with the tapered probes on both sides is utilized.



Harness

When measuring the height of the crimping height for a crimped wire bundle, a dedicated micrometer is often used.

Charger and Charging Port

Car Charger

The car charger consists of various parts such as a cover, a connector, a housing and a relay. Mitutoyo's extensive product portfolio, such as three dimensions coordinate measuring machine, vision measuring machine, form measuring instrument, etc. can take so many measurements.

Rapid Charger

To improve the electrical conductivity of the metal terminals of the jack, it is very effective to measure with a surface roughness measuring instrument.

Precision Measuring Instruments that give support to the development and manufacture of new energy vehicles

The following is a description of Mitutoyo precision measuring instruments suitable for various purposes

Component		Use	Three dimensions Coordinate Measuring Machine	Vision Measuring Machine	Micro Shape Measuring System	Form Measuring Machine	Optical Measuring Machine	Sensor System	Hardness Testing Machine	Measuring Tools
										
Battery	Lithium Ion Battery	Cover Part Size Measurement and Surface Properties	❍			❍	❍		❍	❍
		Battery Box Size Measurement and Surface Properties	❍	❍			❍		❍	❍
		Isolator Thickness and Width						❍		
		Measurement and Observation of Cut Surface Size (with or without foreign matter)		❍			❍			
	Hydrogen-Oxygen Fuel Cell Separator	Molded Product Size and Shape Measurement	❍		❍					
		Molded Product Thickness Measurement				❍				
		Mold Shape Measurement	❍		❍					
Electric Motor	Motor Core	Pre-Lamination Stamping Dimensional Measurement		❍		❍	❍		❍	❍
		Post-Lamination Dimensional and Various Geometric Tolerance Measurements	❍	❍		❍				❍
		Rotary Axis Beat	❍					❍		
	Commutator	Peripheral Adjacent Gap	❍	❍		❍	❍			
	Housing	Bearing Coaxiality	❍			❍				
	Coil	Diameter Size						❍		❍
		Post-Winding Shape Confirmation	❍							
Power Control Unit (PCU)	IGBT (*)	Power Blocks of Various Sizes	❍	❍		❍	❍		❍	❍
		Semiconductor Circuits of Various Sizes		❍			❍			
		Weld Section Crack Inspection					❍			
		Key Alloy Wire Height		❍						
	Inverter Housing	Aluminum Frames of Various Sizes and Surface Properties	❍	❍		❍	❍		❍	❍
Chargers	Car Charger	Aluminum Frames of Various Sizes	❍	❍		❍	❍		❍	❍
		Stampings of Various Sizes	❍	❍		❍	❍		❍	❍
		Connector Terminal Lodging and Roughness	❍	❍		❍				
	Rapid Charger	Jacks of Various Sizes	❍	❍		❍	❍		❍	❍
		Terminal Surface Characteristics				❍				
		Panels of Various Sizes	❍	❍		❍	❍		❍	❍
Harness		Crimped Terminal Crimp Height								❍
		Core Wire Length and Diameter		❍			❍	❍		❍

(*)IGBT…Insulated Gate Bipolar Transistor

Remarks:
The names of some precision measuring instruments in the text are classified according to the product names listed in the table.
Coordinate Measuring Machine: Three Dimensions Coordinate Measuring Machine
Form Measuring System: Surface Roughness Measuring Instrument, Surface Roughness and Contour Measuring System, Roundness and Cylindricity Shape Measuring Instrument
Optical Instruments: Optical Measuring Machines, Projectors, Measuring Microscopes, Surface Measuring Instruments
Sensor System: Laser Scan Micrometer, Bench Low Force Altimeter
Test and Measurement Equipment: Hardness Testing Machine
Scale: Linear Scale

Mitutoyo

Mitutoyo Asia Pacific Pte. Ltd.
Company Reg No. 197800892N
24 Kallang Avenue, Mitutoyo Building, Singapore 339415
Tel: (65) 6294 2211 Fax: (65) 6299 6666
E-mail: mapsg@mitutoyo.com.sg

www.mitutoyo.com.sg | www.mitutoyo.com.my
www.mitutoyo.co.th | www.mitutoyo.co.id
www.mitutoyo.com.vn | www.mitutoyo.com.ph

Mitutoyo (Malaysia) Sdn. Bhd.
Mah Sing Integrated Industrial Park,
4, Jalan Utarid U5/14, Section U5,
40150 Shah Alam, Selangor, Malaysia
Tel: (60) 3-7845 9318
Fax: (60) 3-7845 9346
E-mail: mmsb@mitutoyo.com.my
Penang Branch
Tel: (60) 4641 1998 Fax: (60) 4641 2998
E-mail: mmsbpen@mitutoyo.com.my
Johor Branch
Tel: (60) 7352 1626 Fax: (60) 7352 1628
E-mail: mmsbjhr@mitutoyo.com.my

Mitutoyo (Thailand) Co., Ltd.
76/3-5, Chaengwattana Road, Kwaeng
Anusaowaree, Khet Bangkaen,
Bangkok 10220, Thailand
Tel: (66) 2080 3500
Fax: (66) 2521 6136
E-mail: office@mitutoyo.co.th
Chonburi Branch
Tel: (66) 2080 3563
Fax: (66) 3834 5788
ACC Branch
Tel: (66) 2080 3565

PT. Mitutoyo Indonesia
Jalan Sriwijaya No.26
Desa cibatu
Kec. Cikarang Selatan
Kab. Bekasi 17530, Indonesia
Tel: (62) 21-2962 8600
Fax: (62) 21-2962 8604
E-mail: ptmi@mitutoyo.co.id

Mitutoyo Vietnam Co., Ltd.
1st & 2nd Floor, MHDI Building,
No. 60 Hoang Quoc Viet Road,
Nghia Do Ward, Cau Giay District,
Hanoi, Vietnam
Tel: (84) 24-3768 8963
Fax: (84) 24-3768 8960
E-mail: mvc@mitutoyo.com.vn
Ho Chi Minh City Branch
Tel: (84) 28-3840 3489
Fax: (84) 28-3840 3498
Hai Phong City Branch
Tel: (84)22-5398 9909

Mitutoyo Philippines, Inc.
Unit 1B & 2B LTI,
Administration Building 1,
Annex 1, North Main Avenue,
Laguna Technopark, Biñan,
Laguna 4024, Philippines
Tel: (63) 49-544 0272
Fax: (63) 49-544 0272
E-mail: mpi@mitutoyo.com.ph

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