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## HAND SAWS

**ALO 486-490**  
**ALO 487-MH**  
**ALO 490-L**  
**ALO 491**  
**SS 25**

SETTING AND INDUCTION HARDENING OF HAND SAWS  
SETTING AND INDUCTION HARDENING OF HAND SAWS  
TOOTH HARDENING AND TEMPERING OF HAND SAWS  
TOOTH HARDENING AND TEMPERING OF HAND SAWS  
AUTOMATIC STRAIGHT SAW GRINDING MACHINE

Document No: B486-490  
Edition: 2  
Date: 2019-07-30  
Page: 1(2)  
Prepared: MS  
Approved: UF

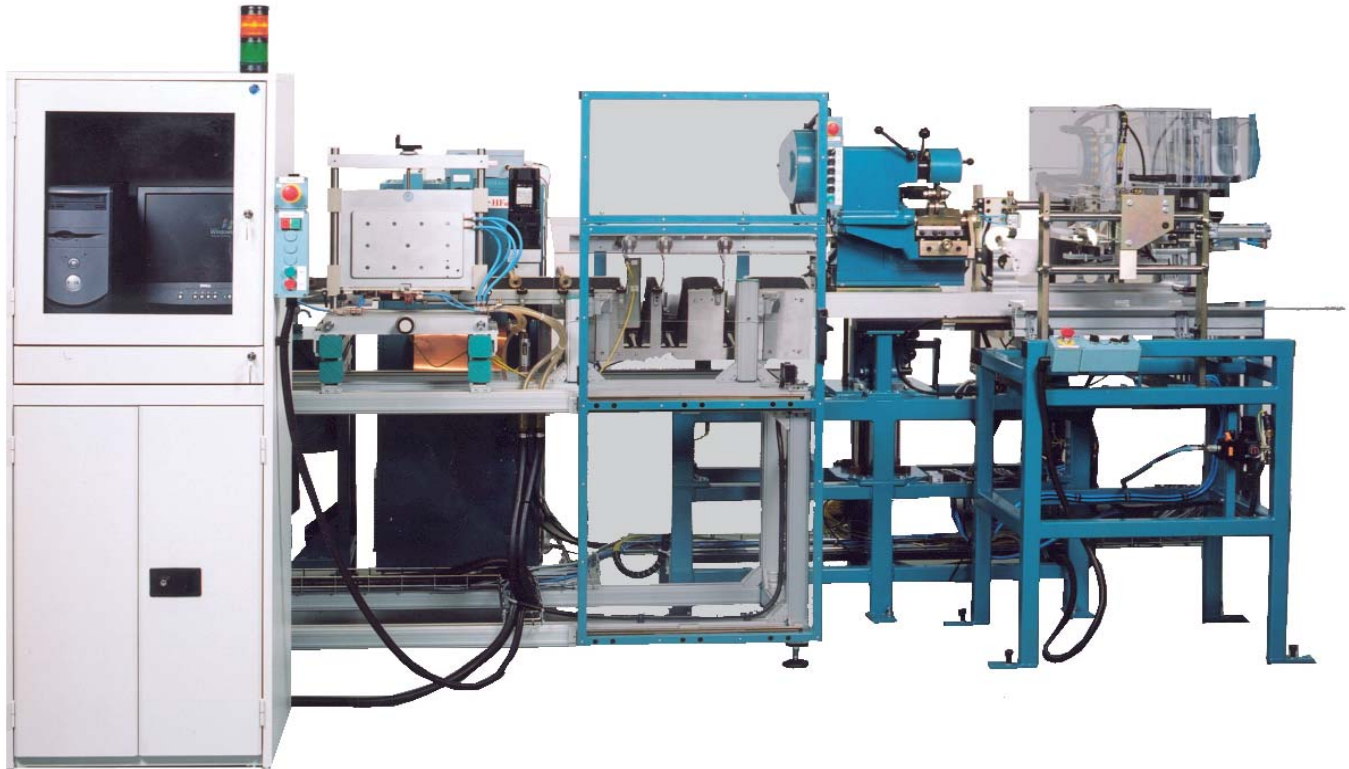
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ALO 486-490

