LC f1 NT SERIES

3 Axes Linear Motor Drive Laser Machine

VPSS
Virtual Prototype Simulation System

AMADA

Ultrafast! Ultraprecise!
Full range, fine cutting laser system.

What do leading manufacturer's need in a laser machine to stay competitive?
Amada produced the LC-F1NT after carefully examining this question.
The answer is to have the best machine for any manufacturing requirement
with the ability to produce high-quality products as efficiently as possible.
Amada, who understands every manufacturing need,
addresses these requirements by introducing the next generation in laser processing
with user-friendly and application-oriented approaches.

Global Standard Laser Machine

LC F1 NT SERIES

7 Achievements of LC-F1NT Series

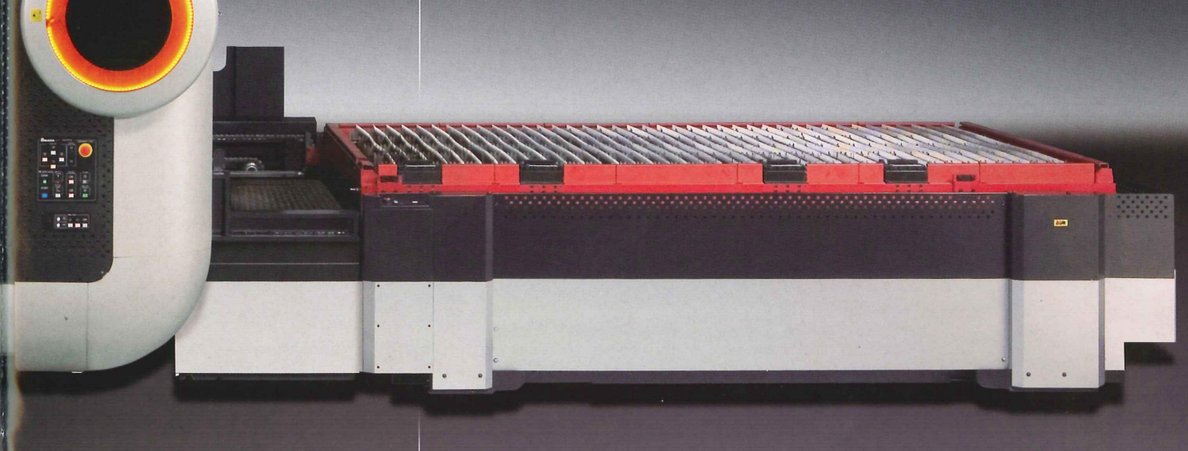
- Achievement 1 Exceedingly fast piercing and remarkably fast cutting with linear motor drive of 3 axes
- Achievement 2 Superb cutting quality with sharp corners over full thickness range
- Achievement 3 Extraordinarily precise
- Achievement 4 No lens change required
- Achievement 5 Cut process monitoring
- Achievement 6 Site friendly with full access enclosure and selectable right or left layout
- Achievement 7 New dust collector allowing maintenance during operation

VPSS
Virtual Prototype Simulation System

5 Innovations

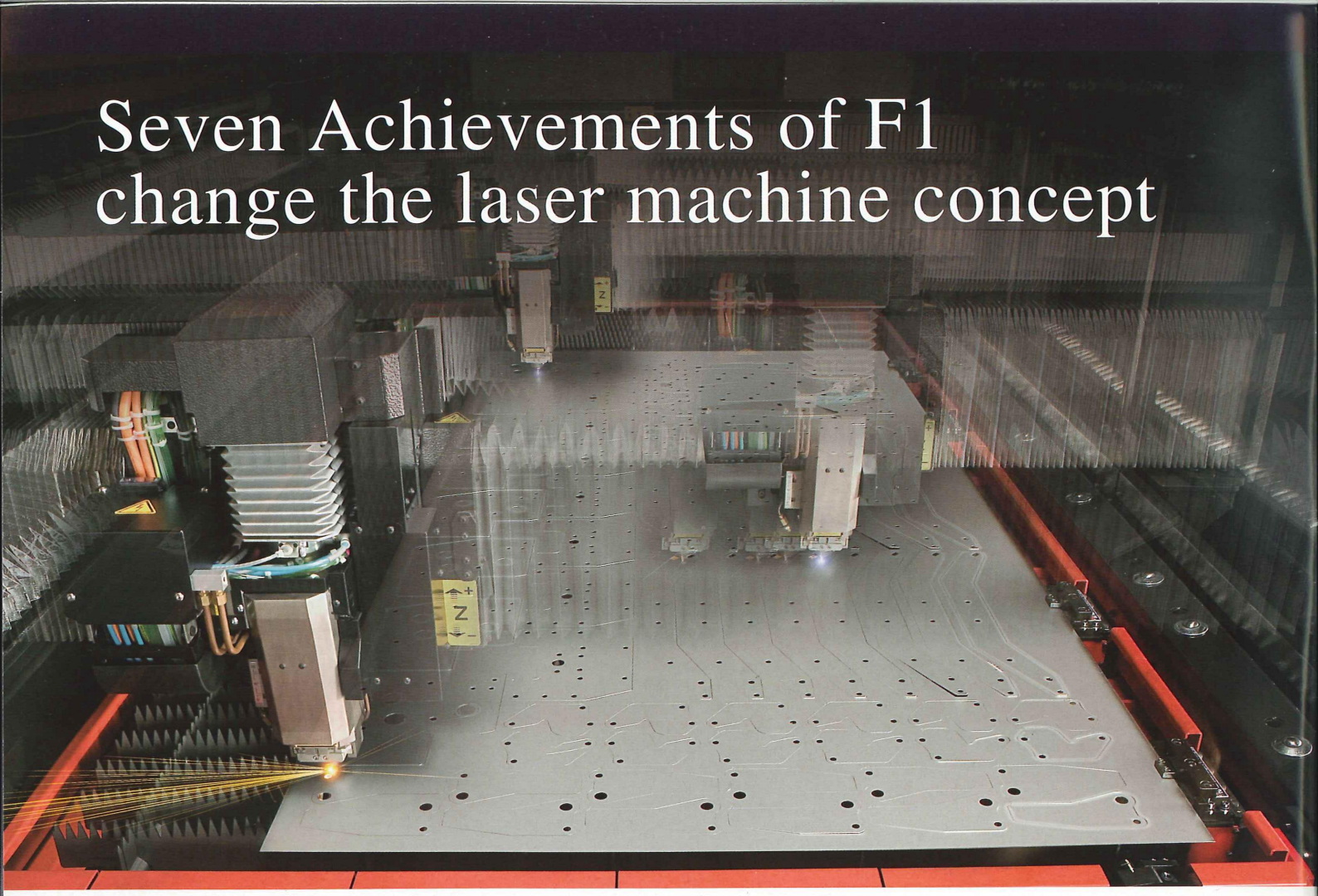
attained through front-loading development

