



THERMOTECH
THERMOTECHNOLOGY GENERAL CATALOG

Fusion of new technology and our extensive experience in heat treatment

Fujikoshi's Thermotech Division has the heat treatment technology that supports the foundations of the world of manufacturing.

In 1928, NACHI-FUJIKOSHI Corp. was founded to begin domestic production of cutting tools in Japan, starting by manufacturing hacksaw blades. In 1938, with the completion of its own steel mill, NACHI-FUJIKOSHI Corp. established full in-house production from materials to finished products.

By capitalizing on techniques learned producing our own line of cutting tools, in 1961 we began production of salt-bath furnaces for heat treatment work.

We then began developing our own technologies, and introducing some from overseas. Our production of industrial furnaces and auxiliary equipment was based on our vacuum heat treatment technologies, balancing the needs for heat treatment work with environmental impact.

Welcome to a guide to NACHI-FUJIKOSHI Corp.'s multifaceted capabilities in processes for full in-house manufacturing from materials to finished product.

Our aim is to support the needs of our customers with total service; from manufacturing and sales to maintenance and technical support; working to advance heat treatment technologies.



History

1961	Salt-bath furnace production started in-house
1963	Salt-bath furnaces sales started
1968	Introducing American technologies for atmosphere furnaces and aluminum furnaces
1974	Vacuum heat treatment furnace production and sales started
1981	L-TEQ (low temperature hardening) process technology released
1983	Ion plating equipment production and sales started
1992	Vacuum degreasing equipment production and sales started
1999	EN-CARBO NVC series of vacuum carburizing furnaces sales started
2001	HCD ion plating equipment sales started
2003	Cell type vacuum carburizing furnace developed
2004	Short-cycle vacuum degreasing equipment sales started
2007	Small-batch type vacuum carburizing furnace sales started
2011	Clean Master-J vacuum degreasing equipment sales started

Outline

Thermotech Division of NACHI-FUJIKOSHI Corp.

Location	176-12 Ogake, Namerikawa, Toyama Prefecture TEL:076-471-2981 FAX:076-471-2988
Business operations	Development, production, and sales of industrial furnaces, vacuum degreasing equipment, and ion-plating equipment. Maintenance services, heat treatment experimentation, coating work on consignment
URL	http://www.nachi-fujikoshi.co.jp



NACHI-FUJIKOSHI Corp. Namerikawa Plant



Welcome to NACHI

Contents

Product lineup	EN-CARBO Vacuum carburizing furnaces	Carburizing, Carbonitriding Oil quenching	5-6P	EN-CARBO
	Vacuum furnaces	Vacuum hardening Tempering Brazing, Solution treatment	7-8P	Vacuum furnaces
	High Bright Furnaces Neutral atmosphere high-temperature hardening furnaces	Hardening, Brazing	9-10P	High Bright Furnaces
	Quick Master Drip-type multi-purpose atmosphere furnaces	L-TEQ processing Gas carbonitriding Gas carburizing, Gas nitrocarburizing	11-12P	Quick Master
	Mesh belt type continuous furnace Continuous heat treatment facilities	Hardening, Tempering Gas carburizing, Carbonitriding	13P	Mesh belt type continuous furnace
	Industrial furnace lineup		14P	Industrial furnace lineup
	Clean Master Vacuum degreasing equipment	Degreasing	15-18P	Clean Master
	Ion plating equipment	Melting type PVD Sputtering type PVD	19-20P	Ion plating equipment
Thermotech Engineering Services	Heat treatment experimentation services		21P	Heat treatment experimentation services
	Consignment coating services		22P	Consignment coating services

Enhance added value in heat treatments

EN-CARBO

Vacuum carburizing furnaces

What is carburizing

This heat treatment penetrates the surface of a metal with carbon to increase the carbon content before hardening to produce a hard surface and a moderate toughness inner. It is widely used in auto parts, construction equipment parts, and parts for many other machines.

Features

High-performance carburizing process

Elevates added value to heat treatment by doing processes that are not possible with gas carburizing furnaces.

Super carburizing

Increase surface carbon content by more than 1.4%, aggressively dispersed carbides to increase product toughness and heat resistance.

High-temperature carburizing

Possible to raise carburizing temperature up to 1050 °C with no metal parts in the furnace. This can shorten the heat treatment cycle.

Safe and clean environment

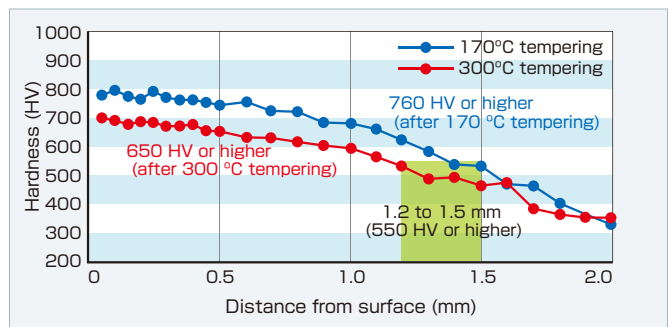
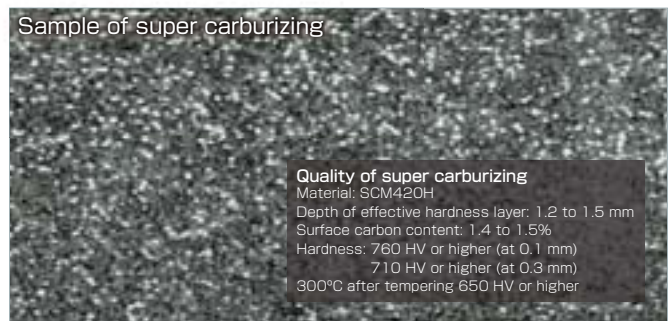
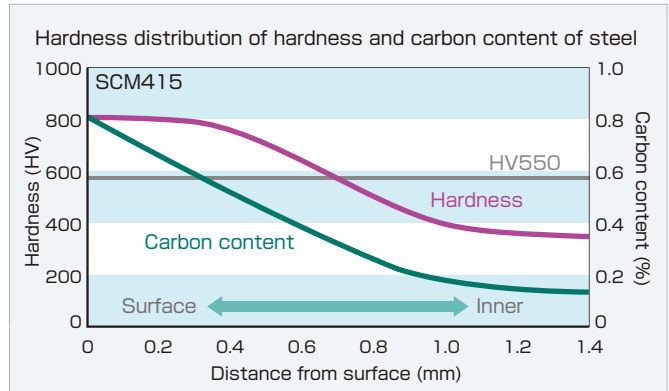
Flameless structure. Can really improve environment of heat treatment area by eliminating concern about fire.

Flexibility

Seasoning is not needed so start up and shut down of furnace is easy.

Lower running costs

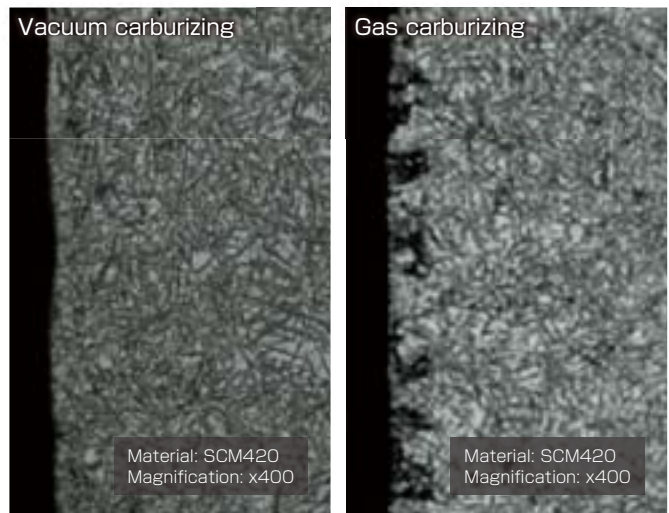
Lower heat loss, compared to gas carburizing furnaces, due to insulation effect of vacuum. Unmanned operation during night hours can greatly reduce labor costs.



