DENSO

Crafting the Core

Potential of Robotics and Automation in Japanese Greenhouse Horticulture

1. Overview of DENSO Group
2. Activities of DENSO Food Value Chain Division
3. Development of Next Generation Greenhouse
4. Collaboration with Certhon

12th November 2020

DENSO AgriTech Solutions, Inc.

Mr. Osamu SHIMIZU

1. Overview of DENSO Group -Corporate Profile-

Established	December 16, 1949	
Capital	¥187.5 billion	
Revenue	Consolidated basis	¥5,153.5 billion (US$47.6 billion)*
Operating Profit	Consolidated basis	¥61.1 billion (US$563.8 million)*
Employees	Consolidated basis	170,932
	Non-consolidated basis	45,280
Consolidated Subsidiaries	200 (Japan 64, North America 23, Europe 32, Asia 74, Others 7)	
Affiliates under the Equity Method	88 (Japan 24, North America 11, Europe 17, Asia 32, Others 4)	

* U.S.dollar amounts have been translated, for convenience only, at the rate of 108.33 yen = US$1, the approximate exchange rate prevailing on March 31, 2020. Billion is used in the American sense of one thousand million.

as of March 31, 2020

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1. Overview of DENSO Group -Four Focused Fields-

DENSO is contributing to the improvement of both industrial and social productivity by working to provide new mobility value, establish factory automation (FA) and industrialize agriculture.

Electrification

Reducing environmental burden and realizing highly efficient mobility

Advanced Safety and Automated Driving

Realizing a safe society without accidents, and free and comfortable mobility

Connected Cars

Realizing a new mobile society that connects vehicles, people, and goods

Non-Automotive Businesses

(Factory Automation and **Agriculture**)

Contributing to improved social and industrial productivity

Agriculture → Food Value Chain Division

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2. Activities of DENSO Food Value Chain Division

Production | Processing・Distribution | Market

Production Improvement through greenhouse（High yield　low cost）

■ Greenhouse model

Low cost and high yield customized greenhouse model for Japan market

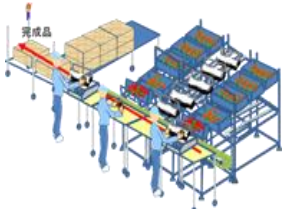
◇**Mid-sized Greenhouse**
(Profarm T-Cube)

◇**Production Support**

・Climate Controller (Profarm Controller)
・Climate Monitoring System (Profarm Monitor)
・Harvesting Robot (under development)

◇**Large-sized Greenhouse**

◇**Workflow design/ improvement**



AgriD (tomato delivered to market in March 2020)

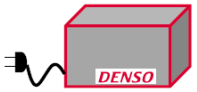
Stable Supply of Fresh Vegetable

■ Cold Chain

◇Transport Refrigerator

Good & Service Integrated Solution

<Goods>　Portable Refrigeration Chiller box



convenient

<Service>　Remote Monitoring

■ QR Code・SQRC

convenient

■ Code Reader

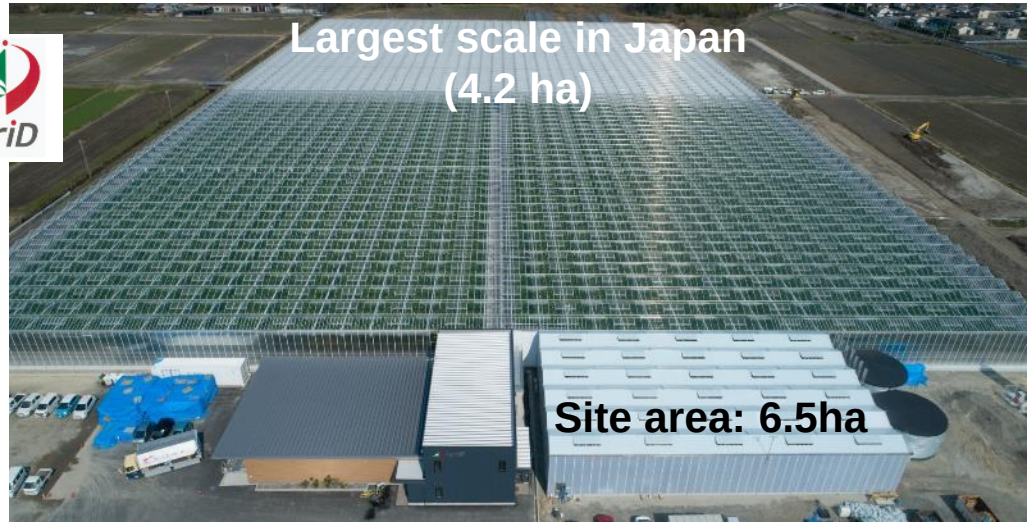
■ Traceability System (Under dev)