1. 3 axes (X,Y,Z) linear motor drive is exceedingly fast and extraordinarily precise
2. Amada-tuned oscillator for quality cutting
3. New AMNC / PC with high speed processor
4. Twin adaptive optics eliminating lens change
5. Cut process monitoring gives repeatable edge quality with auto-plasma detection



LC F1 NT SERIES

Seven Achievements of F1 change the laser machine concept



Achievement **1**

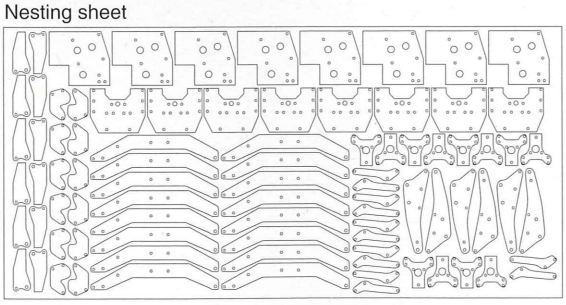
Exceedingly fast piercing and remarkably fast cutting with linear motor drive of 3 axes

Shorter piercing time by way of faster NC processing

Improvement of NC processing led to larger reduction in piercing time

By speeding up the AMNC controller and combining that with linear drives in all three axes, the overall processing speed for the nested sheet shown on the right was reduced by 1.89 times compared to that with our conventional machine. It has achieved to reduce 56% of running cost over those currently in use.

Nesting sheet



Mild Steel, 0.8mm(0.031"),
1 sheet, 4'×8' material

Speed command

Conventional machine: 8000mm/min(315ipm)
LC-3015F1NT: 14000mm/min(551ipm)

Processing time

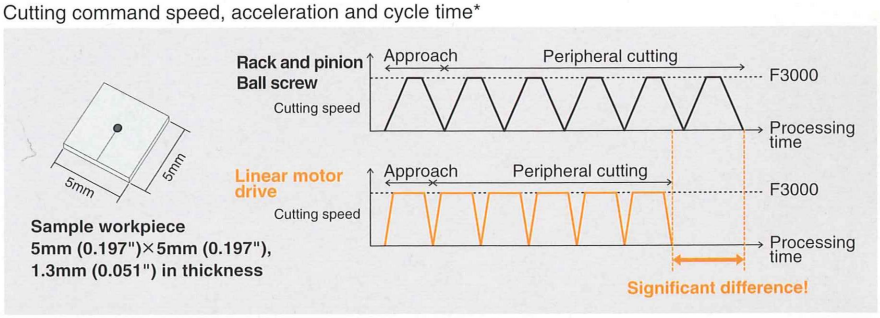
Conventional machine: 23min 50sec
LC-3015F1NT: 12min 37sec

Shorter processing time by quicker acceleration

Shorter processing time at same cut command speed!

A synergistic effect of faster axial acceleration / deceleration and faster travel speed results in total reduction in the fabrication process.

Cutting command speed, acceleration and cycle time*



Sample workpiece
5mm (0.197")×5mm (0.197"), 1.3mm (0.051") in thickness

*Cycle time:The time from the beginning to the end of a series of operations in a single process of laser machine's continuous repetitive operations

Achievement

2 Superb cutting quality with sharp corners over full thickness range

Amada-tuned oscillator AF4000i-B

Minimizes light fluctuation

Laser beam quality has been improved by minimizing beam fluctuation unique to high-speed axial flow.

Comparison of cut surface quality with conventional machine

Processing speed (mm/min) Comparison of cut surface roughness: Ra value (μm) at 1mm from top face of sheet (μm)

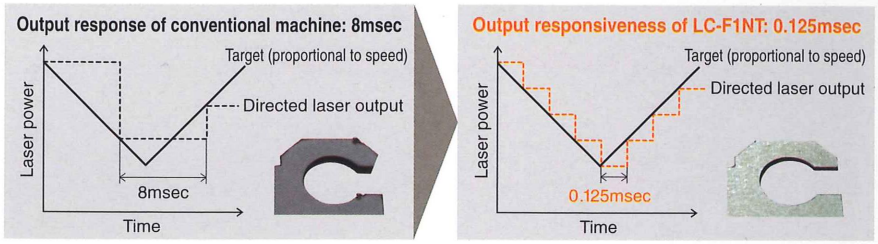
Processing		4kW oscillator (AF4000E) on conventional machine	4kW oscillator (AF4000i-B) on LC-F1NT
Material/Thickness	Assist gas	Cut surface roughness	Cut surface roughness
Stainless steel 1mm	Nitrogen	8000mm/min Ra=2.1	8500mm/min Ra=1.4
Stainless steel 3mm	Nitrogen	3000mm/min Ra=1.9	3000mm/min Ra=1.2
Stainless steel 6mm	Nitrogen	2000mm/min Ra=2.5	2000mm/min Ra=1.4
Mild steel 6mm	Oxygen	3000mm/min Ra=2.2	3000mm/min Ra=1.1

Burn-free corners and edges

Smoother finish on cut surface

High-speed NC control and newly-enhanced oscillator output response allows for burn-free corners and edges.

Output response		
Conventional machine:8msec	64 times faster →	0.125msec



High output responsiveness of 0.125msec with LC-F1NT's oscillator allows thorough control of laser power

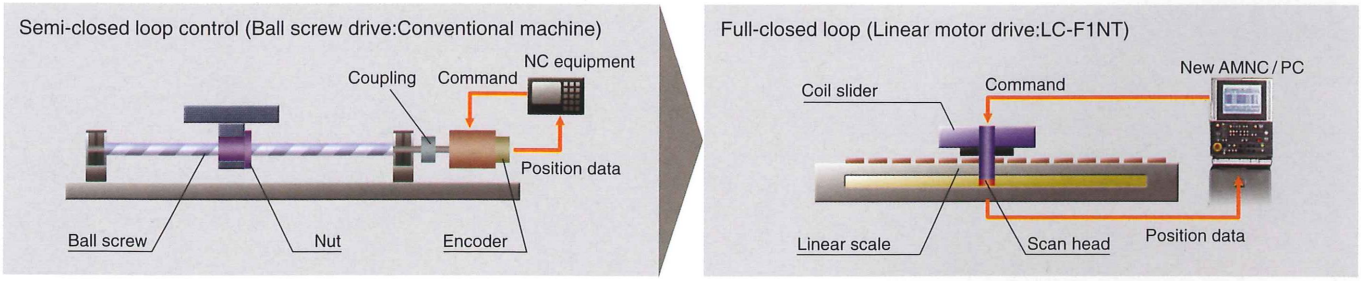
Achievement

3 Extraordinarily precise

Achieving high accuracy in high speed cutting

Constant precision cutting

With the Three Axes Linear Motor Drive system, exceptional high-precision accuracy is enabled by true closed loop feedback of the head position directly to the NC control.



