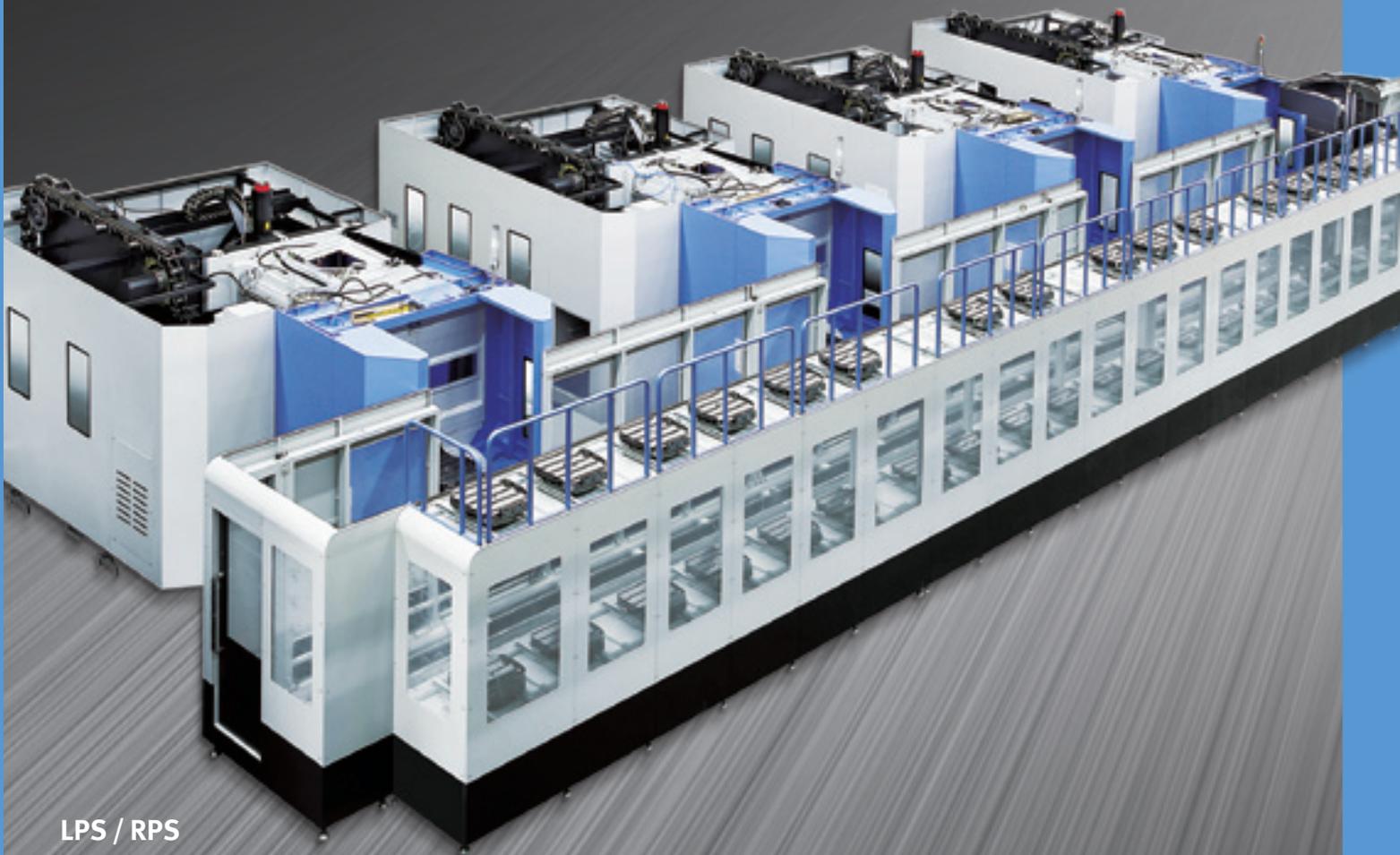


DOOSAN



DOOSAN Pallet Pool System

for Horizontal machining center



LPS / RPS

**MACHINE
GREATNESS™**

Technical Information

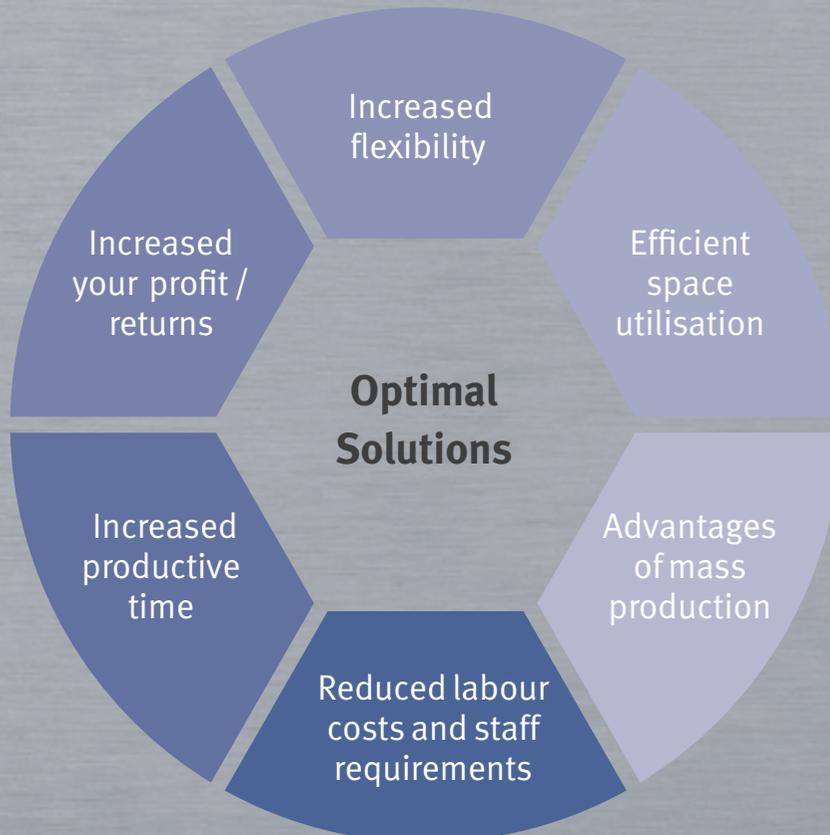
- Line-up
- LPS 4000/5000
- LPS 5500/6300/8000
- RPS 4000/5000
- RPS 4000/5000-21
- RPS 5500/6300/8000
- RPS 1000/1250

Management system

Optimal Solution for your Pallet Automation System

Automated system now offer the reduce labor costs and increase productivity in your factory.
At the same time, the production capacity and utilization rate of the machine tools are increased.