Examples of heat treated products



State of grain boundary oxidation



All-encompassing series



NVC-3

NVC-1/NVC-3

- Heating chamber and quenching oil tank has circular cross section in compact design with easy maintainability and hardenability
- Excellent as a test furnace and for multiple products in small-lot production



NVC-6

NVC-6/NVC-10

- Perfect for mass production facilities for carburizing and carbonitriding
- Oil tank design focused on hardening performance
- Extremely high reproducibility of heat treatment quality

Specifications

	NVC-1	NVC-3	NVC-6	NVC-10
Effective dimensions (W×L×H mm)	400×400×400	460×620×550	610×950×610	760×1220×760
Treatment capacity (kg/h)	100	300	600	1000
Electric capacity (kW)	35	45	100	160
Installation dimensions (W×L×H m)*1	2.7×3.5×2.9	3.5×5.1×2.9	4.8×6.2×3.1	4.8×6.7×3.4
Main unit weight (tons)*2	8	10	15	18
Quenching oil capacity (L)	1100	3500	8000	10000
Operating temperature (°C)	800~1050	800~1050	800~1050	800~1050

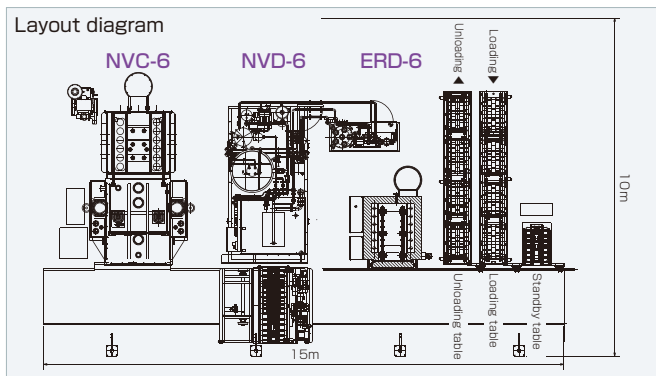
*1 Not including space for maintenance *2 Weight while dry

Options

Refining function	Used for super carburizing, high-temperature carburizing, and reheating.
Carbonitriding function	Function for generating a nitride layer on the carburizing structure.
Remote monitoring system	Function for diagnosing malfunctions via a telephone line.
Loading equipment	Equipment for loading and unloading work from tray in furnace and other equipment.
Automated system	A fully automated cycle can be configured by combining the carburizing furnace and degreasing equipment, tempering furnace and stock table.



NVC-6 line



ENCABRO

Vacuum furnaces

High Bright Furnaces

Quick Master

Mesh belt type continuous furnace

Industrial furnace lineup

Clean Master

Iron plating equipment

Heat treatment experimentation services

Component coating services

Producing surfaces without decarbonizing or oxidizing

Vacuum furnaces

Vacuum heat treatment furnaces

What is vacuum heat treatment

A workpiece is placed in a vacuum, normally of about 0.01 to 1 Pa (abs) and heated. By heating in a vacuum atmosphere, finished surfaces have absolutely no oxidizing or decarbonizing. Also, bright heat treatment can be done easily because it is not necessary to adjust the atmosphere. When heating is finished, there are two quenching methods: 1. Gas quenching and 2. Oil quenching.

1. To introduce and circulate inert gas (usually extremely pure nitrogen) for cooling after heating is finished.
2. Quenching in an oil tank in the vacuum.

Features

- **Supports a wide range of applications**
Excellent for heat treatment for automotive parts and machinery parts. Excellent for quenching, tempering, brazing, annealing, solution treatment, and ageing processes.
- **Also possible to cool thick parts**
Heat treating thick parts is possible because of high heat exchange performance and up to 500 kPa (abs) pressurized gas circulation.
- **Minimize distortion from heat treatment**
The distortion from heat treatment is minimized by even heating and cooling.
- **Design prevents loss of material elements**
Control of the vacuum pressure prevents loss of material elements.
- **Maintenance is easy**
Heating chamber is easy to load and unload, and maintenance is simple.

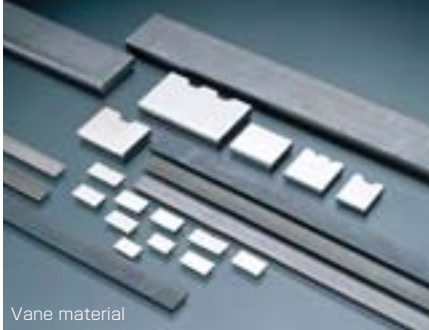
Other series

Target	Material	Model				Example application	
		EVVF	EVHO	EVHQ	EVBF		
Quenching/ solution treatment	SK Carbon tool steel					Clock parts, Jigs	
	SKS Alloy tool steel		●			Die and molds	
	SKD Alloy tool steel		●		●		Press molds and die cast molds
							Precision die and molds extraction
							Rollers for form rolling
							Cutting tools, Die and molds
	SKH High speed tool steel		●		●		Mold measuring gauge
							Machinery parts
	SUS Stainless steel						Jet engine bearings
							Turbine blades
							Miniature bearings
			●	●			Hydraulic equipment parts
						Computer parts	
						Tapping screws	
						Nuclear power equipment	
SUJ Bearing steel			●			Medical equipment parts	
						Aerospace equipment parts	
Annealing						Wheel parts	
		●			●	Electron tube material, Mild steel	
						Coils, Copper wire	
Brazing	Stainless steel brazing metal					Capacitor material, Aluminum boxes	
	Cu-Ag					Magnetic materials, Titanium products	
	Ni-Cr	●				Heat exchangers	
	Aluminum					Electric and electronic equipment	
Sintering	Alloy88Al-12Si	●				Nuclear power equipment	
	Beryllium					Heat exchangers	
						Telecommunications equipment	

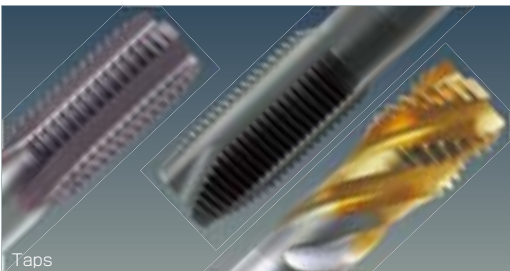
Examples of heat treatment products



Drills



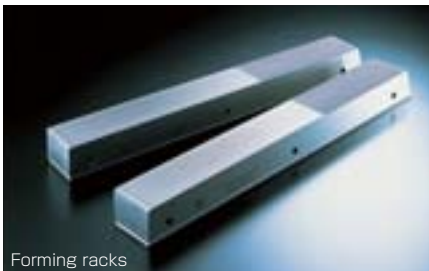
Vane material



Taps



Punches

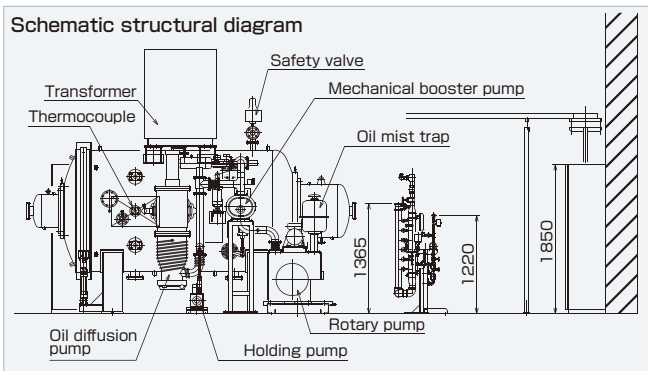


Forming racks

Horizontal single-chamber pressurized cooling vacuum furnace EVHC



Horizontal single-chamber pressurized cooling vacuum furnace EVHC



Specifications

- Temperature range: 550 to 1300°C
- Degree of vacuum: 0.4 Pa (abs) or less
- Exhaust time: Within 15 minutes (up to 6.7 Pa (abs) atmospheric pressure)
- Heating time: Within 45 minutes (empty furnace, from room temperature to 1100°C)
- Maximum cooling pressure: 500 kPa (abs)