Command from NC	Rotary motor	Feeds back to NC via encoder	System does not truly know the actual position of the cutting head

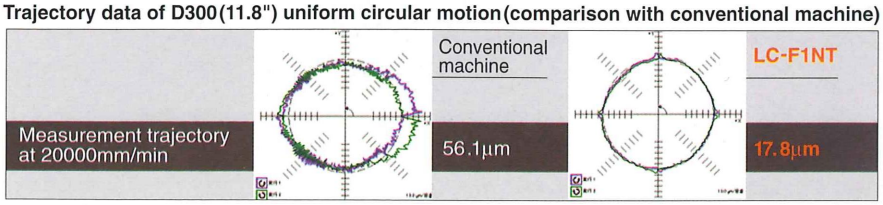
Command from NC	Feeds back position directly to NC	Actual position of the cutting head is known for certain

The reason for the high precision processing is due to the linear drive system

Consistent precision cutting

Three Axes Linear Motor Drive achieves high circularity without axial

Trajectory data of D300(11.8") uniform circular motion(comparison with conventional machine)



Achievement

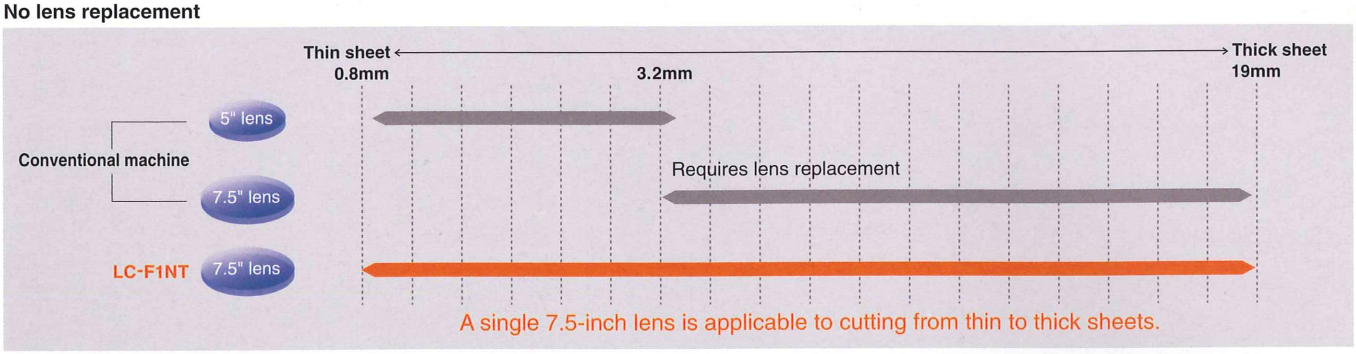
4 No lens change required

Twin adaptive optics generate optimum beam

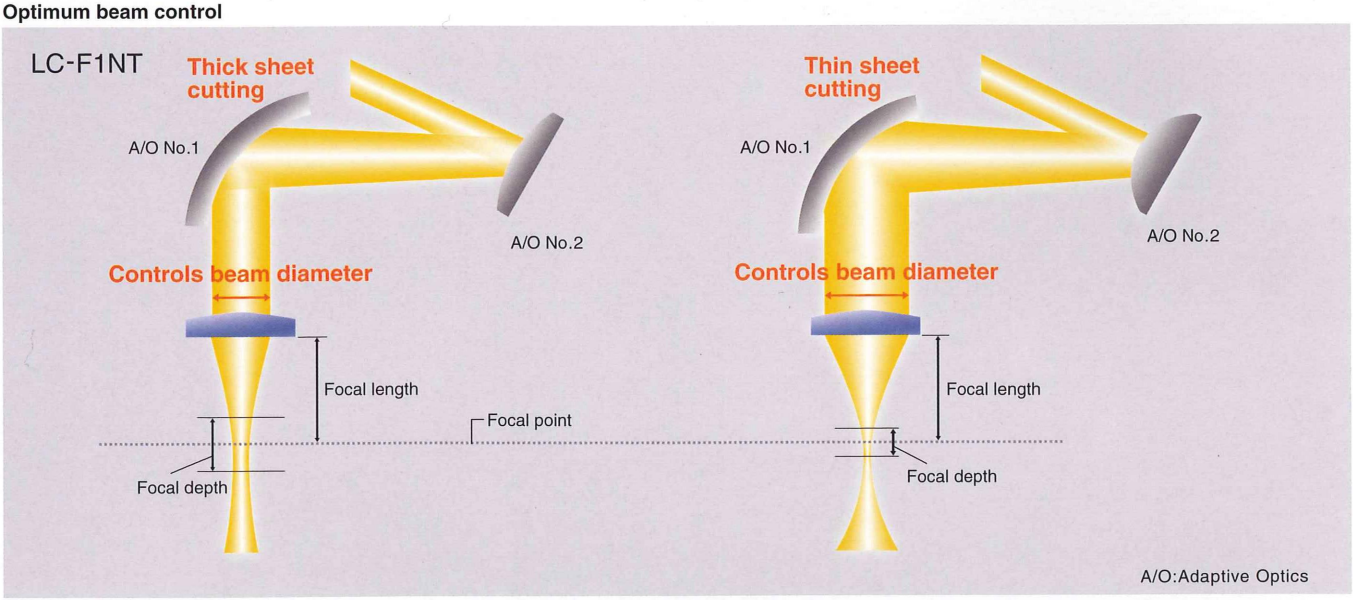
A single 7.5-inch lens handles thin to thick sheets

Two adaptive optics control the beam diameter for optimal cutting performance. A single 7.5-inch lens handles thin to thick sheets, reducing the non-value added time of lens replacement.

No lens replacement



Optimum beam control



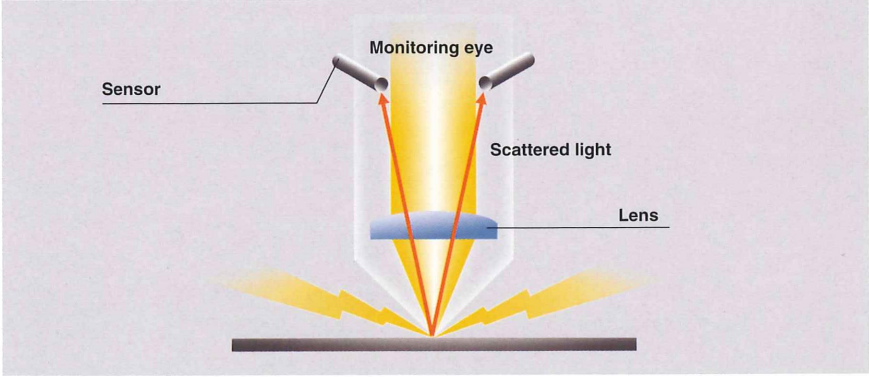
Achievement

5 Cut process monitoring

Cut status detecting function

Monitors cut status and feeds back to machine (optional)

Constantly monitors cut error factors such as piercing, gouging, and plasma to support constant, stable cutting.