Safe

Contributing to the solution development to resolve “Muri, Mura, Muda” (wastes) in FVC

3. Next Generation Greenhouse “AgriD” -Corporate Overview-

Company	AgriD, Inc
Established	Aug 2018, Operation started Sep 2019
Location	Inabe City, 4.2ha Greenhouse
Capital	100 M Yen(Asai Nursery 51%, DN49%)
Initial Inv	1.45 Billion Yen
CEO	Yuichiro ASAI
Business Overview	• Fresh vegetable production/sales • Development/POC of Next General Large Greenhouse model

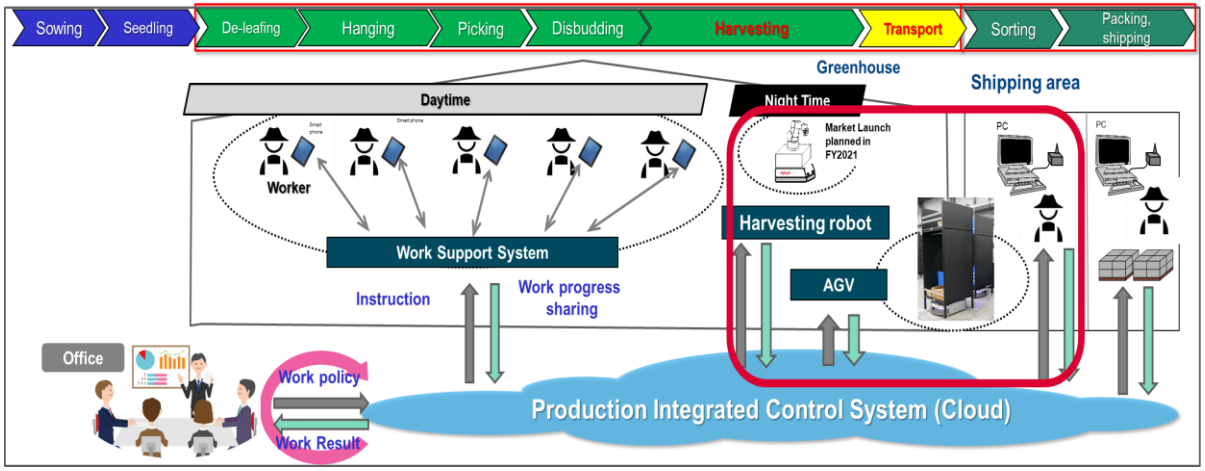


***Operation started in March 2020**

Build-up Next Generation Greenhouse Model

Achieve reduction of “Muri, Muda, Mura” by seamlessly connecting from harvesting to shipping

Human & Robotics Collaboration (24 hours operation)



AGV (harvested crop /residue)

3. Next Generation Greenhouse “AgriD” -FARO-

■ Outline

- ✓ For the sustainable growth of agriculture, automation of harvesting which is high-load work, to correspond to the decreasing farming population
- ✓ Utilize image data at the time of harvest to improve efficiency of cultivation work and predict yield

Harvesting	Night time (8 hours)
Traveling Function	Autonomous driving(automatic rail change)
Harvest Time per unit	20 seconds
Other Features	✓ Yield prediction ✓ Unharvested data collection
Robot Body	DENSO VS060