How are you going to offer price reductions unless you automate in some way and become more efficient?



How we provided for customer Doosan automation system?

We have **4-steps** process. We will offer you the best optimal solution with our best engineers.

STEP 01 Inquiry from customer



The first step, we got the inquiries from the customer, and reviewing then we offer the best solution system for customer

STEP 02 Assembly and test



The Second step, we do assembly, and test. We assemble main machine with automation system and test it in our system building

STEP 03 Try-out



The entire system will be supervised by our control system which takes care of order handling and production control. The training of operators is facilitated by customized training programs.

STEP 04 Customer support



We provide A/S when customer need any support of our system. (Improving Cycle time, maintenance, supply spare part etc.)

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09 RPS 4000 / 5000-21

10 RPS 5500 / 6300 / 8000

11 RPS 1000 / 1250

12 Management system



DOOSAN Pallet expansion system for Horizontal machining center

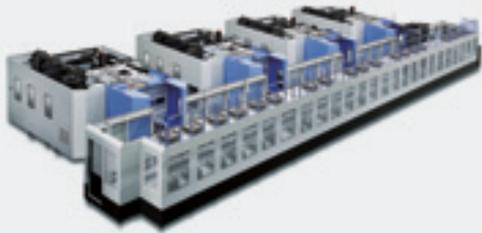
Technical
Information

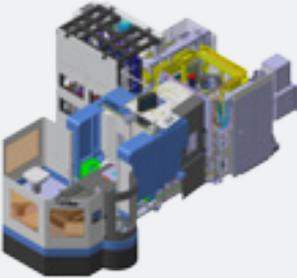
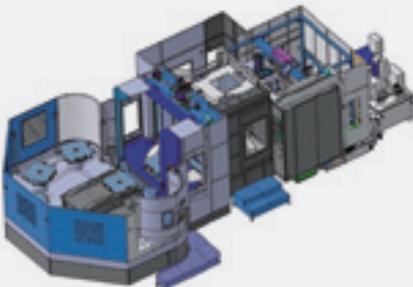
Line-up

LPS 4000/5000
LPS 5500/6300/8000
RPS 4000/5000
RPS 4000/5000-21
RPS 5500/6300/8000
RPS 1000/1250

Management
system

Line-up

Pallet Pool Type	LPS 4000 / 5000	LPS 5500 / 6300 / 8000
Features	<ul style="list-style-type: none"> - Optimized Slim design - Optimized AGV of Single Mast & Single Fork Structure - Easy installation - Easy field retrofit 	<ul style="list-style-type: none"> - Ready to expansion for machine, washing station, setup station, pallet - Full Line-up for all HMC - Easy field retrofit
Available Model	1) NHP 4000 / HC 400 II 2) NHP 5000 / HC 500 II	1) NHM 5000 / NHP 5500 2) NHM 6300 / NHP 6300 3) NHM 8000 / NHP 8000 4) HM 1000 / HM 1250
Workpiece Size	NHP 4000 : Ø630 x 900h x 400kg HC 400 II : Ø600 x 800h x 400kg NHP 5000 : Ø800 x 1000h x 500kg(700kg) HC 500 II : Ø800 x 900h x 500kg	1) Ø850 x 1100h x 800kg 2) Ø1050 x 1350h x 1200kg 3) Ø1450 x 1550h x 2000kg 4) Ø2000 x 1475h / 1725h x 3000kg
Number of Machine	1~7 (AUX. +1)	1~7 (AUX. +1)
Number of Setup Station	1~4	1~4
Number of pallet	Pallet 400 Class : 12 ~ 72 Pallet 500 Class : 12 ~ 72	Pallet 400 Class : 12 ~ 72 Pallet 500 Class : 12 ~ 72 Pallet 630 Class : 10 ~ 72 Pallet 800 Class : 8 ~ 72 Pallet 1000 Class : 6 ~ 30
Operation	<ul style="list-style-type: none"> - PC windows based operation - DPMS II 1) Group part 2) Program up / down loading 3) Alarm / Status e-mailing 4) Tool / Machine monitoring 	<ul style="list-style-type: none"> - PC windows based operation - DPMS II 1) Group part 2) Program up / down loading 3) Alarm / Status e-mailing 4) Tool / Machine monitoring
Exterior		

RPS 4000 / 5000	RPS 5500 / 6300 / 8000	RPS 1000 / 1250
<ul style="list-style-type: none"> - Optimized slim design for space saving & minimal invest cost - Telescopic Mechanism Fork - Simple installation and easy maintenance - Easy field retrofit to Doosan HMC 	<ul style="list-style-type: none"> - Long time unmanned operation - High reliability by servo driven - Simple installation - Easy field retrofit 	<ul style="list-style-type: none"> - Available large volume workpiece - Driven by hydraulic unit - Stable pallet changing unit
<p>1) NHP 4000 / HC 400 II 2) NHP 5000 / HC 500 II</p>	<p>1) NHM 5000 / NHP 5500 2) NHM 6300 / NHP 6300 3) NHM 8000 / NHP 8000</p>	<p>1) HM 1000 / HM 1250 (only for pallet size 1000 x 1000, 1250 x 1000)</p>
<p>1) NHP 4000 6/14p : Ø630 x 900h x 400kg 21p : Ø630 x 700h x 400kg 2) HC 400 II 6/14p : Ø600 x 800h x 400kg 21p : Ø600 x 700h x 400kg 3) NHP 5000 6/14p : Ø800 x 1000h x 500kg(700kg) 21p : Ø800 x 700h x 500kg(700kg) 4) HC 500 II 6/14p : Ø800 x 900h x 500kg 21p : Ø800 x 700h x 500kg</p>	<p>1) Ø850 x 1100h x 800kg 2) Ø1050 x 1350h x 1200kg 3) Ø1450 x 1550h x 1600kg</p>	<p>1) Ø2000 x 1475h / 1725h x 3000kg (Adjacent pallets empty)</p>
<p>1</p>	<p>1</p>	<p>1</p>
<p>1</p>	<p>1</p>	<p>1</p>
<p>6/14/21</p>	<p>7/9</p>	<p>6</p>
<ul style="list-style-type: none"> - PLC operation - Easy scheduling operation (Built-in control) - Buffer Station type with Carrier 	<ul style="list-style-type: none"> - CNC operation - Easy scheduling operation (2-Path control) - Available priority pallet 	<ul style="list-style-type: none"> - CNC operation - Pallet scheduling operation (1-Path, PMC control)
		

DOOSAN Linear pallet system

Technical
Information

Line-up

LPS 4000/5000

LPS 5500/6300/8000

RPS 4000/5000

RPS 4000/5000-21

RPS 5500/6300/8000

RPS 1000/1250

Management
system

LPS 4000 / 5000

LPS 4000 / 5000 is designed to provide optimized system for the user wants space saving & high productivity linear pallet system in pallet size both 400 mm x 400 mm (15.7 inch x 15.7 inch) and 500 mm x 500 mm (19.7 inch x 19.7 inch) with minimum invest cost.