Model: EVHC-	121609	182415	243618	243624	304824
Effective dimensions (W×L×H mm)	300×400×225	450×600×375	600×900×450	600×900×600	750×1200×600
Treatment capacity (kg/h)	60	220	450	500	800
Electric capacity (kW)	60	120	210	210	305
Installation dimensions (W×L×H m) ^{*1}	2.4×3.0×2.1	3.0×3.6×2.9	3.6×4.7×3.5	3.6×4.7×3.6	3.9×5.5×4.5
Main unit weight (tons) ^{*2}	5	8	10	13	17
Operating temperature (°C)	550~1300	550~1300	550~1300	550~1300	550~1300

*1 Not including space for maintenance *2 Weight while dry

Lineup by application

Model	Series model	Major features
Horizontal single chamber vacuum furnace	EVHF	Multi-functional furnace with even heating and cooling to reduce distortion from heat treatment.
Vertical single chamber vacuum furnace	EVPF	Multi-functional furnace that is easy to operate and requires little space.
Elevator type vacuum furnace	EVVF	Suitable for processing large volumes, no pit needed.
Horizontal dual chamber pressure cooling vacuum furnace	EVHP	Excellent cooling performance with gas circulation system pressurized in dual chambers.
Vacuum purge type triple chamber tempering furnace	EVHFD	Possible to do tempering efficiently by using vacuum purge and cooling chambers located before and after the heating chamber.

Horizontal dual chamber pressure cooling vacuum furnace



Elevator type vacuum furnace EVPF



Advantages of horizontal dual chamber vacuum furnaces

Item	Dual chamber	Single chamber
Cooling speed	○	△
Process cycle	○	△
Energy savings	○	△
Productivity	○	△
Installation space	△	○
Running costs	○	△
Initial costs	△	○

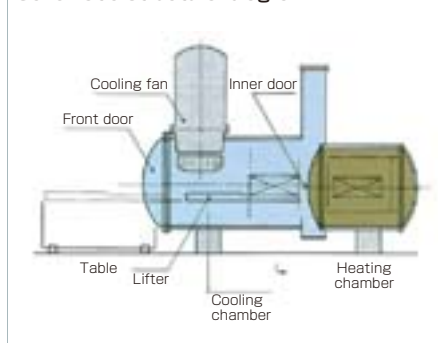
Horizontal single chamber vacuum furnace EVHF



Vacuum purge type triple chamber tempering furnace EVHFD



Schematic structural diagram



EVHFD
 Vacuum furnaces
 High Bright Furnaces
 Quick Master
 Mesh belt type continuous furnace
 Industrial furnace lineup
 Clean Master
 Ion plating equipment
 Heat treatment experimentation services
 Component coating services

NACHI FUJIKOSHI Corp.'s own atmosphere hardening furnace High Bright Furnaces

Neutral atmosphere high-temperature hardening furnaces

NACHI FUJIKOSHI Corp.'s High Bright is a heat treatment furnace that makes neutral atmosphere hardening in a temperature range from low to high possible, and has a wide range of applications from hardening to sintering parts of various types of steel.

NACHI FUJIKOSHI Corp has applied the know-how from its respected work, covering industrial, heat treatment and other types of furnaces, for developments that eliminate the flaws in conventional vacuum furnaces, atmosphere furnaces, salt bath furnaces, and more to achieve heat treatments of high quality at low costs.

Maintenance and handling are easy, plus they are safe and non-polluting.

High Bright is a high temperature atmosphere hardening furnace that improves productivity and conserves nitrogen.

Applications

- **Hardening** High-speed tool steel, Die and molds steel, Stainless steel, Heat resistant steel, Bearing steel, Construction steel, etc.
- **Brazing** Steel, Brass brazing, etc.
- **Sintering** Machinery parts, Electric parts, etc.

Features

■ Double the productivity of vacuum furnaces

The cycle of High Bright furnaces is half that of vacuum furnaces for high productivity.

■ Automation

Program controller makes it possible to preset all processing conditions, so automatic processing with high reproducibility is possible with just the touch of a button.

■ Installation cost is relatively low

Costs are lower because generators are unnecessary as the atmosphere, containing nitrogen gas to which micro amounts of organic liquids are added, is admitted directly into the furnace.

■ Processed surfaces are bright

Processed surfaces are bright without heating deviations because a consistent neutral atmosphere can be attained from low to high temperature ranges as atmosphere adjustments are easy.

■ Extremely safe

There is no risk of the atmosphere igniting or exploding, and no special skills are needed.

■ Improved work environment

The construction is sealed so no hot jets, fumes, or flames are generated making the work environment very good. Maintenance and handling are extremely simple.