# ALO 486-490

## Setting and induction tooth hardening of hand saws



### CAPACITY:

Max blade length:	650 mm
Blade thickness:	0.5 - 1.6 mm
Overall setting accuracy:	± 0.02 mm
Symmetry accuracy:	± 0.02 mm
Tooth pitch:	2 - 20 tpi
Max. group length	150 mm

### THE SYSTEM COMPRISES:

- Setting unit
- Hardening generator and inductor
- Closed cooling system

### OPTIONS / ACCESSORIES:



ALO 83-60  
Set gauge



ALO 61201  
Grinding fixture



ALO 61207  
Grinding fixture



## MACHINE DESCRIPTION

### Setting unit

The setter consist of a mechanical and powered setting head mounted on welded stand of sturdy construction equipped with a linear feeder driven by a servo motor. Both setter and induction unit are fully automatic and all functions are controlled by a programmable controller. The whole length of the blade can be set, or portions of the blade ends can be left unset. Setting symmetry and over all set is easy to adjust with micrometers. During the setting operation the blade is clamped by a pair of mechanically timed clamping jaws. Blades are set in sections up to 150 mm/feeding, depending on the length of blades and setting tools.



*Pick and place unit and setting unit*

### Hardening unit

Blades are automatically by a integrated pick and place unit transferred from setter to the hardening unit. The conveyer belt, that is built into a welded stand of sturdy construction, feeds the blades through the hardening inductor that is located at the front side of the feeder. Blades are transported with the teeth towards front, operator side. The conveyer feeder is, before and by the inductor, equipped with a blade hold down system to assure perfect blade alignment during the hardening process. Teeth are air quenched immediately after hardening.

The heat treated blade is transported out to a "pick up" position where blade is to be picked up by a customer supplied device. "Device" is customers design and responsibility.

### Generator

The hardening generator are enclosed in separate aluminium cabinet, equipped with a separate oscillating circuit connected to the cabinet via a coaxial cable. The generator are air cooled, thus limiting the cooling water requirements to inductors and oscillating circuit only. The hardening generator is equipped with an automatic anode current regulator, thus ensuring a stable power during the hardening operation and a chopper for infinitely variable control of the output power.

## TECHNICAL SPECIFICATION:

Max blade length:	650 mm
Blade thickness:	0.5 - 1.6 mm
Overall setting accuracy:	± 0.02 mm
Symmetry accuracy:	± 0.02 mm
Tooth pitch:	2 - 20 tpi
Max. set length/set cycle:	150 mm
Weight:	1500 Kg
Air pressure:	6.3 bar
Standard voltage:	400VAC ±10% 3-phase, 50-60 Hz ±1% directly earthed system, other voltages available upon request.

Document No: B487MH  
Edition: 1  
Date: 2019-07-30  
Page: 1(2)  
Prepared: AP  
Approved: MS