Features

- Optimized Slim design for space saving & minimal invest cost
- Optimized AGV of Single Mast & Single Fork Structure
- Simple installation in one piece
- Easy field retrofit to Doosan horizontal machining center
- User friendly intuitive way to register basic information for flexible manufacturing

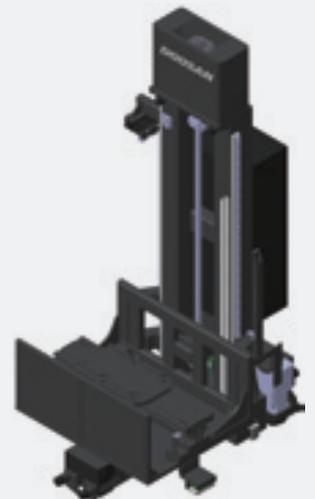
Machine Specifications

Description		LPS 4000	LPS 5000
Available Model		NHP 4000 / HC 400 II	NHP 5000/HC 500 II
Pallet Dimension	mm (inch)	400 x 400 (15.7 x 15.7)	500 x 500 (19.7 x 19.7)
Workpiece Diameter	mm (inch)	630 / 600 (24.8 / 23.6)	800 (31.5)
Workpiece Height	mm (inch)	900 / 800 (35.4 / 31.5)	1000 / 900 (39.4 / 35.4)
Workpiece Weight	kg (lb)	400 (881.8)	500 (1102.3) {700 (1543.2) : NHP 5000}*
Travelling (X) Speed	m/min (ipm)	60 [Load], 90 [Unload] (2362.2, 3543.3)	
Lifting (Y) Speed	m/min (ipm)	10 [Load], 20 [Unload] (393.7, 787.4)	
Forking (Z) Speed	m/min (ipm)	20 [Load], 50 [Unload] (787.4, 1968.5)	
Axis Control		Servo	
Forking Type		Single Fork (Telescopic Mechanism)	
Turntable Indexing		45°	
Power Supply (AGV)		Trolley Bar	
Communication (AGV<-> Main Controller)		Optical	
Number of Machines		1 ~ 7 (Aux. +1)	
Number of Setup Stations		1 ~ 4	
Number of Pallet	ea	12 ~ 72	
Dimension(Basic)	mm (inch)	6980 [L] x 2400 [W] (274.8 x 94.5)	

Optimized AGV

Unit : mm (inch)

- Lifting Axis with Ball Screw & LMG
- Optimized AGV of Single Mast & Single Fork Structure

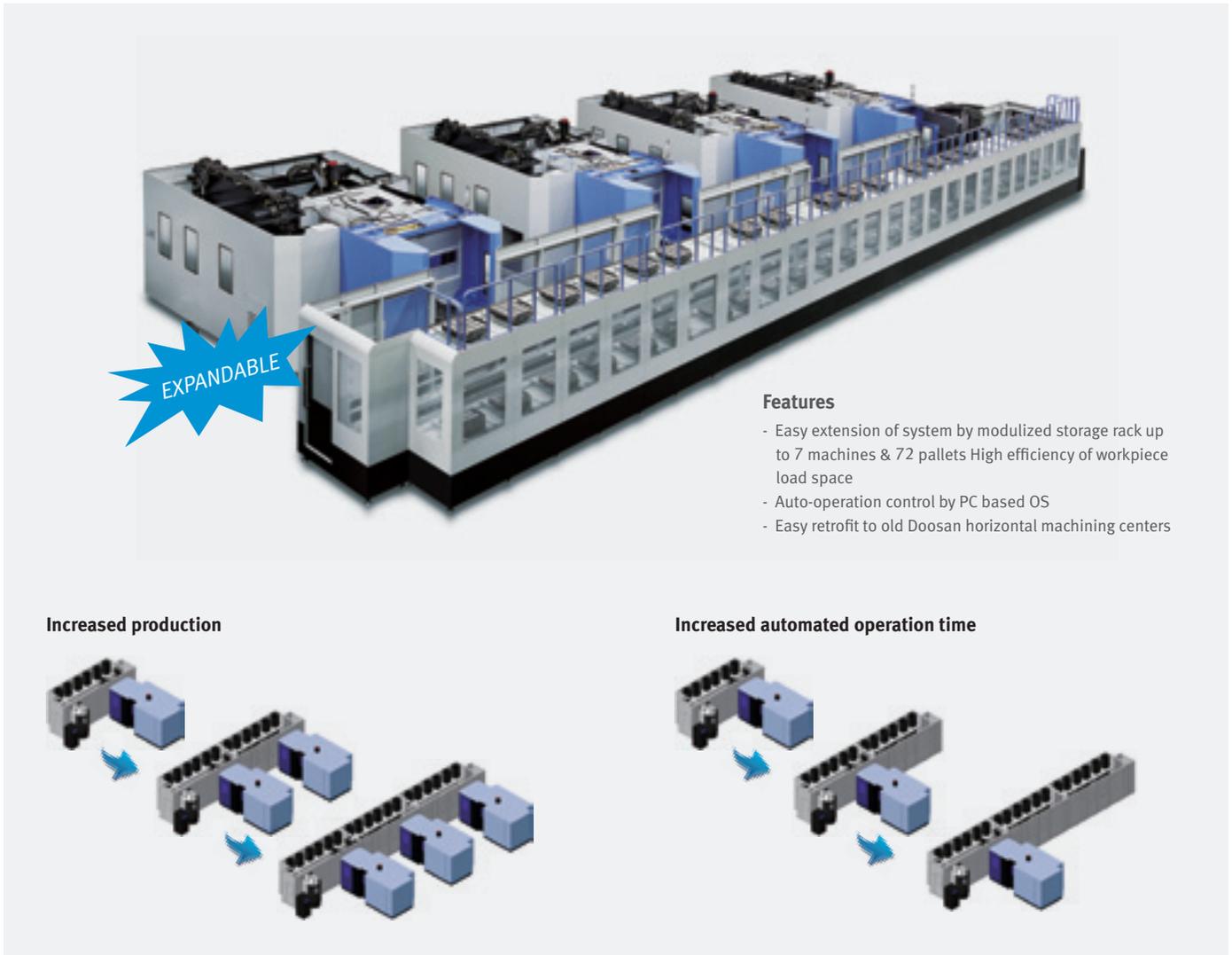


* { } : Option

Note) Please contact DOOSAN sales representative for further information

LPS 5500 / 6300 / 8000

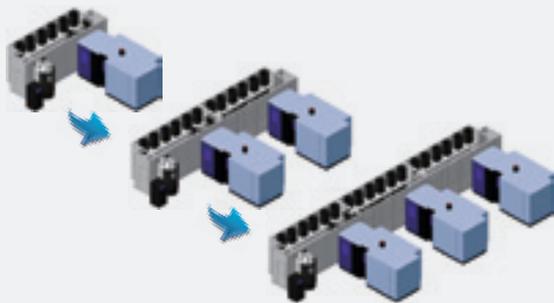
LPS 5500 / 6300 / 8000 is designed to provide a high level of automation system for the customer wants high storage capacity.