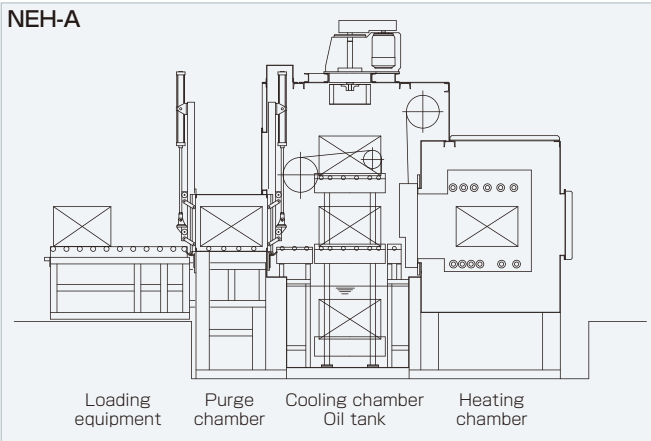


High Bright furnace line

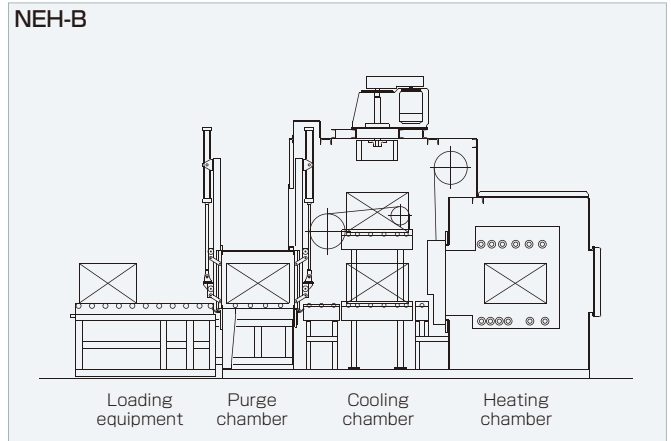


Model

NEH-A



NEH-B

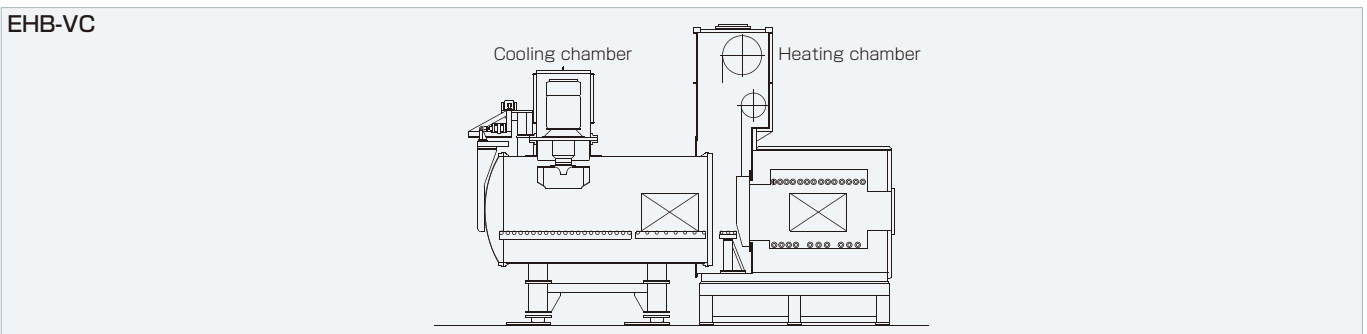


	NEH-3	NEH-6	NEH-10
Effective dimensions (W×L×H mm)	460×620×550	610×950×610	760×1220×760
Treatment capacity (kg/h)	150(75)* ³	300(150)* ³	500(300)* ³
Electric Capacity (kW)	45	80	120
Installation dimensions (W×L×H m)* ¹	2.1×6.4×3.9	2.3×7.3×4.4	2.5×8.3×4.9
Main unit weight (tons)* ²	10	12	15
Quenching oil capacity (L)	2000	3000	5000
Operating temperature (°C)	850~1250	850~1250	850~1250

*1 Not including space for maintenance *2 Weight while dry *3 Values in () are for high-speed tool steel
 ●NEH-3A [A and B indicate cooling method. A: Oil or atmosphere cooling. B: Atmosphere cooling.]

Pressure cooling High Bright furnace

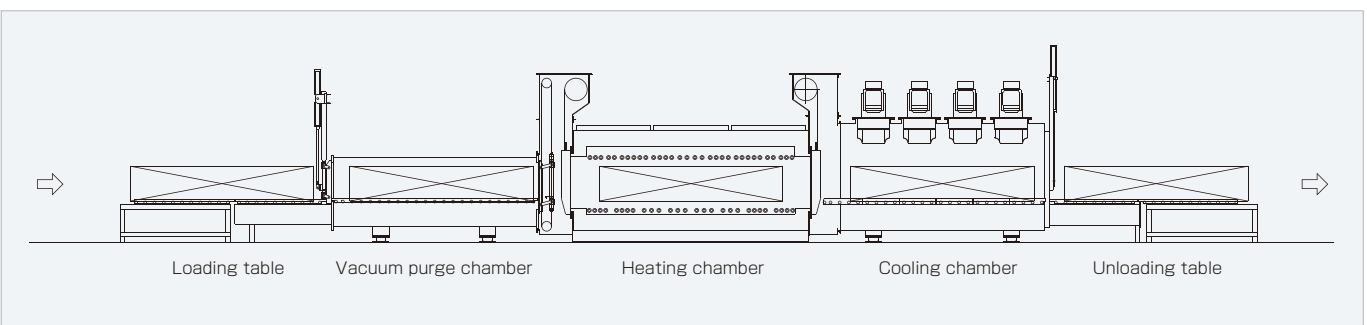
EHB-VC



	EHB-3VC	EHB-6VC	EHB-10VC
Effective dimensions (W×L×H mm)	460×620×550	610×950×610	760×1220×760
Treatment capacity (kg/h)	150(75)* ³	300(150)* ³	500(300)* ³
Electric Capacity (kW)	45	80	120
Installation dimensions (W×L×H m)* ¹	5.0×6.0×3.5	5.5×7.0×3.8	6.0×8.0×4.0
Main unit weight (tons)* ²	13	15	18
Operating temperature (°C)	850~1250	850~1250	850~1250

*1 Not including space for maintenance *2 Weight while dry *3 Values in () are for high-speed tool steel

Specialized specifications for long type High Bright furnace



ENCAPED

Vacuum furnaces

High Bright Furnaces

Quick Master

Mesh belt type continuous furnace

Industrial furnace lineup

Clean Master

Iron plating equipment

Heat treatment experimentation services

Component coating services

Many heat treatment applications possible with one furnace

Quick Master

Drip-type multi-purpose atmosphere furnaces

The Quick Master's heating chamber is a muffle furnace construction, so the atmosphere in the furnace can be created very quickly. This makes changing the atmosphere easy and it supports many various heat treatment processes. One special feature is that it can do L-TEQ processing (low temperature hardening processing), which is suitable for machine parts for which minimizing distortion deformation is important. This furnace is very useful because one installation can do a variety of heat treatment processes.

What is L-TEQ processing (low-temperature and low distortion hardening)

Creating an alloy of steel and nitrogen on the surface of carbon steel reduces the transformation temperature. This makes it possible to reduce the hardening temperature, so low-temperature low-distortion heat processing is possible.

Merits of L-TEQ processing

- Reduction in heat treatment distortion
- Improved variance in depth of surface hardened layer
- Increase depth of hardened layer to increase wear resistance and surface durability
- Reduce costs by switching from alloy steel to carbon steel
- Shorten processing time

Features

■ Many heat treatment applications possible with one furnace

1. Carburizing
2. Carbonitriding
3. Bright hardening
4. Gas nitrocarburizing
5. L-TEQ processing

■ Gas not needed

Initial costs are reduced because gas generator is not needed.

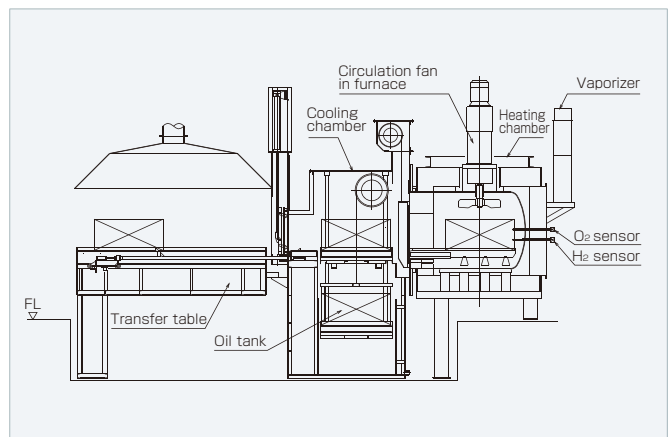
■ Atmosphere control system

High precision control of atmosphere is possible by constructing atmosphere control system with H₂ sensor combined with atmosphere control using conventional CP measurements or O₂ sensors.

■ Adjustment of atmosphere in furnace is easy

Using an alloy muffle even eliminates the need for seasoning as in intermittent operation. Little time is lost because the atmosphere quickly stabilizes even after a long work stoppage. This makes multiple jobs possible because switching between various uses of the furnace is fast.