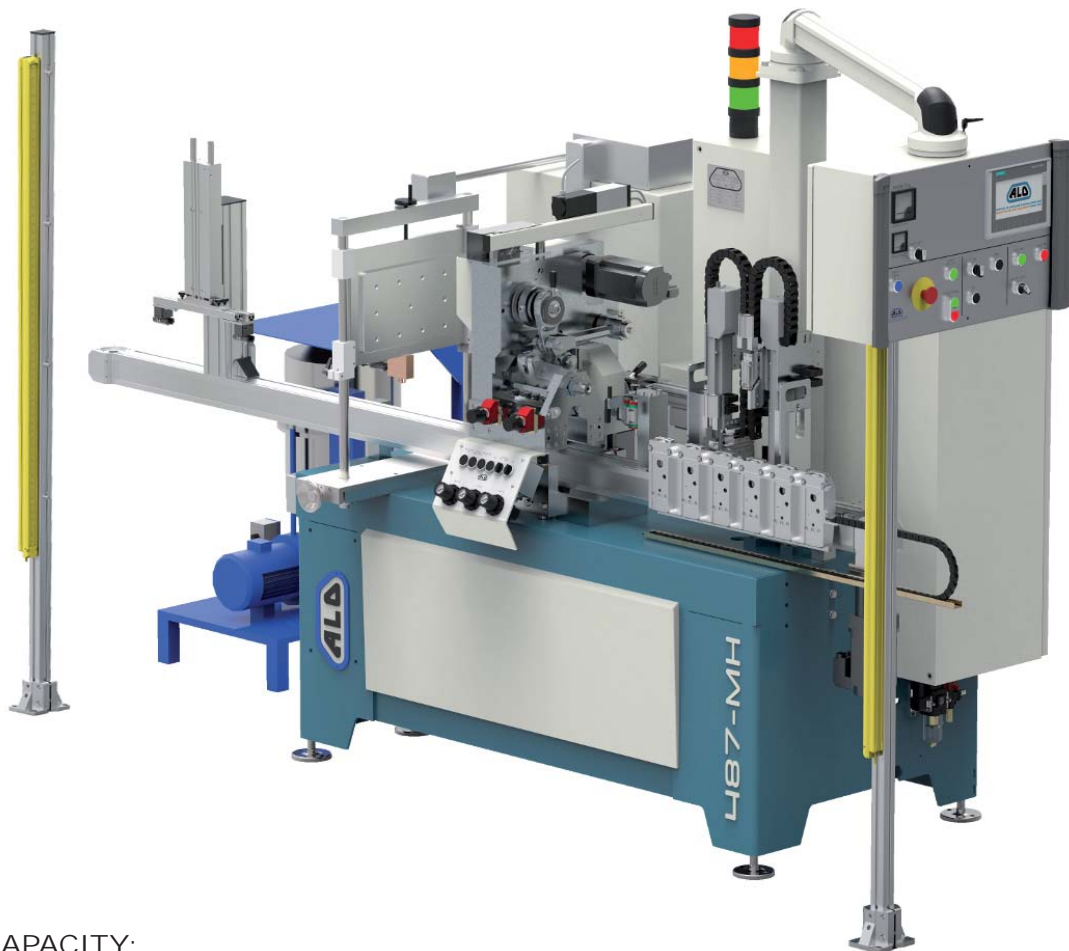
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# ALO 487-MH

## ALO 487-MH

Setting and induction tooth hardening machine  
for hand saw blades



### CAPACITY:

Blade thickness: 0.5 - 1.6 mm  
Max blade length: 650 mm  
Max. group length: 150 mm

Tooth pitch: 4 - 12 tpi  
Setting tolerance:  $\pm 0.02$  mm  
Symmetry tolerance:  $\pm 0.02$  mm

### OPTIONS / ACCESSORIES:



ALO 81-60  
Set gauge



ALO 61201  
Grinding fixture



ALO 61207  
Grinding fixture





Sensor positioner and magnetic carrier



Laser sensor tooth positioner and setting unit



Hardening unit



Outfeed magazine

## MACHINE DESCRIPTION

ALO 487-MH is design for the hand saw blade market and can handle all known forms and groups of teeth with a repeated feed pattern up to 150mm.

The setting unit is easy to adjust mechanically, supported by an operator friendly HMI, making change over between different blades widths very easy.

The parallel clamping jaws are located on the front of the machine and are adjustable by two micrometers, equipped with a display showing the value.

All blades <150 mm length can be set in one set cycle.

150-650 mm blades requests two or more set cycles depending on the length of blade and setting tools. With custom made setting tools the machine can set all known tooth forms and setting patterns which are repeated within a length of 150 mm or less.

The generator is equipped with an automatic anode current regulator that will control the anode current, thus ensuring a stable power during hardening.

A flash guard unit monitors the hardening inductor area and automatically shuts down the machine if a flash-over are detected.

The inductor is made of copper tubing and can be custom made for different pitches and blade gauges.

The setting and hardening are integrated making the sequences fully automatic and all functions are controlled by a PLC.