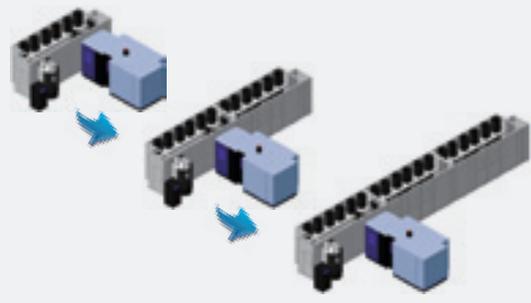
Features

- Easy extension of system by modularized storage rack up to 7 machines & 72 pallets High efficiency of workpiece load space
- Auto-operation control by PC based OS
- Easy retrofit to old Doosan horizontal machining centers

Increased production



Increased automated operation time



Machine Specifications

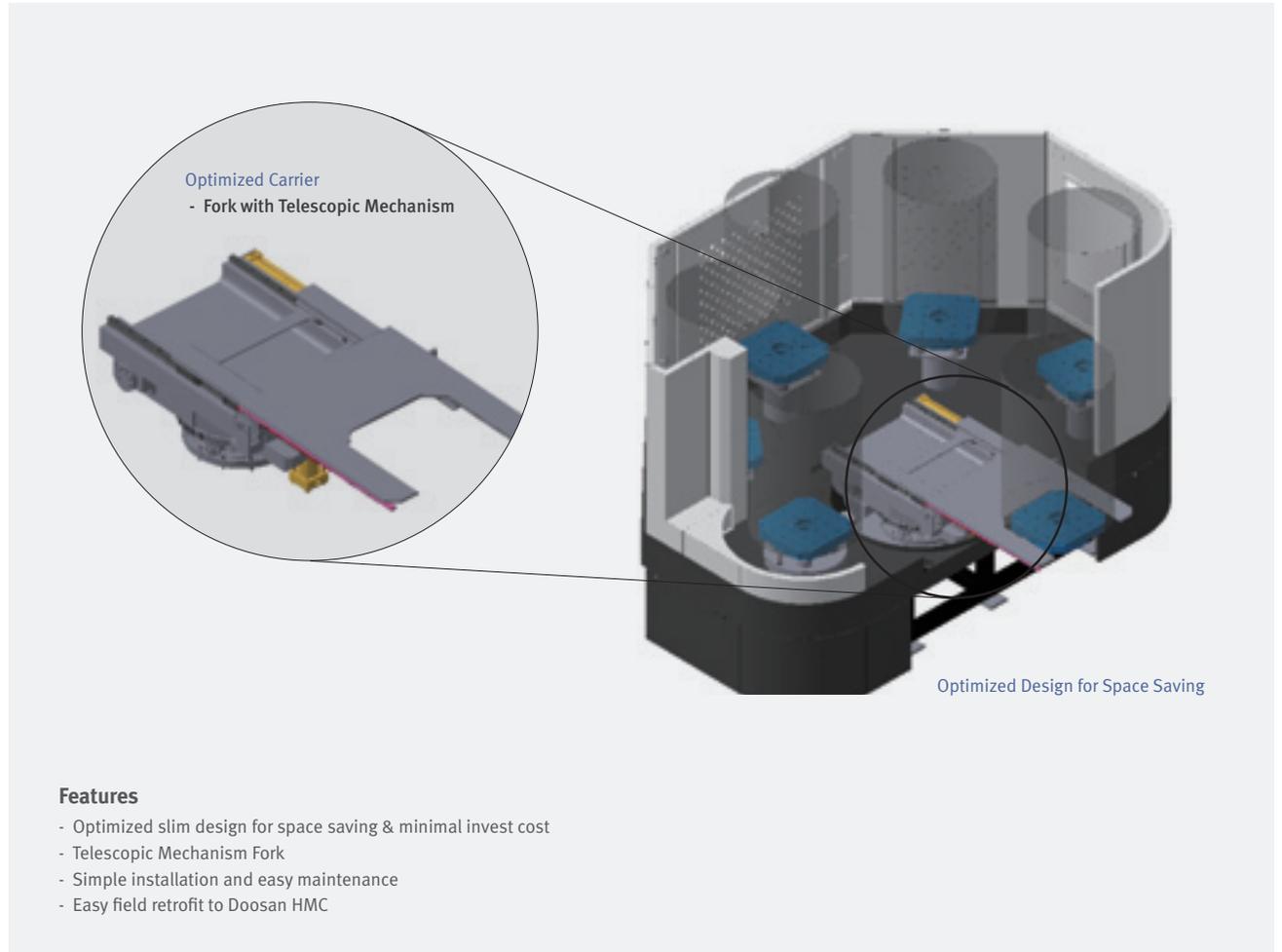
Description		LPS 5500	LPS 6300	LPS 8000
Available Model		NHM 5000 / NHP 5500	NHM 6300 / NHP 6300	NHM 8000 / NHP 8000
Pallet Dimension	mm (inch)	500 x 500 (19.7 x 19.7)	630 x 630 (24.8 x 24.8)	800 x 800 (31.5 x 31.5)
Workpiece Diameter	mm (inch)	850 (33.5)	1050 (41.3)	1450 (57.1)
Workpiece Height	mm (inch)	1100 (43.3)	1350 (53.1)	1400 (55.1)
Workpiece Weight	kg (lb)	800 (1763.7)	1200 (2645.5)	2000 (4409.2)
Number of Machines		1 - 7		
Number of Setup Stations		1 - 4		
Number of Pallet		12 ~ 72	10 ~ 72	8 ~ 72
Dimension (Basic)	mm (inch)	7824 [L] x 2400 [W] (308.0 [L] x 94.5 [W])	7904 [L] x 785 [W] (311.2 [L] x 30.9 [W])	8952 [L] x 3500 [W] (352.4 [L] x 137.8 [W])

Note) Please contact DOOSAN sales representative for further information

DOOSAN Round Pallet System

RPS 4000 / 5000

Compact size Slim Round Pallet System for New HMC Taper #40 Series.