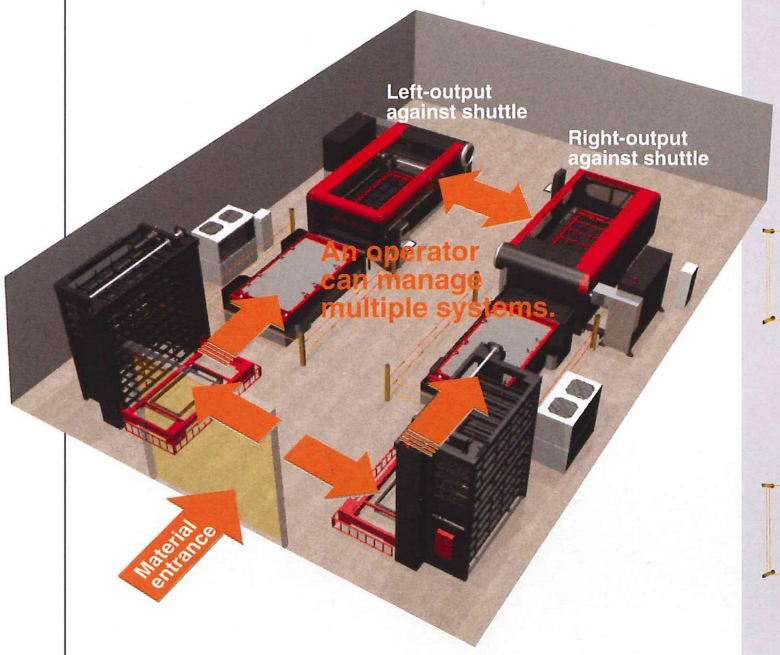
Achievement

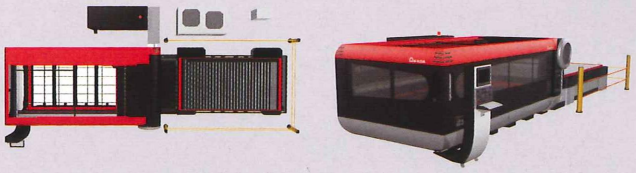
6 Site friendly with full access enclosure and selectable right or left layout

Flexible layout [for machine with shuttle table (LST)]

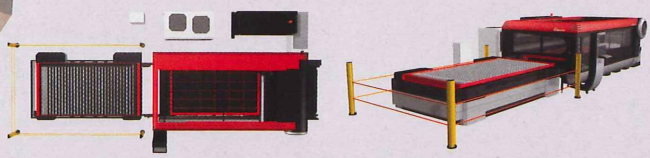
Customers can choose a sheet output direction, right or left, for peripheral equipment according to their system layout

By placing all shuttle tables to be on the material entrance side, a single operator can manage multiple systems.

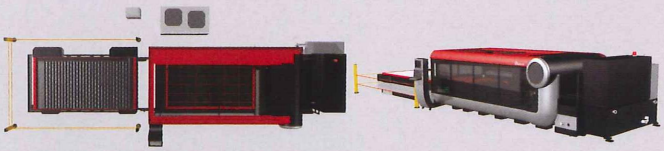




Shuttle table: Right-output Oscillator: Rear side (standard)



Shuttle table: Left-output Oscillator: Rear side



Shuttle table: Left-output Oscillator: Right side

Simple setup enabled by fully opening enclosure

Machine design achieves both high-speed and versatility with linear motor drive

The fully opening enclosure allows easier access for nozzle replacement and lens maintenance and also allows an operator to carry in / carry out materials from the main cutting area.

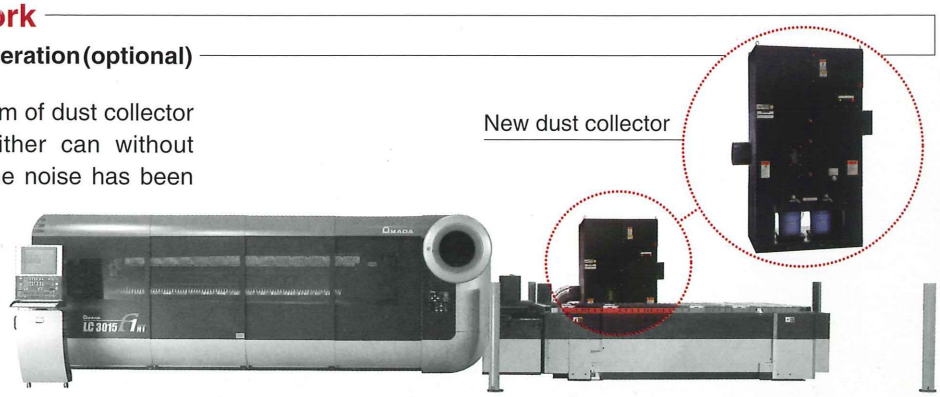
Achievement

7 New dust collector allowing maintenance during operation

Reduces dust collecting work

Disposes of dust during machine operation (optional)

Two canisters are provided at the bottom of dust collector so that dust can be disposed to either can without stopping the machine. Furthermore, the noise has been reduced by approximately 5dB from our conventional machine for better factory environment. This is the local accessary. Specification may changed depends on countries.



Comparison with Conventional Machine (Time, Cost and Power Consumption)

When the cutting productivity of part samples is compared with a conventional machine, the advantage of the LC-F1NT is clear.

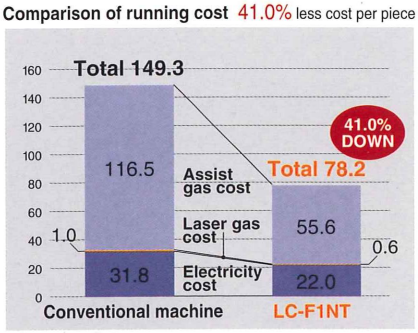
Comparison of sample cutting

Workpiece sample: Mild steel 1mm, Nitrogen cut

Comparison of cutting time
36.6% shorter time per piece

	Conventional machine:4kW	LC-F1NT:4kW
Cutting speed	8000mm/min	8500mm/min
Three nested parts	5min4sec	3min11sec
Single piece part	1min41sec	1min4sec

Comparison of running cost 41.0% less cost per piece

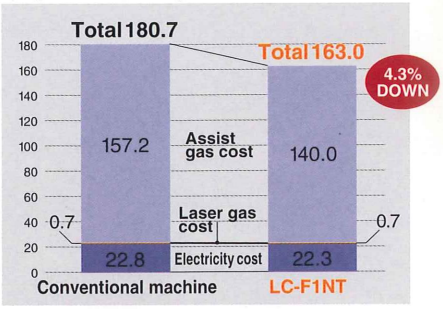


Workpiece sample: Stainless steel 6mm, Nitrogen cut

Comparison of cutting time
11% shorter time per piece

	Conventional machine:4kW	LC-F1NT:4kW
Cutting speed	1800mm/min	2000mm/min
Four nested parts	4min50sec	4min19sec
Single piece part	1min13sec	1min5sec

