CDTI-NEDO online Joint Workshop on Hydrogen Technology
- Green Hydrogen Production & Mobility -

FC Development in Toyota

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MINISTERIO DE CIENCIA E INNOVACIÓN

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AeH2 ASOCIACIÓN ESPAÑOLA DEL HIDRÓGENO

FC Development History in Toyota

’92 ’96 ’02 ’05 ’08 ‘14

Starting point

Parade in Osaka(‘96)

Great cheer for a few circles in test course

Limited for JP&US(‘02)

JP: 4units, US:2units

Bus for Expo
8units/13000km
A million people used

Metropolitan bus (17000km)

Meet the high pressure H2 gas regulation(‘04)

Meet standard JP ministry of land(‘0

Highway bus(‘10)

More than 11000 units
Two hundred Million km driving
(Assumption:20000km/vehicle)

“FCV hired” taxi (‘11)

(From Toyota 75years history)

FC Development History in Toyota

’14 ’20 ‘50

Carbon Neutral

SUSTAINABLE DEVELOPMENT GOALS

- High-speed production
- Lowering cost
- High Functionality
- Additional value

99.7% reduction of PM2.5

(Toyota internal test)

Stating point toward a sustainable future and happiness

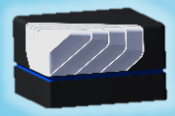
Next Action Toward Sustainable Progress

Next Action Toward Sustainable Progress

Toyota FC module

Vertical type: 60/80kW

Horizontal type: 60/80kW



Small type: 8kW

All in one FC module

Various types of light weight H2 storage tank

Possible to apply various FC applications by compact FC module

Next Action Toward Sustainable Progress


Forklift


Towing truck


Stationary power supply


Railroad


Marine


Aviation


Light-duty Truck

Heavy-duty truck


Heavy-duty tractor truck


Bus

Power Supply Vehicles


Moving-e

Variations
- Output line-up
- Tank size

Packaging
- Installation
- System I/F
- High voltage system

Service, Support
- After service
- Reliability, Durability

『Variation』and『Compatibility』is important to correspond to diverse application

Progress of FC Technologies

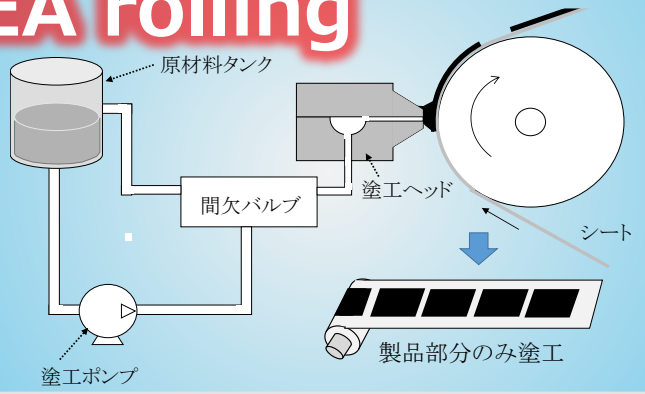
	1st Gen. MIRAI	New MIRAI
Size Weight		
Max. Power	114kW	128kW
Volumetric Energy Density	3.5kW/L	5.4kW/L
Cruising range (Toyota internal test)	650km	850km

High Speed Production

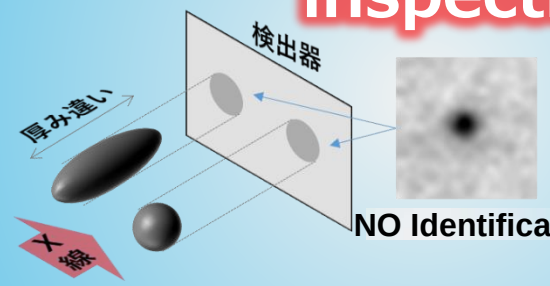
High Speed Cell Assembly

High Speed Production

High Speed MEA rolling



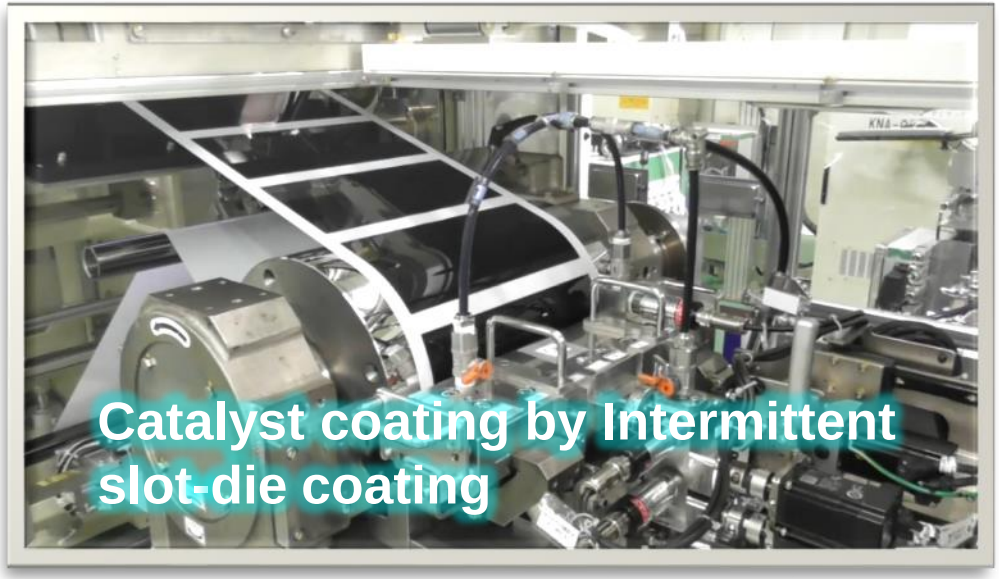
Faster and Highly accurate quality management, inspection