Features

- Optimized slim design for space saving & minimal invest cost
- Telescopic Mechanism Fork
- Simple installation and easy maintenance
- Easy field retrofit to Doosan HMC

Machine Specifications

Description		RPS 4000 / 5000-6P		
Available Model		NHP 4000 / HC 400 II	NHP 5000 / HC500 II	
Pallet Dimension	mm (inch)	400 x 400 (15.7 x 15.7)	500 x 500 (19.7 x 19.7)	
Max. Workpiece Diameter	mm (inch)	630 / 600 (24.8 / 23.6)	800 (31.5)	
Max. Workpiece Height	mm (inch)	900 / 800 (35.4 / 31.5)	1000 / 900 (39.4 / 35.4)	
Max. Workpiece Weight	kg (lb)	400 (881.8)	500 (1102.3) {700 (1543.2)}*	
Number of Pallets	ea	6		
Magazine Type	-	Buffer Station type with Carrier		
Operation	-	Easy scheduling operation (Built-in Control)		
Driving Mechanism	Rotating Axis(X)	-	Servo Motor & Reduction Gear	
	Forking Axis(Z)	-	Hydraulic Cylinder & Rack/Pinion	
DIMENSION		mm (inch)	3230 x 2215 (127.2 x 87.2)	3630 x 2415 (142.9 x 95.1)

* { } : Option

Line-up

LPS 4000/5000
 LPS 5500/6300/8000
 RPS 4000/5000
 RPS 4000/5000-21
 RPS 5500/6300/8000
 RPS 1000/1250

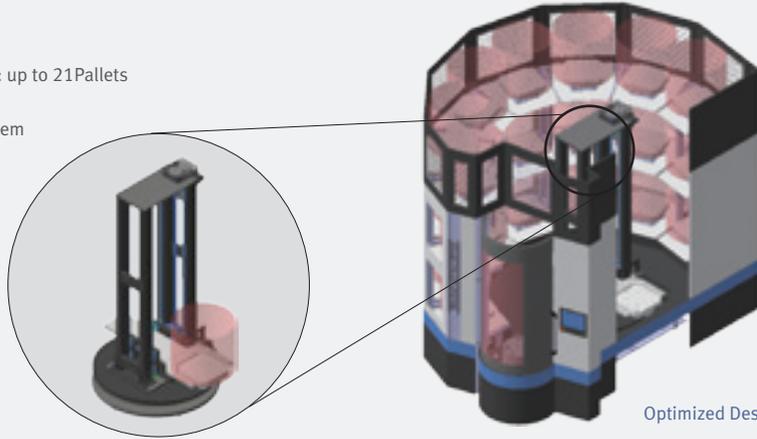
DOOSAN Multi level pallet system

RPS 4000 / 5000-21

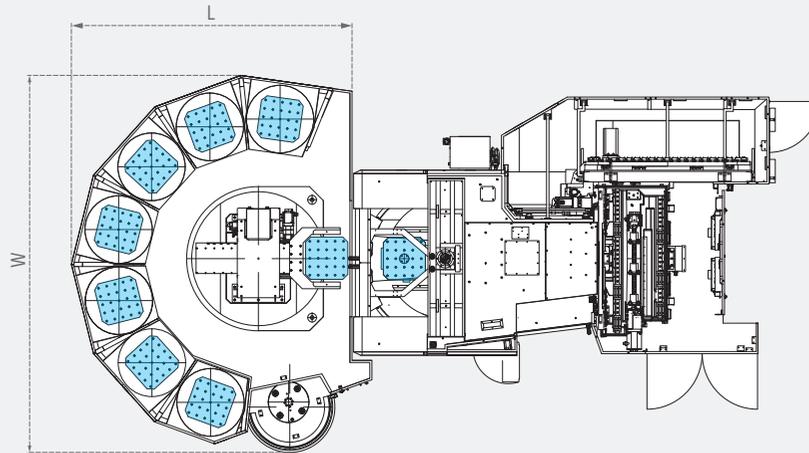
Slim Multi Level Pallet System for HMC Taper #40 Series

Features

- Optimized Multi Level storage design for space saving : up to 21Pallets
- Minimal invest cost automation solution
- Enhanced unmanned time, compared to six pallet system
- Simple installation and easy maintenance
- Easy field retrofit to Doosan HMC



External Dimensions



Machine Specifications

Available Model			NHP4000 / HC400II	NHP5000 / HC500II
Pallet Dimension	mm (inch)		400 x 400 (15.7 x 15.7)	500 x 500 (19.7 x 19.7)
Workpiece Diameter	mm (inch)		630 / 600 (24.8 / 23.6)	800 (31.5)
Workpiece Height	mm (inch)		NHP4000: 900(14P) / 700(21P) HC400II : 800(14P) / 700(21P)	NHP5000: 1000(14P) / 700(21P) HC500II: 900(14P) / 700(21P)
Workpiece Weight	kg (lb)		400 (881.8)	500 (1102.3) {700 (1543.2) : NHP 5000}*
Number of Pallets	Ea		14P / 21P	
Magazine type	-		Buffer Station type with Carrier	
Operation	-		Easy scheduling operation (Built-in control)	
Driving Mechanism	Rotating Axis	-	Servo Motor & Reduction Gear	
	Lifting Axis	-	Servo Motor & Ball Screw w / LMG	
	Forking Axis	-	Servo Motor & Rack / Pinion	
DIMENSION		mm (inch)	3700 x 2800 (145.7 x 110.2)	4445 x 3320 (175.0 x 130.7)

* { } : Option

DOOSAN Round Pallet System

Technical Information

Line-up

LPS 4000/5000
LPS 5500/6300/8000
RPS 4000/5000
RPS 4000/5000-21
RPS 5500/6300/8000
RPS 1000/1250

Management system

RPS 5500 / 6300 / 8000

Compared to a standard twin pallet machine, the RPS offers a long period of unmanned operation and the flexibility to produce many different workpieces using the work scheduling function. This system can be easily retrofitted to existing machines in the field.