Comparison of running cost 4.3% less cost per piece

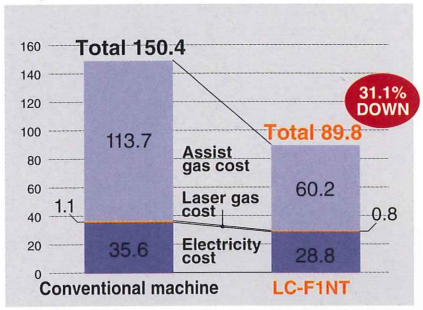


Workpiece sample: Stainless steel 2mm, Nitrogen cut

Comparison of cutting time
27% shorter time per piece

	Conventional machine:4kW	LC-F1NT:4kW
Cutting speed	5000mm/min	5500mm/min
Three nested parts	5min45sec	4min13sec
Single piece part	1min55sec	1min24sec

Comparison of running cost 31.1% less cost per piece

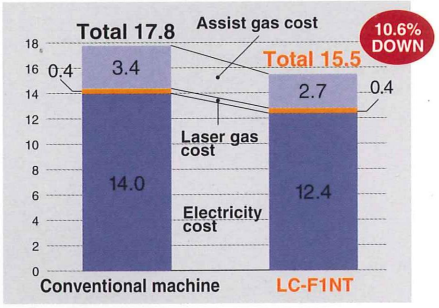


Workpiece sample: Mild steel 6mm, ECO-cut

Comparison of cutting time
18.2% shorter time per piece

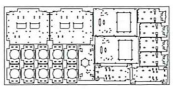
	Conventional machine:4kW	LC-F1NT:4kW
Cutting speed	3000mm/min	3000mm/min
Four nested parts	2min55sec	2min22sec
Single piece part	44sec	36sec

Comparison of running cost 10.6% less cost per piece



Comparison of running cost

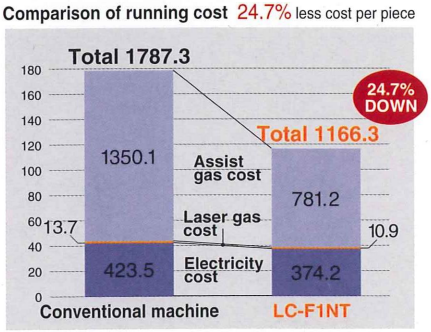
Workpiece sample: Stainless steel 2mm, Nitrogen cut, Nested sheet
Workpiece size: 4'× 8'



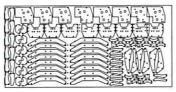
Comparison of cutting time
20.2% shorter time per piece

	Conventional machine:4kW	LC-F1NT:4kW
Cutting speed	5000mm/min	5500mm/min
Cutting time	22min46sec	18min10sec

Comparison of running cost 24.7% less cost per piece



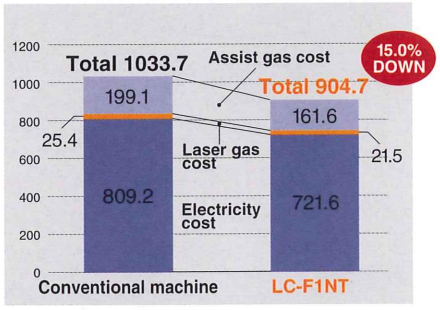
Workpiece sample: Mild steel 6mm, ECO-cut, Nested sheet
Workpiece size: 4'× 8'



Comparison of cutting time
15.3% shorter time per piece

	Conventional machine:4kW	LC-F1NT:4kW
Cutting speed	3000mm/min	3000mm/min
Cutting time	42min22sec	35min54sec

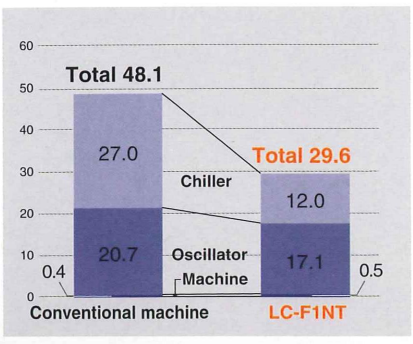
Comparison of running cost 15.0% less cost per piece



Comparison of power consumption

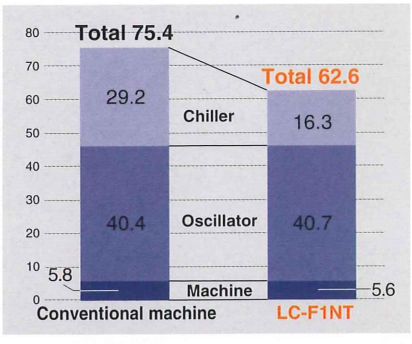
Comparison of standby power

Unit: kW



Comparison of power consumed during cut at 4kW output

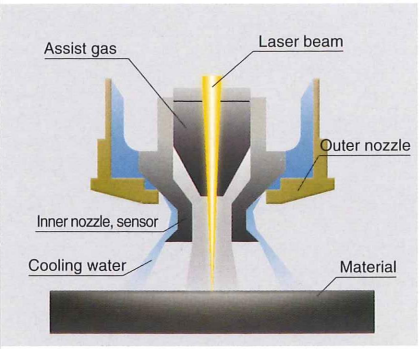
Unit: kW

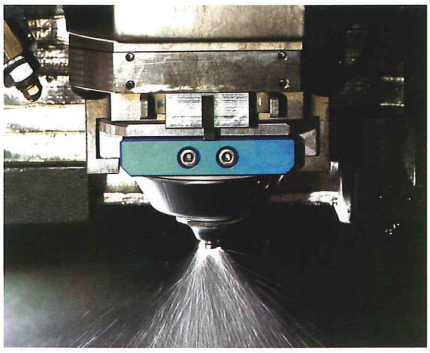


Options

The optional equipments can be selected for efficient production.

Cooling cut



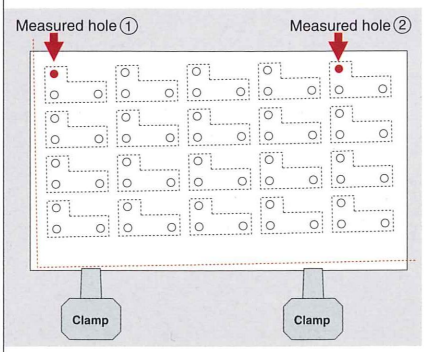


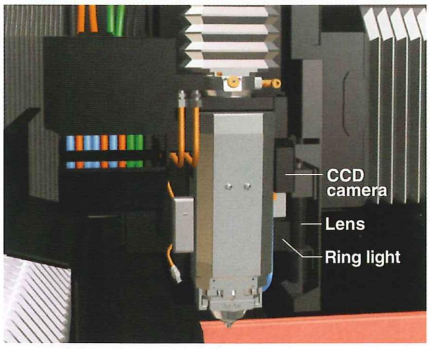
■ WACS (Water Assist Cutting System) for thick mild steel

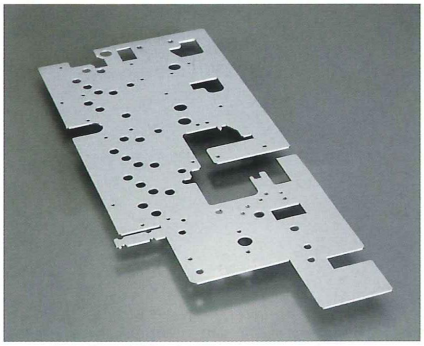
(WACS) Sprays water on the surface of thick material during laser cutting to prevent the heat build up from adversely affecting cut quality as well as improving the yield of the material.