## TECHNICAL SPECIFICATION:

Band thickness:	0.5 - 1.6 mm
Max. blade length:	650 mm
Max. group length:	150 mm
Tooth pitch:	4 - 12 tpi
Setting tolerance:	±0.02 mm
Symmetry tolerance:	±0.02 mm
Capacity:	6 blades / min at a blade length of 550 mm
Air pressure:	5 bar
Voltage:	400 VAC, ± 10%, 1-phase, 50-60 Hz ± 1%, directly earthed system
Space requirement (LxWxH):	3 x 3 x 2 m
Weight:	1 500 kg

Document No: B490-L  
Edition: 4  
Date: 2019-07-30  
Page: 1(2)  
Prepared: MS  
Approved: UF

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# ALO 490-L

## ALO 490-L

Inductive tooth hardening and tempering of wood hand saws



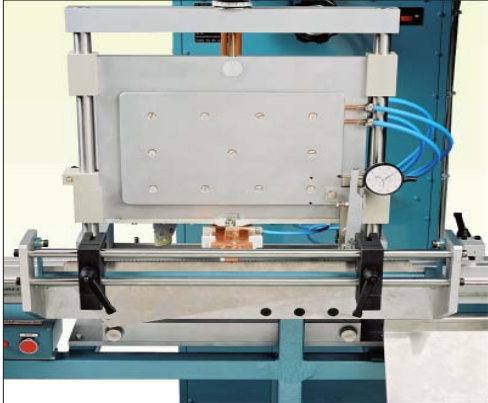
### THE SYSTEM COMPRISES:

Hardening / Tempering generator  
Hardening / Tempering inductor  
Closed cooling system  
Blade feeder

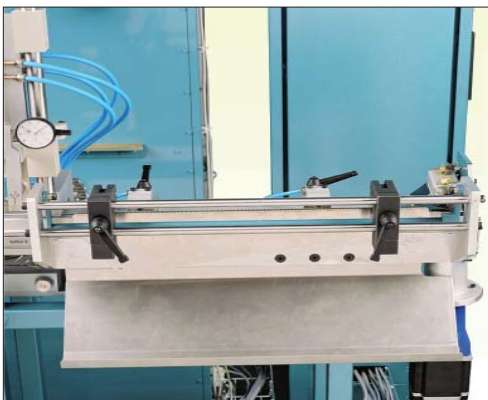
### CAPACITY:

Blade length: 250 - 812mm  
Blade width: 50 - 150mm  
Blade thickness: 0.5 - 1.6mm  
Tooth pitch: 4 - 12 TPI  
Feedspeed: 5 - 8 m/min





*Oscillating circuit with hardening/tempering inductor*



*Loading / unloading position with receiving magazine*

## MACHINE DESCRIPTION

### Generator

The generator are enclosed in separate aluminium cabinet, equipped with separate oscillating circuit connected to the cabinet via coaxial cables. The generator are air cooled, thus limiting the cooling water requirements to inductor and oscillating circuit only. The generator is equipped with an automatic anode current regulator, thus ensures a stable power during the hardening operation, and a chopper to control the output power during the tempering sequence.

### Inductor

The inductor are made of copper tubing and can be custom made for different pitches and band gauges. The inductor are adjustable in height for different blade widths and sideways for different blade gauges. The inductor can easily be replaced.

### Blade feeder

The blade feeder unit consists of a linear feeder driven by a servo motor and are equipped with a blade holder adjustable for different blade lengths, and a leveling device for correct positioning of the blade in relation to the inductor. The blades are manually loaded with the teeth up in the blade holder and the blade feeder feeds the blades through the hardening inductor, after which the teeth are quenched with air. The feed direction of the linear feeder is then converted and the blades are tempered on the return movement.

The heat treated blades are then automatically dropped into a receiving magazine for 10-15 blades.