Features

- Long time unmanned operation
- High reliability by servo driven carrier type
- Simple installation and easy maintenance Easy field retrofit
- The priority order for pallet and schedule operation

External Dimensions

MACHINE		WIDTH	LENGTH
NHM 5000	mm (inch)	3848 (151.5)	2674 (105.3)
NHP 5500	mm (inch)		
NHM 6300	mm (inch)	4706 (185.3)	3276 (129.0)
NHP 6300	mm (inch)		
NHM 8000	mm (inch)	6462 (254.4)	4400 (173.2)
NHP 8000	mm (inch)		

Machine Specifications

Available Model		NHM 5000 / NHP 5500	NHM 6300 / NHP 6300	NHM 8000 / NHP 8000
Pallet Dimension	mm (inch)	500 x 500 (19.7 x 19.7)	630 x 630 (24.8 x 24.8)	800 x 800 (31.5 x 31.5)
Workpiece Diameter	mm (inch)	850 (33.5)	1050 (41.3)	1450 (57.1)
Workpiece Height	mm (inch)	1100 (43.3)	1350 (53.1)	1550 (61.0)
Workpiece Weight	kg (lb)	800 (1763.7)	1200 (2645.5)	1600 (3527.3)
Number of pallets	ea	7 & 9		
Magazine type		Buffer Station type with Carrier		
Operation		Easy scheduling operation (2-Path control)		
Pallet Drive Device		Servo Motor & Reduction Gear		
Hydraulic Power Unit	kW (Hp)	2.2 (3.0)		

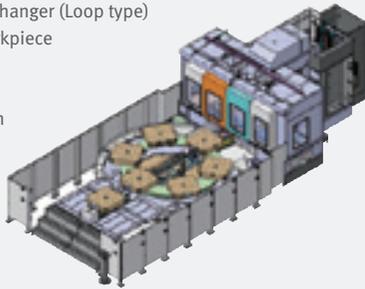
Note) Please contact DOOSAN sales representative for further information

RPS 1000 / 1250

RPS 1000 / 1250 is composed of a rotating pallet pool storage unit and a feed mechanism to transfer the pallet to and from the machine working area. In addition, a pallet can be transferred to a separate setup station where the operator has all-round access for loading the workpiece.

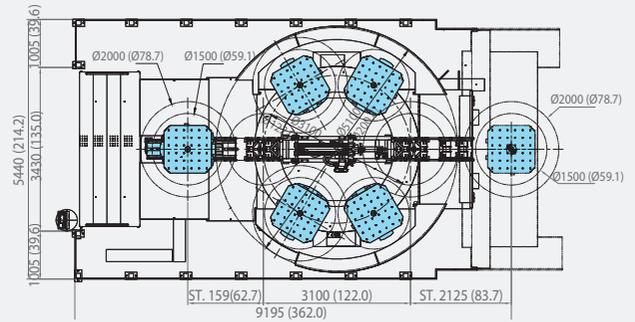
Features

- Conventional multi pallet changer (Loop type)
- Available large volume workpiece
- Driven by hydraulic unit
- Stable pallet changing unit
- Pallet scheduling operation (1-Path, PMC control)



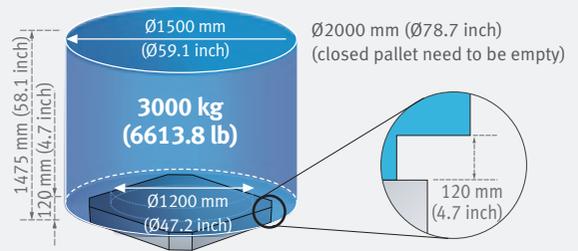
External Dimensions

Unit : mm (inch)



Machine Specifications

Available Model		HM 1000	HM 1250	HM 1250W
Pallet Dimension	mm (inch)	1000 x 1000 (39.4 x 39.4), 1250 x 1000 (49.2 x 39.4)		
Workpiece Diameter	mm (inch)	1500 (59.1) {2000 (78.7), closed pallet need to be empty}		
Workpiece Height	mm (inch)	1475 (58.1)	1725 (67.9)	
Workpiece Weight	kg (lb)	3000 (6613.8)		
Magazine type		Round type		
Operation		Pallet scheduling operation (1-Path, PMC control)		
Pallet Drive Device		HYDRAULIC MOTOR & CHAIN		
Hydraulic Power Unit	kW (Hp)	7.5 (10.1)		



Recommendable options

	ITEMS	SPECIFICATION
ESSENTIAL OPTION	TOOL STORAGE CAPACITY	MORE THAN 90 TOOLS
	FEEDBACK SYSTEM	ABSOLUTE TYPE
	SHOWER COOLANT	CLEANING FOR WORKPIECE AND FIXTURE
	COOLANT DRAIN PUMP (LPS II , Compact only)	EACH STOCKER
	TOOLBREAKAGE DETECTOR	NEEDLE SWING TYPE FOR SMALL SIZE TOOLS
	AIR CONDITIONER	FOR ELECTRICAL CABINET
	THRU. SPINDLE COOLANT	MIDDLE or HIGH PRESSURE
	PREPARATION FOR F.M.S (LPS II)	ELECTRICAL INTERFACE, WIRING..., ADDITIONAL SOFTWARE A.P.C MODIFICATION PALLETS MODIFICATION
	FANUC CNC FUNCTION	WORK COORDINATE : 300 (PAIRS) NUMBER OF TOOL OFFSET : 400 (PAIRS) PART PROGRAM STORAGE : MORE THAN 2560M (1MB)_1000EA TOOL LIFE MANAGEMENT
	Doosan Tool Management II or 8 digits	Support 3 or 8 digits T code Support various functions for Tool management Support Tool ID system
SELECTIVE OPTION	Advanced Tool & Pallet Retract	When Tool broken is detected by TLM or OMP60 automatically tool and pallet retract is performed and than next pallet is automatically continued.
	AUTO WORKPIECE MEASUREMENT	OMP60 / RENISHAW
	AIR GAP SENSOR	FOR A.P.C
	ETHERNET FUNCTION	
	AUTO. TOOL LENGTH MEASUREMENT	
	AUTO. POWER OFF	

Matrix ATC



Touch Sensor



Laser Sensor



Needle Swing Sensor



TSC 70 Bar



Shower Coolant



Management system

Technical Information

Line-up

LPS 4000/5000

LPS 5500/6300/8000

RPS 4000/5000

RPS 4000/5000-21

RPS 5500/6300/8000

RPS 1000/1250

DPMS (Doosan Production Management System) for LPS

The DPMS is to schedule the automatic pallet transfers between the setup stations, machining centers, and buffer stations. After operator set a part on pallet and enter detailed information to DPMS, the pallet will be transferred to the Machining Center or the Buffer Station by priority order of AGV. If there is not pallet in Machining Center, the pallet will be sent to the Machining Center by the top priority order. If there is pallet in the Machining Center, the pallet will be sent to the Buffer Station until the machining center is emptied. The operation of the LPS is based on automatic operation. Basically, the sequence of pallet transfer in the system will be performed according to the due-date.