■ Future Application Development

Multi-Functions

Work Assistance

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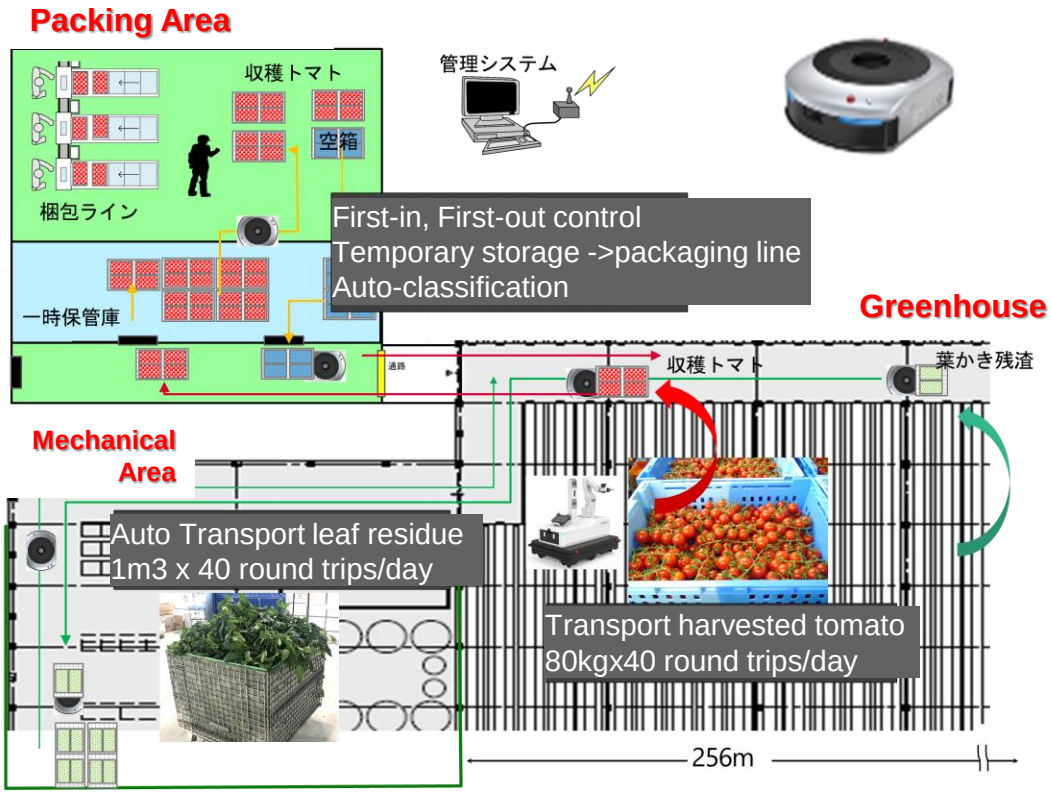
3. Next Generation Greenhouse “AgriD” -Automated Transport-

■ Outline

✓ Reduction of heavy work in large greenhouse to improve the working environment for farmers

✓ Automation of transportation work related to work process



■ Future Application Development

Establishing a high production system that achieves optimal balance of humans & machines

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4. Collaboration with Certhon -Sales-

■ Establishment of JV “DENSO AgriTech Solutions, Inc.” with Certhon (May 2020)

DENSO and Certhon Establish DENSO AgriTech Solutions

-To the Global Expansion of Next Generation Horticulture-

Jun. 1, 2020 News Releases Investors Sustainability

DENSO Corporation
Certhon Group

DENSO Corporation (DENSO) and Certhon Group (Certhon) announced they have established on May 29, 2020, DENSO AgriTech Solutions, Inc., (Head office: Minato-ku, Tokyo, President: Osamu Shimizu) a sales company focused on providing innovative horticulture solutions.

■ Company Profile

Company	DENSO AgriTech Solutions, Inc. (DNAG)
Established	29th May 2020
Location	1-8-15 Kounan Minato-ku, Tokyo
CEO	Osamu SHIMIZU
Corporate Identity	Grow Together (With Customers)
Business	・Sales of greenhouse materials & equipment ・Provide cultivation consulting services ・ Aftermarket service related to greenhouse materials and equipment

■ Sales Scheme

■ Market Expansion

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