Construction

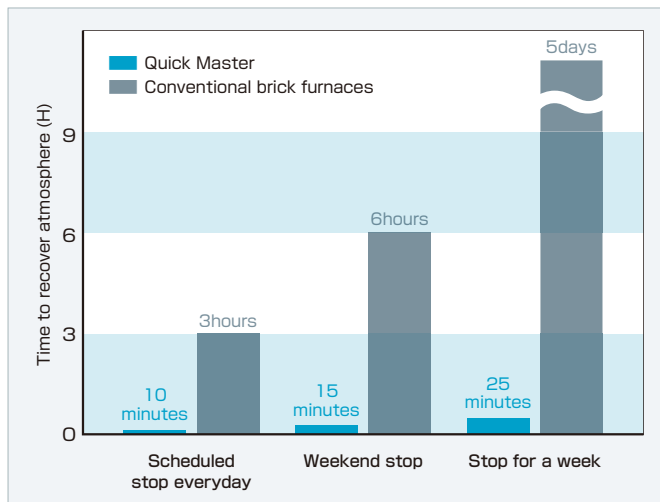


Specifications

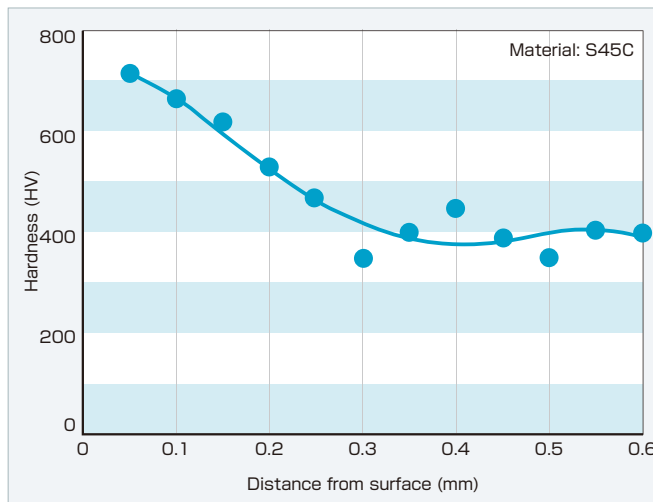
	EQ-3	EQ-6	EQ-9
Effective dimensions (W×L×H mm)	450×600×375	600×900×450	650×1000×475
Treatment capacity (kg/h)	150	350	500
Electric capacity (kW)	48	90	90
Installation dimensions (W×L×H m)*1	1.8×4.7×3.5	2.2×5.3×3.7	2.7×6.8×3.7
Main unit weight (tons)*2	10	15	19
Quenching oil capacity (L)	1900	3400	5400
Operating temperature (°C)	500~900	500~900	500~900

*1 Not including space for maintenance *2 Weight while dry

Graph showing recovery of atmosphere



L-TEQ process Hardness distribution from surface



L-TEQ process Performance data

Heat treatment distortion from L-TEQ Sewing machine parts

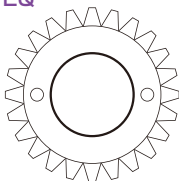
Specifications
Material: SPC
Depth of effective hardness layer: 0.24mm

Unit: mm

	X			σ		
	Before	After	Distortion	Before	After	Distortion
Radial runout	0.0106	0.108	0.002	0.0106	0.108	0.002

Heat treatment distortion from L-TEQ Sprocket

Specifications of Sprocket
Inner diameter: 37.0mmφ
Root diameter: 69.7mmφ
Plate thickness: 4.2mm
Material: SPC
Depth of effective hardness layer: 0.15mm



Unit: mm

	X			σ		
	Before	After	Distortion	Before	After	Distortion
Hole diameter	37.010	37.019	+0.009	0.0026	0.0032	+0.0006
Root diameter	69.750	69.774	+0.024	0.0035	0.0032	+0.0016
Surface distortion	0.047	0.038	+0.009	0.0129	0.0140	+0.0011
Roundness	0.028	0.048	+0.020	0.0079	0.0079	0

Corrosion resistance with L-TEQ

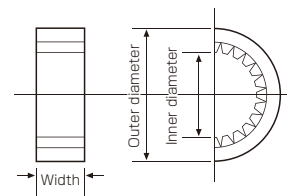
Processing method	Tempering temperature (°C)	4 days after start of test		16 days after start of test	
		Rust status	Change in weight (mg)	Rust status	Change in weight (mg)
L-TEQ	As quenched	No rust	+1.2	No rust	+0.2
	150	No rust	+1.3	No rust	+0.4
	200	No rust	+1.4	Several points of rust	+0.6
	300	No rust	+1.7	No rust	+0.7
Carburizing/quenching	As quenched	Several points of rust	+1.9	1/3 rusty	+1.7
	150	Several points of rust	+1.6	2/3 rusty	+1.7
	200	3/4 rusty	+1.4	Almost entire surface rusty	+1.9
	300	Points of rust on entire surface	+1.7	Entire surface rusty	+3.3

Humidity of atmosphere Temperature 15 ± 1°C Humidity 95%

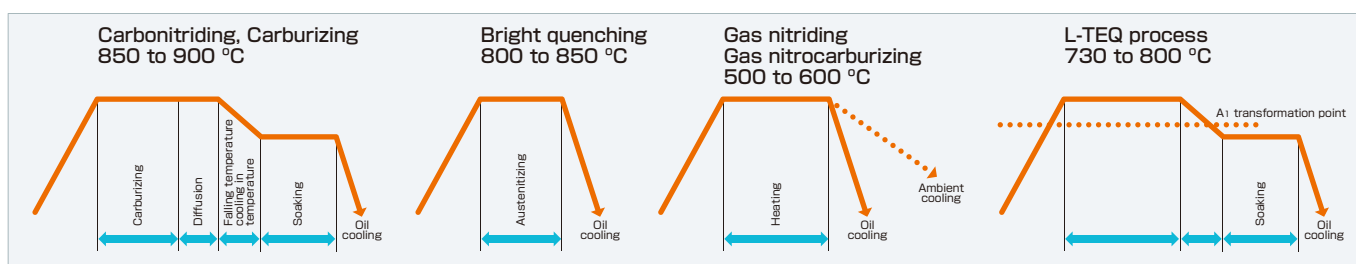
Heat treatment distortion from L-TEQ Gear

Specifications of Gear
Module: 2.75 Material: S45C
Tooth count: 20 Depth of effective hardness layer: 0.15mm
Over pin diameter: 48.5

	Nominal dimensions (mm)	Heat treatment distortion (μ)
Outer diameter	72.0	-1~+2
Inner diameter	50.75	-10~+10
Width	26.0	-2~+11
Over pin diameter	48.50	-11~+24



Heat treatment cycle



Continuous processing of heating, quenching, washing, and tempering

Mesh belt type continuous furnace

Continuous heat treatment furnaces

What is Mesh belt type continuous furnace

Items being processed travel on a stainless steel mesh conveyor belt so heat processing procedures can be done continuously with this equipment.

Features

Austenitizing furnace

Mesh belt uses a roller house construction for a long service life
Construction matches purpose of process for diverse atmosphere control.

Quenching oil tank

Oil curtain reduces degradation of oil for easier maintenance
Prevents oil smoke from entering heating chamber.

Washing tank

Dual tank construction (hot and cold) and laminar flow nozzle give high washing performance.