Management system

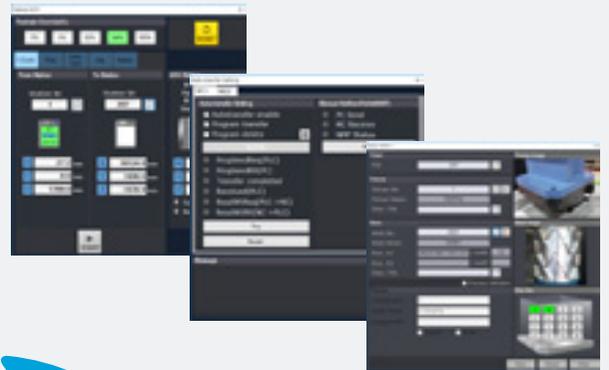
Preparation

- Program/Fixture/Part Data
- Planning & Schedule
- Supports up to 16 parts on a pallet



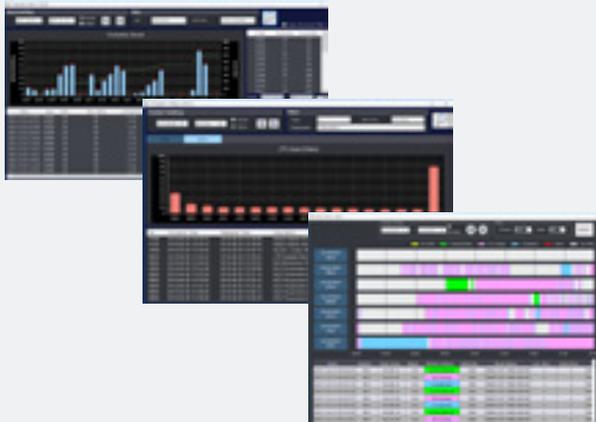
Production

- Job Dispatching in order of Due-date
- Automatic Pallet Call
- Program Auto-transfer



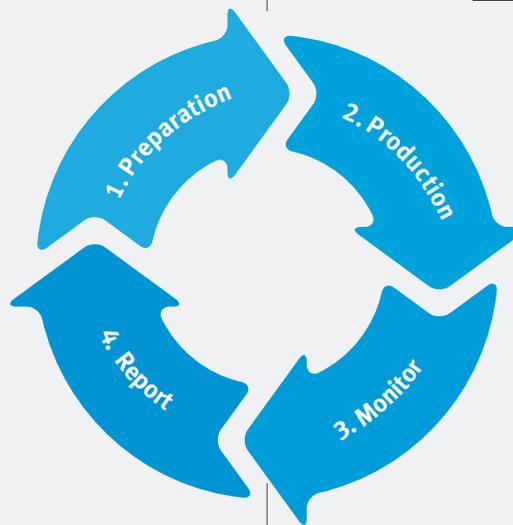
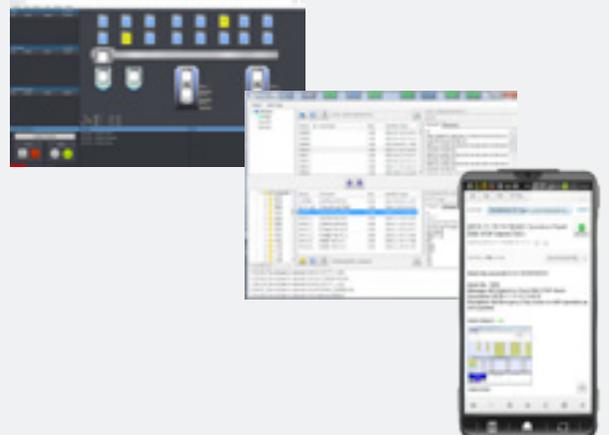
Report

- Production Results
- Alarm History
- Status Monitor

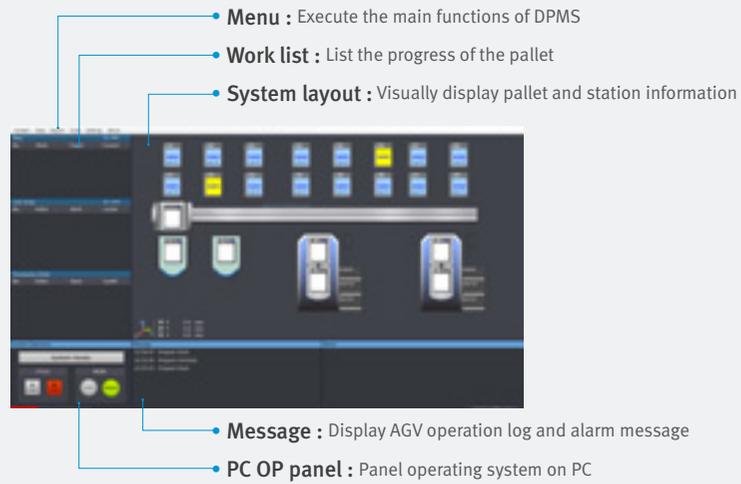


Monitor

- Program Manager
- Tool Manager
- Remote Alarm / Remote DPMS



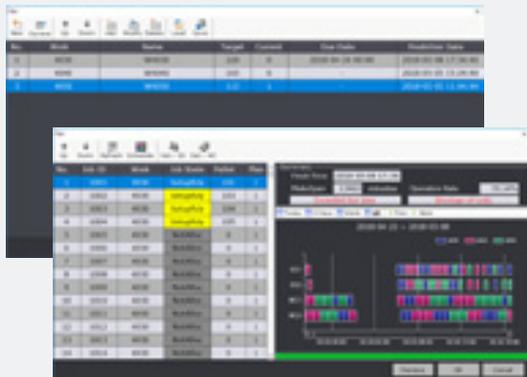
Main Screen



Standard function

Planning

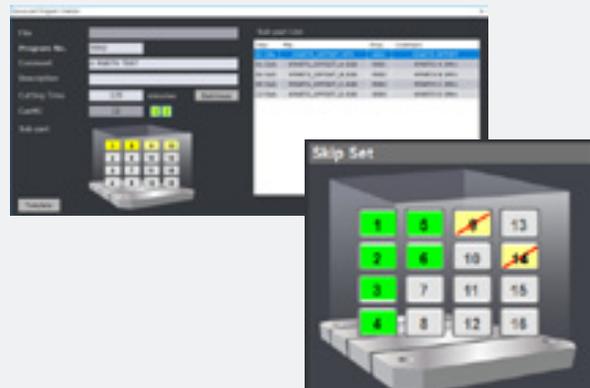
- It makes a production plan and job schedule easier



Setup function

- Max 16EA different sub programs and offsets can be assigned to a pallet.