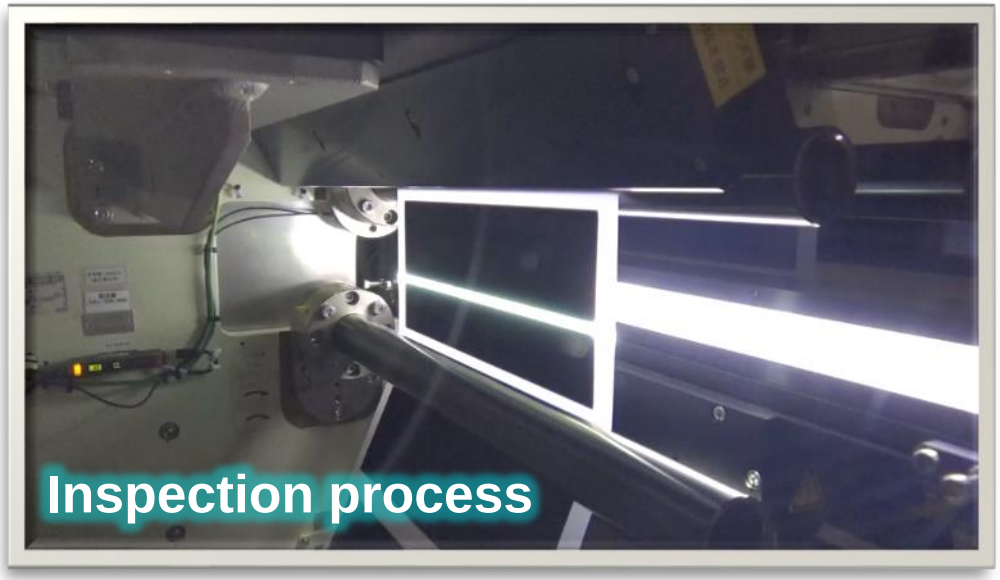


Activation Treatment for Contamination Control

High Speed Production

Catalyst coating process

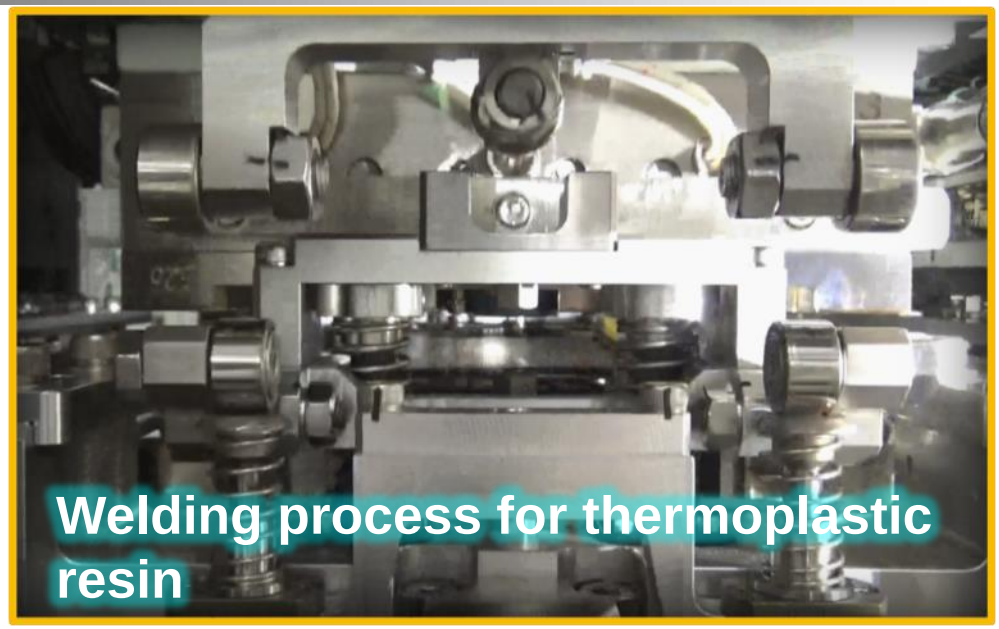




Intermittent slot-die coating is applied to reduce Pt loss. Shape of catalyst layer and defect can be confirmed by transmitted light

High Speed Production

Cell assembly process



Originally developed thermoplastic resin is adopted as sealing material. Cell assembly time can be reduced in several seconds per cell.

Ideas for a Japan – Spain collaboration

Toyota Motor Europe to supply fuel cell modules for train project as member of FCH2RAIL Consortium

Spanish state railway operator

renfe

DLR

Spanish manufacturer

CAF

Stemmann-Technik
A Wabteo Company

Infraestruturas de Portugal

Spanish administrator

adif

Spanish hydrogen research

Centro Nacional del Hidrógeno

TOYOTA

The Collaboration between Spanish companies and Toyota has already started.

Toyota-Caetano co-branded FC bus

Delivered to Barcelona