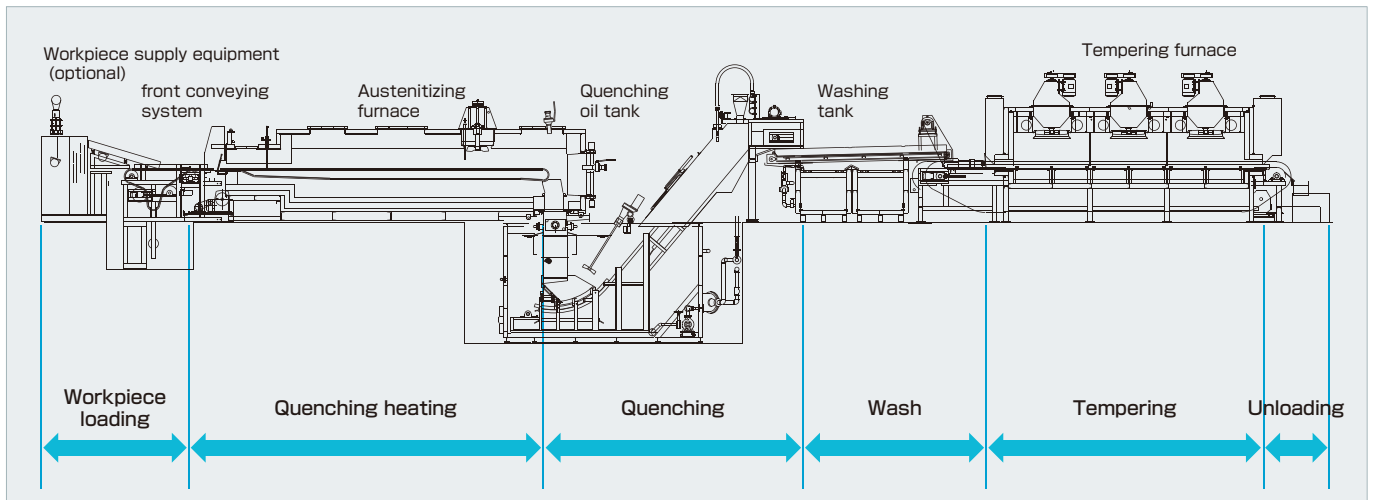
Applications

- Bright quenching process
- Carburizing/quenching process
- Carbonitriding/quenching process

Installation photo



System flow



Mesh belt standard specifications

Facilities	Standard A type	Standard B type	Remarks
Effective dimensions (W×L×H mm)	800×5000×100	900×5400×100	Heating furnace
Treatment capacity (kg/h)	400	450	For bright quenching
Electric capacity (kW)	330	449	Complete facility
Installation dimensions (W×L×H m)*1	7×30×5	8×30×5	H is from bottom of oil tank pit to top of equipment
Main unit weight (tons)*2	37	45	Complete facility
Quenching oil capacity (L)	14,500	18,000	
Operating temperature (°C)	800~900	800~900	Heating furnace
System to supply workpieces automatically	Robot to supply workpieces	Robot automatically supplies workpieces to workpiece supply equipment from the basket.	
	Equipment to supply workpieces	They are fed automatically to the mesh belt according to the set processing volume (kg/h).	
Supports carbonitriding processes	Ammonia is injected and circulation fan is added to heating furnace.		
Smoke collector	Frame is mounted on top of washing tank, and oil smoke mist generated by quenching oil tank is collected.		

*1 Not including space for maintenance *2 Weight while dry

Industrial furnace lineup



Vacuum purge type triple chamber tempering furnace EVHFD



Nitrogen purge atmosphere tempering furnace



Tempering furnace



Large size annealing furnace



Aluminum solution treatment furnace



Pit type nitriding furnace



Bogie furnace

- ENCARPO
- Vacuum furnaces
- High Bright Furnaces
- Quick Master
- Mesh belt type continuous furnace
- Industrial furnace lineup
- Clean Master
- Ion plating equipment
- Heat treatment experimentation services
- Consignment coating services

Optimum washing before and after heat treatment

Clean Master

Vacuum degreasing machines

Features

Simple

Everything completed in a single chamber, from washing to drying, with no moving parts.

Compact designing and high durability.

Safe

Front door uses double lock construction and pneumatic valves, solvent is moved with a pressurized control from vacuum + nitrogen, vacuum (air and cutoff) and thermal oil use intermediate heating.

Energy savings

Equipped with a high-efficiency distillation recycler so highly pure solvent can be reused.

Low solvent costs because of high recovery rate in a fully closed system.

Low environmental impact

Hydrocarbon solvent is used.

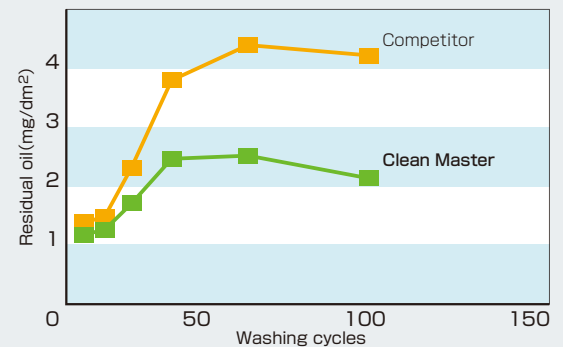
(exempt from air pollution laws, soil pollution laws, water pollution laws, and PRTR laws and regulations.)

Easy to install

System has many possible layouts because of modular design of functions.

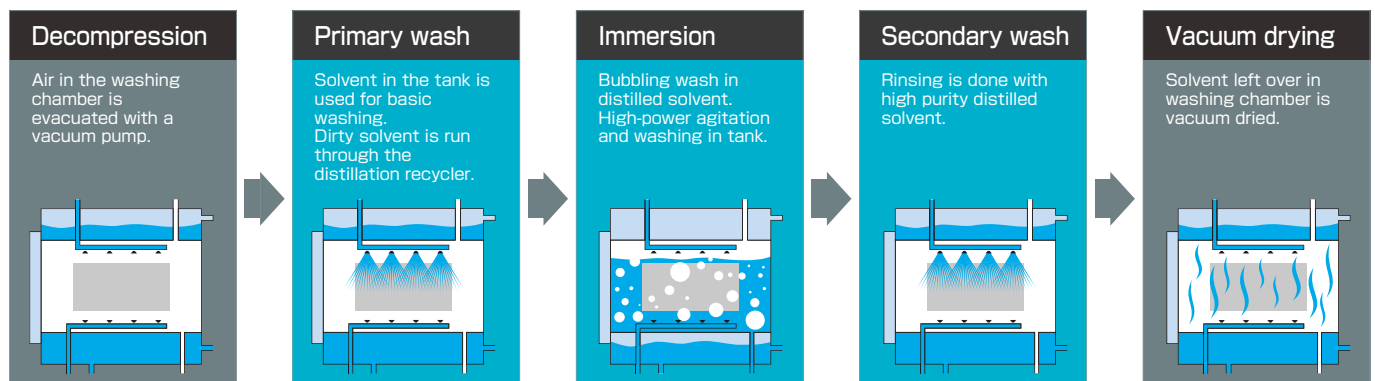
Meets short delivery time and low cost targets, saving space when updating existing facilities.

Changes in washing cycles and residual oil



- Test equipment: NVD-10
- Load volume: 500kg/N.C
- Solvent temperature: 110°C
- Solvent used: Semi-hot quenching oil
- Load volume: 3.0 L/cycle 1 → 85 ch

Superior washing functions for various products in triple wash and high-power degreasing



Washed items



Series lineup



In & Out Types NVD-3, NVD-6, and NVD-10



Through types NVD-6T, and NVD-10T



In & Out Large Types NVD-15, and NVD-30



SNVD-6LT for short cycle continuous lines

Specifications

	NVD-3	NVD-6(T)	NVD-10(T)	NVD-15	NVD-30	SNVD-6LT
Effective dimensions (WxLxH mm)	460x620x550	610x950x610	760x1220x760	920x1220x920	920x1800x920	660x1220x650
Treatment capacity (kg/h)	300	600	1000	1500	2700	600
Normal wash time (min/ch)	30	30	30	40	50	20
Electric capacity (kW)	55	70	70	120	120	95
Installation dimensions (WxLxH m) ^{*1}	2.1x5.5x2.8	2.2x6.2x3.0	2.2x6.2x3.0	2.6x7.5x3.3	2.6x8.5x3.3	5.0x7.0x3.8
Main unit weight (tons) ^{*2}	8	11	11	13	15	14
Solvent volume (L)	900	1900	1900	2500	3700	1600
Thermal oil (L)	400	600	600	900	900	700

*1 Not including space for maintenance *2 Weight while dry

ENCARBO

Vacuum furnaces

High Bright Furnaces

Quick Master

Mesh belt type continuous furnace

Industrial furnace lineup

Clean Master

Ion plating equipment

Heat treatment experimentation services

Component coating services

Proprietary solvent circulation system and four wash cycles minimize solvent volume

Clean Master^J

Vacuum degreasing equipment

Features

Save energy and reduce environmental impact

- Solvent is efficiently recovered through high performance distillation recycler, mist trap, after cooler, and condenser. Reduce consumption of solvent.
- Less than 1 Nm³ nitrogen per charge consumption.
- Energy saver mode reduces power consumed in standby.
- Low noise design uses screw type dry vacuum pump.