■ Sample workpiece

OVSIV





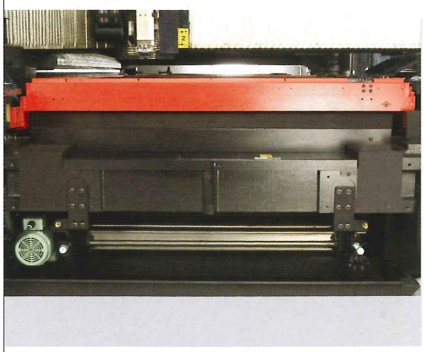


■ Position measurement of two scanned holes

1. In combination processing with NCT, a position of scanned holes is measured and displacement from NCT's original point for processing is corrected automatically.
2. The pitch between two processed holes and the circularity are measured. If the measurement result is out of specification, an alarm message is displayed.

■ Sample workpiece

X-direction conveyor



Carries out scrap and small-size products in X-direction using a conveyor provided within the frame.

Lens assembly

Left: 5" lens assembly
(for thin materials)
Right: 10" lens assembly
(for thick materials)

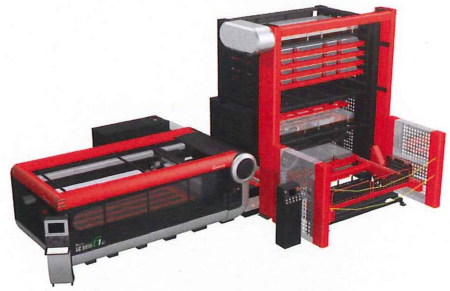
Variety of Configurations

The LC-F1NT utilizes a cell system to let you select the optimum configuration according to your production style, fabrication process, and installation space. The system is designed to be flexible enough to handle high-mix / low-volume production as well as high-volume mass production. All configurations also increase machine utilization.

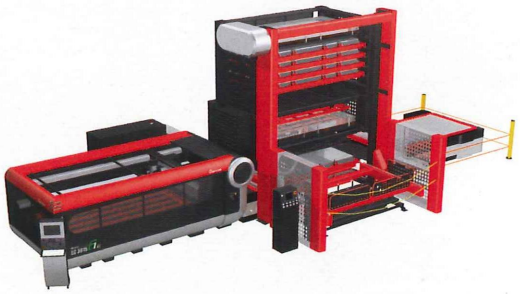
Long run automated operation model for high-mix / low-volume production and mass production

Fork pallet changer (ASF)

Single-sheet loading / unloading equipment + Shelf containing packaging pallet, product stacking pallet and processing (fork) pallet



LC-3015F1NT+ASF-3015F1



LC-3015F1NT+ASF-3015F1+2nd Station

LC-3015F1NT+ASF-3015F1 Twin tower

Automated storage (MARS)

Large-size shelf allowing free setting for packaging pallet and product stacking pallet

LC-3015F1NT+ASF-3015F1+MARS

Solution Packages

Machine, peripherals, software and engineering are the keys for productivity improvement.
The Solution Packages are the products that solve your problems by combining these four elements at a high level.

Factory

Office

Model 10

Basic model

Programming time has been significantly reduced by utilizing drawing and nesting data made on Dr.ABE_Blank.

LC-F1NT+LST

(Option)
SheetWorks

Bending machine

Model 20

During the day, the machine can be operated either as a stand alone unit or fully automated

During night shifts, the machine can be operated in a fully automated operation.In a manned operation the system is flexible enough for remnant material to be loaded into the system helping to reduce material waste.

LC-F1NT+ASF

AP100 SDD

(Option)
FMS controller

Dr.ABE_Blank

Punch & Laser
combination machine

Model 30

Automatic operation during daytime and nighttime

High-capacity model capable of operating for 24 consecutive hours together with automated storage MARS.

LC-F1NT+ASF+MARS

FMS controller

(Option)
vFactory

Punching machine

Software

High-mix / low-volume production, job interuptions, unexpected job and short lead time...
With such a variety of demands pressuring your shop floor, our cutting-edge software offers you support to improve

AMNC/PC

High efficiency NC control system as standard equipment

Simplifies operation and management of LC-F1NT.

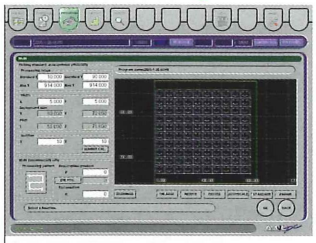
"Consolidation function" with one-touch operation

You can consolidate functions you frequently use, such as Origin Return, JOG cut, Positioning, and Nozzle / Head Replacement Position, with one-touch operation. Just press the Start button for execution.

Processing Condition setting

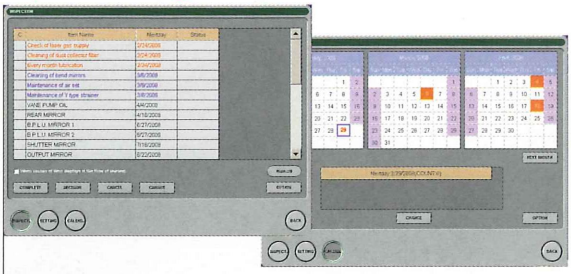
This allows you to set optimum conditions for piercing, corner treatment, etc. Setting of up to 10 conditions each for a single material (thickness) type and a maximum 200 types is permitted.

Grid Pattern setting

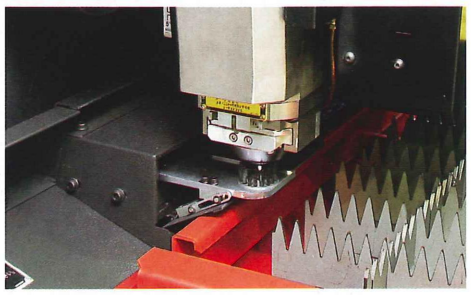


This enables you to easily create a grid pattern program on the shop floor.

Inspection setting



This automatically notifies an operator of an upcoming part inspection with a warning message based on the inspection period he / she set for each item.



Schedule

This allows you to set daily schedule for stand-alone machines as well as manufacturing lines and check the overall progress.

FMS controller

The LC-F1NT and the automation for it are controlled by a state of the art system, which supports the long hours of automatic operation attainable by the LC-F1NT laser cell.

The FMS controller responds quickly and adjusts to requirements for high-mix / low-volume production, shorter lead time and lower cost.

Pre-edit / Schedule

Creates, edits, and manages processing schedule for scheduled operation using FMS.

Operation status animation

- Starts automatic operation for laser cell.
- Estimates scheduled completion.
- Displays workpiece flow on manufacturing line during scheduled operation using FMS.

History management

Displays history of completed production in scheduled operation using FMS

Maintenance

Allows for various options to be setup in the operating schedule of the FMS system.

your production efficiency.