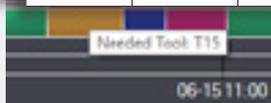
- It supports skip part set, proto set, urgent set



Tool use prediction

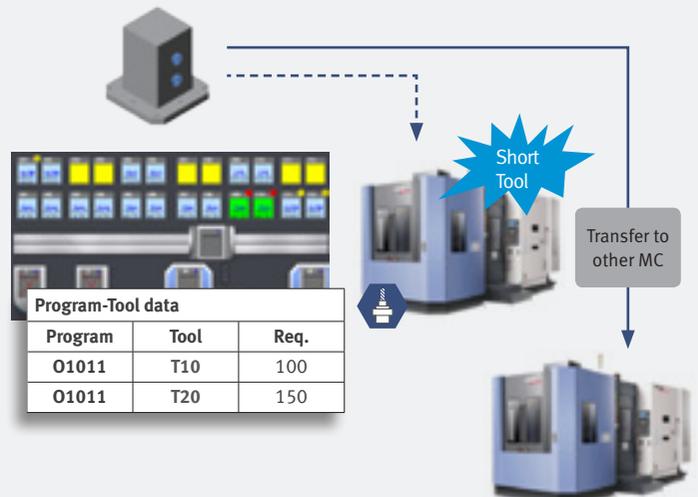
- This function is a predictable for tool life at the planning step.

MC1 Tool Prediction		MC2 Tool Prediction	
Tool	Req.	Tool	Req.
T10	800	T10	1000
T15	700	T15	1000
T20	1200	T20	1000



Tool pre-check

- Before sending the pallet to the MC, check the tool status of the MC.



Technical Information

- Line-up
- LPS 4000/5000
- LPS 5500/6300/8000
- RPS 4000/5000
- RPS 4000/5000-21
- RPS 5500/6300/8000
- RPS 1000/1250

Management system

DPMS (Doosan Production Management System) for LPS

Standard function

Automatic resume after tool alarm

- When using the Advanced Pallet & Tool Retract function, automatic operation resumes automatically even if a tool alarm occurs.

Schedule preview

- Display pallet schedules of setup and MC so operator can prepare job ahead of time.
- Display the next movement of AGV.



Time	Pallet	Work	MC
13:20	10	40Mn	2
13:21	10	40Mn	2
13:22	10	40Mn	2
13:23	10	40Mn	2
13:24	10	40Mn	2
13:25	10	40Mn	2
13:26	10	40Mn	2
13:27	201	40Mn	3
13:28	201	40Mn	3
13:29	201	40Mn	3
13:30	201	40Mn	3
13:31	201	40Mn	3
13:32	201	40Mn	3
13:33	201	40Mn	3
13:34	201	40Mn	3
13:35	201	40Mn	3
13:36	201	40Mn	3
13:37	201	40Mn	3
13:38	201	40Mn	3
13:39	201	40Mn	3
13:40	201	40Mn	3
13:41	201	40Mn	3
13:42	201	40Mn	3
13:43	201	40Mn	3
13:44	201	40Mn	3
13:45	201	40Mn	3
13:46	201	40Mn	3
13:47	201	40Mn	3
13:48	201	40Mn	3
13:49	201	40Mn	3
13:50	201	40Mn	3
13:51	201	40Mn	3
13:52	201	40Mn	3
13:53	201	40Mn	3
13:54	201	40Mn	3
13:55	201	40Mn	3
13:56	201	40Mn	3
13:57	201	40Mn	3
13:58	201	40Mn	3
13:59	201	40Mn	3
14:00	201	40Mn	3

Next AGV Move	Time	Pallet	Work	MC
14:32	1	10	(101)	
14:33	102	1	(102)	

Optional function

Remote alarm

- By the registered alarm, the Remote Alarm sends e-mail to system manager.



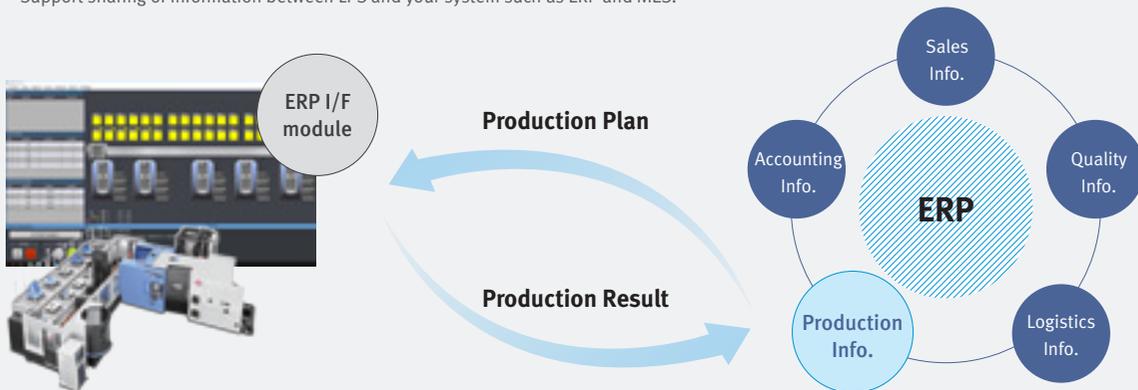
Remote DPMS

- Check the status of LPS using the web at remote site.
- Program, work, plan data can be registered and changed in process order using the web.



ERP interface

- Support sharing of information between LPS and your system such as ERP and MES.



Management system

Check Sheet for LPS

Basic Information

- Custome : _____
- Machine spec : _____
- Pallet size : _____ mm
- The height of the stocker : 1F 2F 3F
- The Numbers of Setup station : _____ EA
- Maximum size of nc programs : _____ Kbyte
- Maximum height of the workpiece with fixtures : _____ mm
- Maximum weight of the workpiece with fixtures : _____ ton
- Additional Info : _____

※ If Retrofit, you need model and expiration information of your equipment

Optional Functions

1. The process of pallets

- Washing process needed

2. Tool Management

- The tool number is up to 8 digits Tool-life pre-check Tool ID system is needed

3. Safety/recover

- Advanced Pallet Retract

4. Remote Monitoring

- Remote DPMS (Customer requires Ethernet)

5. Additional Requirements

Process Information

Operator work time : ~ or total hours/day

Process(or part)	Target quantity	Setup time	NC time	Remarks

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* For more details, please contact Doosan Machine Tools.

* The specifications and information above-mentioned may be changed without prior notice.

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**Fire Safety
Precautions**

There is a high risk of fire when using non-water-soluble cutting fluids, processing flammable materials, neglecting use coolants and modifying the machine without the consent of the manufacturer. Please check the SAFETY GUIDANCE carefully before using the machine.

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