Prevent re-adherence of particulate foreign matter

Saving installation space

- Installation possible in 55% of space required for NVD-10E (including maintenance space).
- All-in-one design for easy transport and installation so upgrading existing facilities is simple.

High-performance distillation recycling system reduces running costs

- Distillation recycler performance is 170 l/hr
- Recycling purity is over 99%
- Solvent consumption is about 150 cc/charge

Uses less than 1/5 the solvent of conventional systems

Exempt from fire safety regulations because proprietary solvent circulation recycling system (patent pending) reduces solvent volume to less than 280 liters, 1/5 of conventional systems.

No need to apply to store low volumes of hazardous materials

Four cleaning functions

- Jet High-pressure high-speed nozzles wash with pounding force
- Spray High-pressure mist washes with micro droplets
- Shower High-volume overhead shower bath
- Vapor Solvent is vaporized to wash intricate areas



Jet (movable nozzles)



Spray



Shower

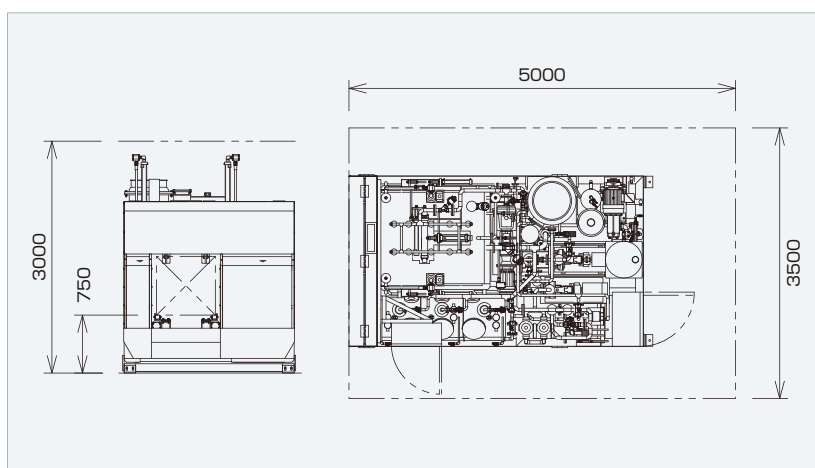


Vapor

Specifications

JNVD-10		H	HM	HL	L
Washing method	Shower	●	●	●	●
	Jet	●	●		
	Spray	●		●	
	Vapor	●		●	
Effective dimensions (W×L×H mm)		760×1220×760			
Treatment capacity (kg/g.c.)		1000			
Normal wash time (min/ch)		30~45			
Electric capacity (kW)		75			
Installation dimensions (W×L×H/m) ^{*1}		2.2×3.8×2.8			
Main unit weight (tons) ^{*2}		10			
Solvent volume (L)		280			
Thermal oil (L)		340			

*1 Not including space for maintenance *2 Weight while dry



Customized specifications supported

Top charge type



4-tray washing and large volume through type



Options

Thermal oil boiler
(13 A LPG butane)



Solvent neutralizer feeder
(to prevent oxidation of solvent and handle corrosion of equipment)



Large volume wash chamber filter



Conveyor systems



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Heat treatment experimentation services

Consignment coating services

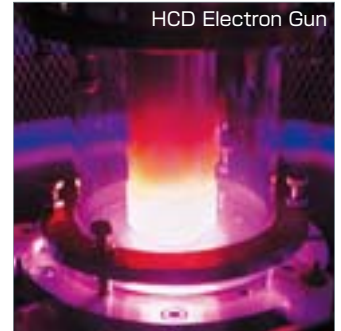
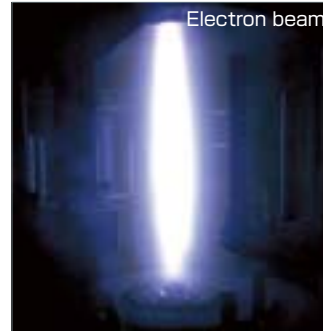
High-density plasma electron beam generates fine coatings

HCD ion plating equipment

PVD coating equipment

Features

- Fast coating formation speed (TiN: 2 to 5 $\mu\text{m}/\text{h}$)
- Excellent quality coating performance with melting method
- Low running cost (100% of vaporized materials used)
- Wide range of software for coating provided
- DLC coating process is possible (options required)
- Nitriding + coating can be done continuously (options required)



SS-2-8N



SQ-3-8N

Specifications

Type	SS-2-8N	SQ-3-8N
Installation dimensions (m)	4.0×5.4 (including space for maintenance)	5.0×5.5 (including space for maintenance)
Supported types of coatings	TiN, TiCN, CrN	TiN, TiCN, CrN
Processable size	$\phi 150 \times 270 \text{H} \times 8 \text{spindles}$	$\phi 220 \times 400 \text{H} \times 8 \text{spindles}$
Processing volume	Rotating 8 kg/spindle (maximum 15 kg)	Rotating 15 kg/spindle (maximum 40 kg)
Processing temperature	400~500°C	400~500°C

Options

HCD hybrid ion plating equipment SH-4-8

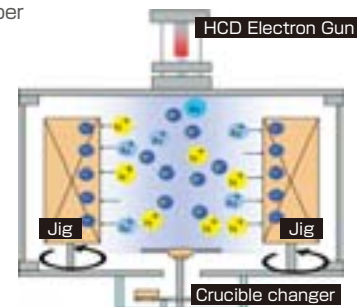
Process flow



Features

- Plasma nitriding and coating can be done consecutively
- Types of supported coatings
TiN, TiCN, CrN, Nitride + TiN, Nitride + TiCN, DLC, VC
- Layering of coatings is possible with crucible changer (3 mounted)

Coating chamber construction



Excellent for coating mass produced parts

Sputtering equipment

PVD coating equipment

Features

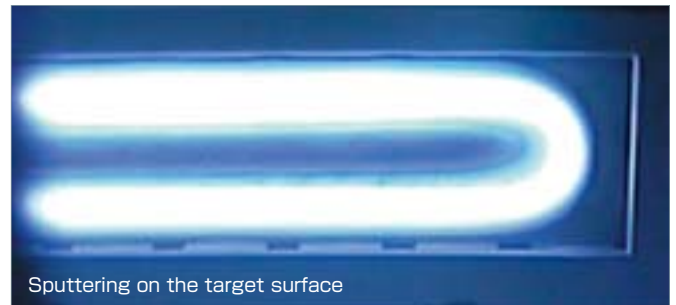
- Four angled target magnetrons
- Booster magnet coils used
- Excellent quality coatings can be generated
- Low temperature processing supported
- Alloy targets not needed (different metals set up as counter targets)
- Low running costs