Dr.ABE_Blank

High-efficiency nesting system maximizing laser machine productivity

Dr.ABE_Blank is a fully-automatic CAM software for making laser processing data. You can generate processing data automatically just by calling upon drawing data and setting numeric / material information for it.

Operating AP100

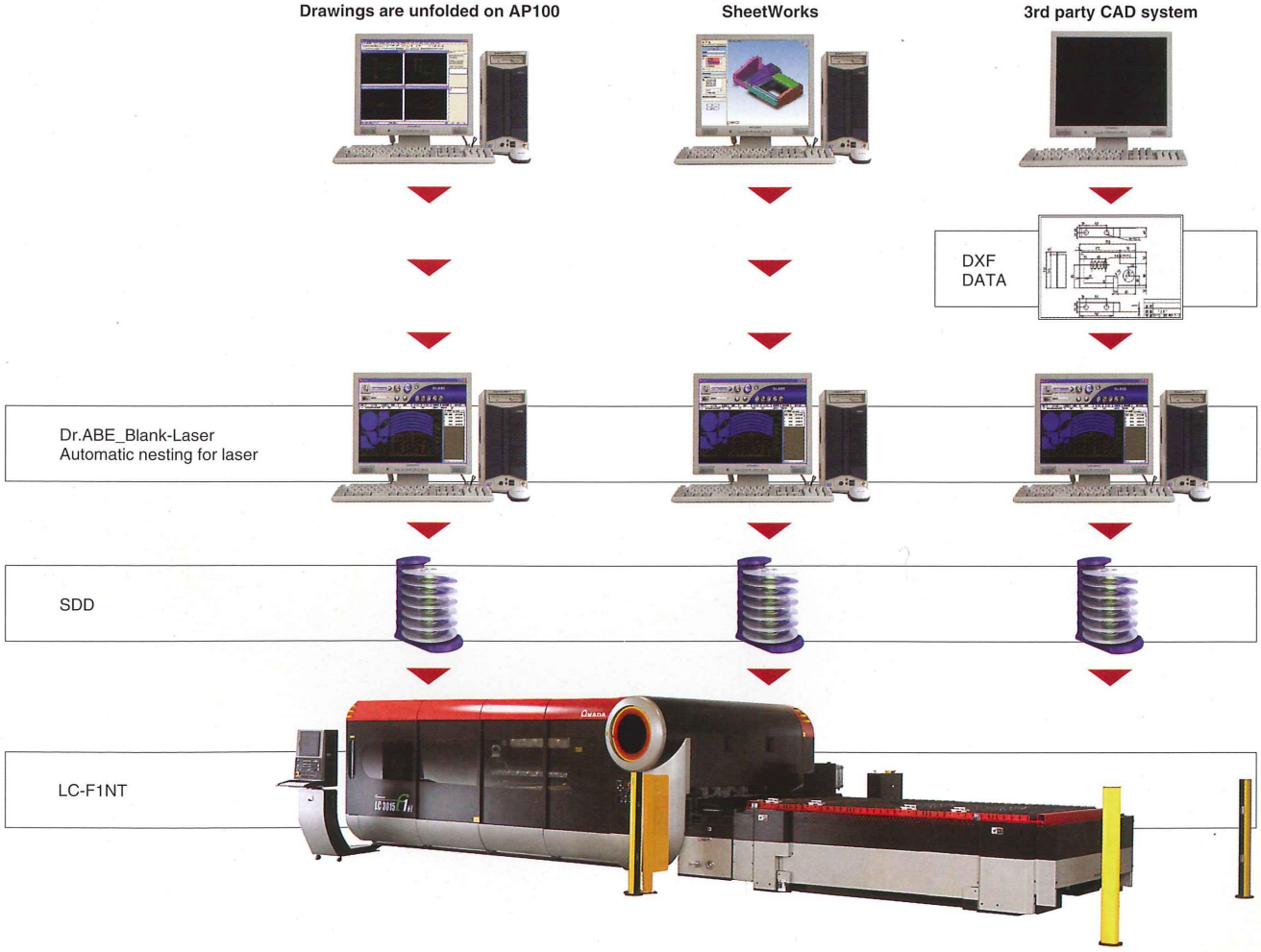
After drawings are unfolded on AP100, processing data is created automatically by simply calling up the drawing data from the SDD and setting numerical / material information. So, data creation time can be shortened and productivity and operation rate of laser machine can be maximized.

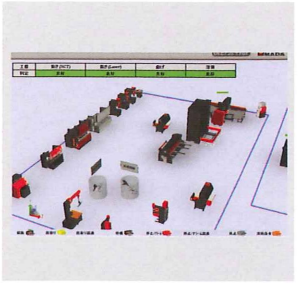
Operating 3D data

Drawing data unfolded by SheetWorks is stored in the SDD. The processing data is created automatically by calling up the drawing data from the SDD and setting numerical / material information. So, data creation time can be shortened and productivity and operation rate of laser machine can be maximized.

Operating DXF data

The processing data is created automatically by setting the numerical / material information based on DXF data created on a CAD system. So, data creation time can be shortened and productivity and operation rate of laser machine can be maximized.





vFactory

Solves customers' production problems by utilizing digital data

vFactory "visualizes" your factory by automatically collecting various information from your factory's machines via the network. vFactory is helpful in solving your factory's problems by allowing you to check production progress and processing state of each machine in real time.

Visualization of factory machine state

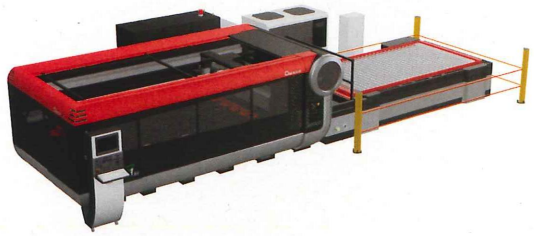
Virtual factory

Displays operation / stop status of machine in real time.

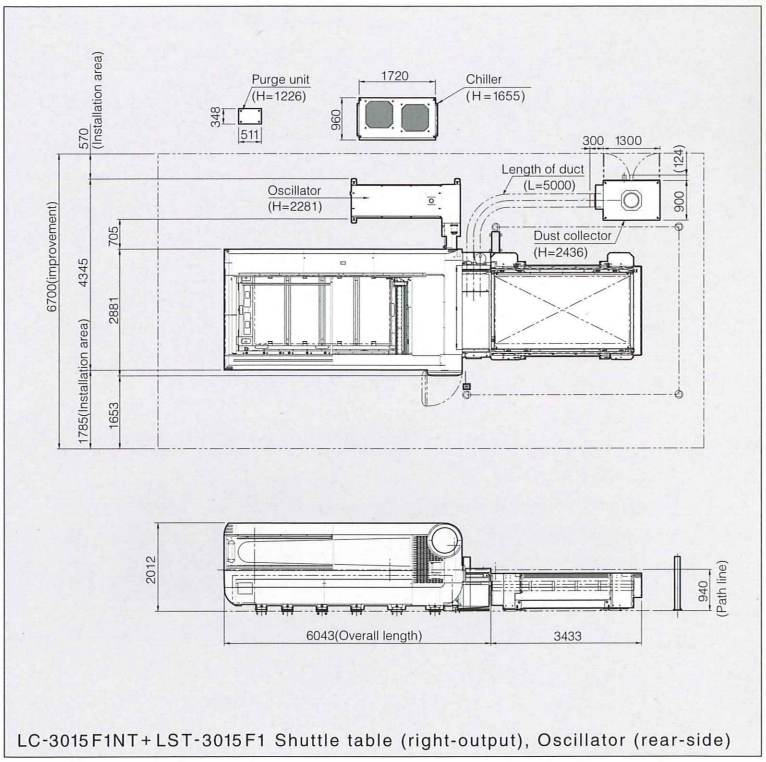
Dimensions / Specifications

Shuttle table (LST)