SP-6090

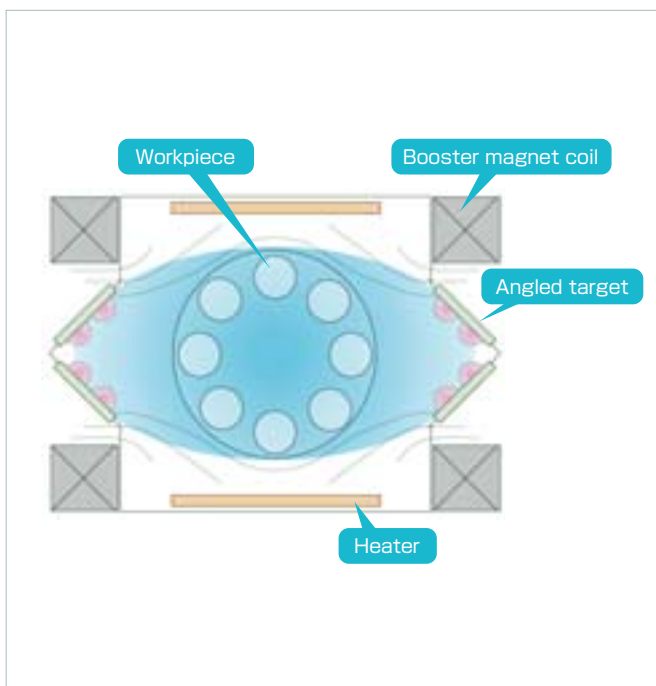
Specifications

Type	SP-6090
Installation dimensions (m)	4.0×6.0 (including space for maintenance)
Supported types of coatings	DLC, CrN
Processable size (mm)	φ600×900H
Processing volume	Rotating 300 kg
Processing temperature	180~500°C



Sputtering on the target surface

Coating chamber construction



Auxiliary equipment



Low reciprocating pressure ultrasonic cleaner

Hole punch for measuring thickness of coating

Demagnetizer

ENCABED

Vacuum furnaces

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Mesh belt type continuous furnace

Industrial furnace lineup

Clean Master

Ion plating equipment

Heat treatment experimentation services

Consignment coating services

Capable of testing individual parts or large lots

Heat treatment experimentation service

Heat treatment testing and processing services

Supported processes

Vacuum hardening

Vacuum carburizing/
quenching

Vacuum
carbonitriding

Super carburizing

Vacuum water
quenching

Vacuum carburizing/
water quenching

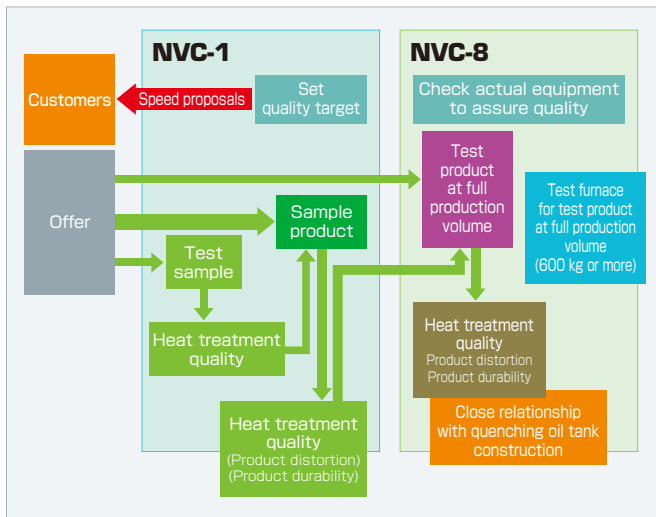
*Contact us about processes not shown here.



Test run at full production volumes + back up

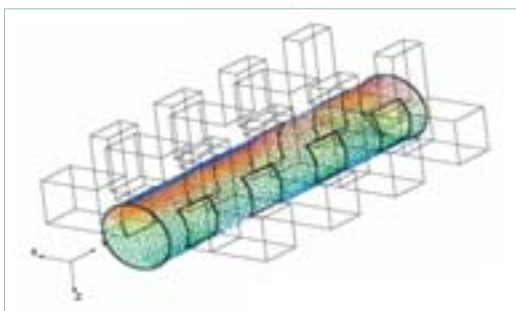
Material examination

(hardness, metallic micro structure, component analysis, EPMA)



Consultations about heat treating technologies

Heat treatment simulation (fluid, temperature, transformation)



Fluidic simulation of distribution of heat in furnace. This can be very helpful in basic heat treatment designs.

Sales of easy-to-use metal analyzers

Easy to check for foreign elements or measure carburizing depth.



Increase productivity and improve quality

Consignment coating services

Consignment coating services

Increase productivity and improve quality. Fujikoshi's coating service provides total service, including hardware, software, and consignment work, to meet demands from across the industrial sector.

Coating improves the tribological (friction, abrasion, lubrication) properties of parts and tools to get superior characteristics for both product life and the environment.

NACHI FUJIKOSHI Corp. can provide total coating services because we know materials and coating equipment.

We promise certain results and the production of many added values.

In the die and molds and punches fields

Improved mold release characteristics

Ceramic coating improves mold release characteristics.

Achieve high hardness

Increase wear resistance and extend service life.

Contamination prevention

Control contamination (deposits) and improve yield.

In the automotive parts and machinery parts fields

Improve friction characteristics

Reduce energy loss by reducing friction.

Improved adhesion resistance

Ceramic coating can prevent seizing.

Improved durability

Increase wear resistance and get longer service life.

Examples of TiN applications



Injection molding screw parts
Improved wear resistance



Liquid chemical extraction needles
Improved wear resistance



Mold for cold forging (bevel gear mold)
Improved wear resistance

Examples of TiCN applications



Mold for cold forging
Improved wear resistance



Punch
Improved wear resistance



Mold for cold forging
Improved wear resistance

Examples of CrN applications



Parts for automobile engines
Improved wear resistance
Abrasion resistance



Punch for tablets (pestle)
Improved wear resistance
Improved mold release



Inner plate
Improved corrosion resistance
More stable power transmission
Improved wear resistance

Examples of DLC applications



Vaness for compressors
Improved wear resistance
Abrasion resistance



Tips for machining
Prevents adhesion



Punch for screws
Improved wear resistance
Improved adhesion resistance

Types of coatings and applicable fields

Type of coating	Basic characteristics					Features	Applications													
	Standard coating thickness (μm)	Hardness of coating (HV)	Coefficient of friction	Upper temperature limit (°C)	Removable		Die and molds					Sliding parts			Cutting tools					
							Cold forging	Hot forging	Injection molding	Aluminum	Other	Light load	Medium load	Heavy load	Steel		Nonferrous iron			
CrN	2~4	1100~2000	0.5	700	○	Heat resistance/Anti-adhesion	○	○	◎	△	○	○	◎						△	
DLC	2~4	1000~3000	0.1	300	×	Low friction/Anti-adhesion			○	◎		○	△						◎	○
TiN	2~4	2400	0.6	600	○	Wear resistance/Extensive applicability	◎	△	○	△	○	○	○						◎	△
TiCN	2~4	2700	0.6	400	○	Wear resistance	◎	△		△	○								◎	△
TiAlN	2~4	2600	0.7	850	○	Wear resistance/Heat resistance												◎	○	
VC	2~10	2800	0.6	400	○	Wear resistance	◎	○	△											
VC/C	2~6	2300	0.2~0.4	300	○	Wear resistance/Low friction	◎	○	△											

EMC/ABED
Vacuum furnaces
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Industrial furnace lineup
Clean Master
Iron plating equipment
Heat treatment experimentation services
Consignment coating services

The logo for NACHI, featuring the word "NACHI" in a bold, red, sans-serif font. The letter "i" has a small red dot above it.

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