Simple loading/unloading equipment (shuttle table) with two alternately-moving processing pallets



Unit: mm



LC-3015F1NT+LST-3015F1 Shuttle table (right-output), Oscillator (rear-side)

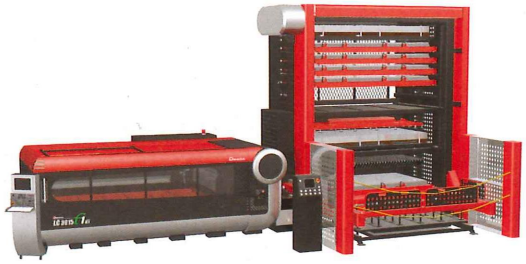
Specifications

Items		LST-3015F1
Material spec	Max. size mm	3050×1525×25
	Max. mass of load kg	920/pallets
Wrok support		Metal plate
Operation method		Shuttle operation only

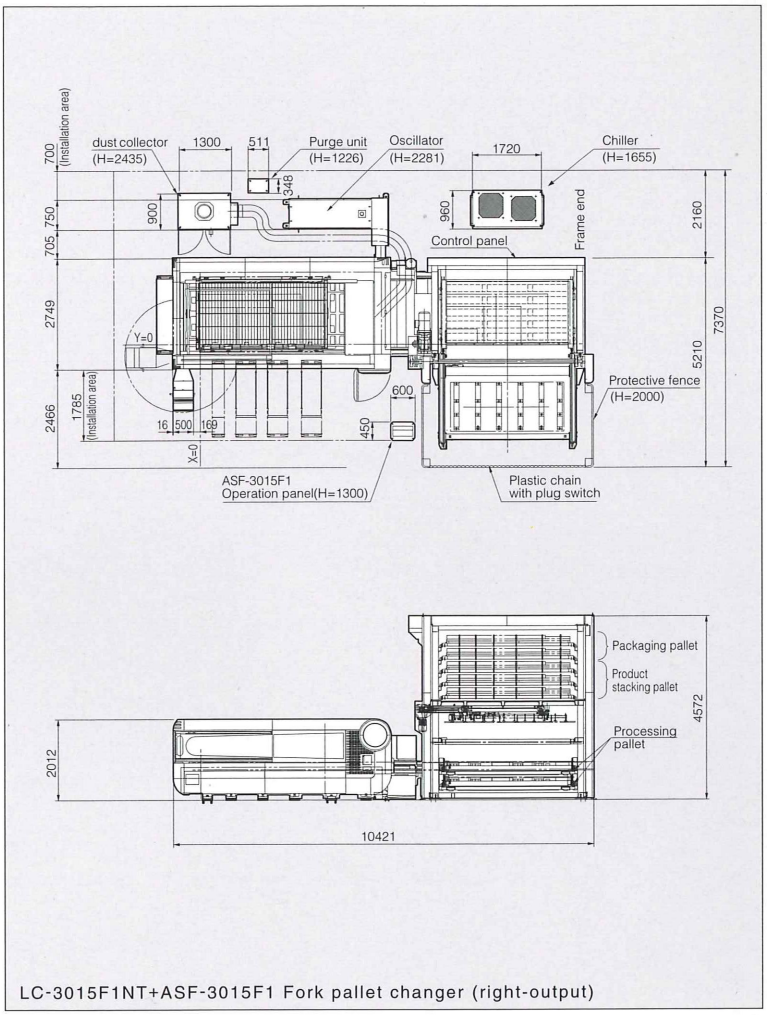
*These specifications and machinery and equipment appearance are subject to change without notice for reason of improvement.

Fork pallet changer (ASF)

Single-sheet loading/unloading equipment + Shelf consisting of packaging pallet, product stacking pallet and processing (fork) pallet



Unit: mm



LC-3015F1NT+ASF-3015F1 Fork pallet changer (right-output)

Specifications

Items		ASF-3015F1
Pallet layout (standard type)		Packaging pallet: 2 Product stacking pallet: 2 Processing(fork) pallet: 3
Shelf heigh mm		4572
Tact time	Pallet change	40sec
	Single-sheet cycle	5min30sec
Packaging pallet specifications (preset to original point)	Min. material size mm	915 × 915 × 0.8
	Max. material size mm	3050 × 1525 × 12
	Max. load height mm	260(incl. skid height)
	Max. mass of load kg	2000 / 3000*
Processing (fork) pallet specifications (with 4 clamps) (bolt-tightening structure)	Min. workpiece size mm	800 × 150 × 0.8
	Max. workpiece size mm	3050 × 1525 × 25
	Max. mass of load kg	920
	Work clamps	4(Pneumatic)
Product stacking pallet specifications	Min. product size mm	150 × 150
	Max. load height mm	215(incl. skid height)
	Max. mass of load kg	2000 / 3000*

*The packaging pallet can be used without skids.
*These specifications and machinery and equipment appearance are subject to change without notice for reason of improvement.
*Specification may changed depends on countries.

Machine specifications

Model name	LC-3015F1NT
Max. axis travel mm	3070×1550×100
Max. mass of load kg	920
Fast-forwarding speed m/min	X,Y,Z:120
Max. cutting speed m/min	60
Acceleration/deceleration G	X,Y:1.5 Z:3
Cutting head	Cartridge-type cutting head
Z-axis sensor	HS-2007 (Anti-plasma, Noise-resistant)
NC	AMNC/PC
Oscillator model	AF4000i-B(4kW)
Power requirement kVA	51(machine), 55(oscillator), 27(chiller)
Mass of machine kg	13000(Including oscillator)
Standard equipment	Full opening enclosure,CNC assist gas control(2.0MPa),CNC focus control,Oil shot,Cut process monitoring,Nozzle cleaner

*The specifications, appearance and equipments are subject to change without prior notice for improvement.

* LC3015F1NT, LST3015F1, ASF3015F1 Please use these model names when applying for administration applications such as installation report, export, and financing, etc.
To make this catalog more legible, we have inserted a hyphen in the machine model name such as LC-3015F1NT, LST-3015F1 and, ASF-3015F1NT
* There may be differences in the specification that has been described in this catalog to the Amada products which are actually shipped. Please ask our staff for more detail.