## TECHNICAL SPECIFICATION:

Blade length:	250 - 812mm
Blade width:	50 -155 mm
Blade thickness:	0.5 - 1.6 mm
Tooth pitch:	4 -12 TPI
Air pressure:	6 bar
Standard voltage:	400VAC $\pm$ 10% 3-phase, 50-60 Hz $\pm$ 1% directly earthed system, other voltages available upon request.
Max output power Hardening generator:	5 kW
Power consumption (at max output power):	10 kVA
Space requirement:	3 x 2 m

## ALO 491

### Induction tooth hardening and tempering for hand saws



#### CAPACITY:

Blade length:	250 - 812 mm
Blade width:	50 - 155 mm
Blade thickness:	0.5 - 1.6 mm
Tooth pitch:	4 - 12 tpi

#### THE SYSTEM COMPRISES:

Hardening generator and inductor  
Tempering generator and inductor  
Blade feeder  
Closed cooling system

- High efficiency and low energy consumption generators with air-cooled oscillator tubes.
- Automatic anode current control keep the anode current constant during the whole coil.
- Automatic flash guard protect the system against damage from flash-overs.
- Band feeder with servo drive system designed for accurate speed and guiding.
- Electromagnetic brake for optimal control of band tension.
- High reproducibility due to accurate digital/analogue settings of power, speed and work coils.
- Fast and easy start up and change over.

#### OPTIONS / ACCESSORIES:



ALO 81-60  
Set gauge





## MACHINE DESCRIPTION

### GENERATORS



*Hardening inductor with flash guard and air quench*

The Generators are enclosed in an aluminium cabinet and equipped with a separate oscillating circuit connected to the cabinet via coaxial cables. The rear of the generator cabinet can be opened for service and maintenance. The generator are air cooled, thus limiting the cooling water requirement to inductors only.

### INDUCTORS

The inductors are made of copper tubing and can be custom made for different pitches and blade gauges. They are horizontally and vertically adjustable by means of a micrometer system. The inductors are interchangeable and can easily be replaced. Changing from one inductor type to another is very simple and fast.



*Tempering inductor and air cooling*

### BLADE FEEDER

The blade feeder consists of a conveyor belt built into a welded stand of sturdy construction. The conveyor belt is driven by an AC-motor. The speed is controlled by a frequency controller in order to achieve an accurate and constant speed. The inductors are located at the rear side of the feeder. The conveyor belt feeds the blade teeth correctly positioned through the hardening inductor, after which the teeth are quenched in air or liquid quenchant and then tempered in the tempering inductor. The heat treated blades drops into a bin or similar.

### LOADING DEVICE

For Machine 490-A and 491-A a pneumatic pick and place device takes the blades from a stacking magazine and places them against a fixed position on a feeder.

### AVAILABLE MODELS:

ALO 491-A	Automatic loading
ALO 491-M	Manual loading
ALO 490-A	Without tempering, automatic loading
ALO 490-M	Without tempering, manual loading

### TECHNICAL SPECIFICATION:

Blade length:	250 - 812 mm
Blade width:	50 - 155 mm
Blade thickness:	0.5 - 1.6 mm
Tooth pitch:	4 - 12 tpi
Approx feed speed:	8 m / min
Air pressure:	6.3 bar
Voltage:	400 VAC, $\pm 5\%$ , 3-phase, 50 – 60 Hz $\pm 1\%$
Power consumption (at max output power):	20 kVA
Space requirement (l x w):	3 x 2 m

Other customer requirements may be discussed between customer and ALO.



# NORMAC SS 25

## Automatic straight saw grinding machine



### EXCLUSIVE FEATURES SS25 AUTOMATIC STRAIGHT SAW GRINDING MACHINE

- Automatic grinding cycle.
- Fully enclosed grinding chamber.
- Automatic self-compensating dressing system.
- Solid state programmable control system.
- 20 horsepower spindle drive.
- Easy load and unload.
- Fast size changes.
- Small floor space requirement.
- Grinds conventional and fast-cut tooth profiles.

[www.normac.com](http://www.normac.com)



**NORMAC, Inc.** / Precision Grinding Machines



## MACHINE DESCRIPTION

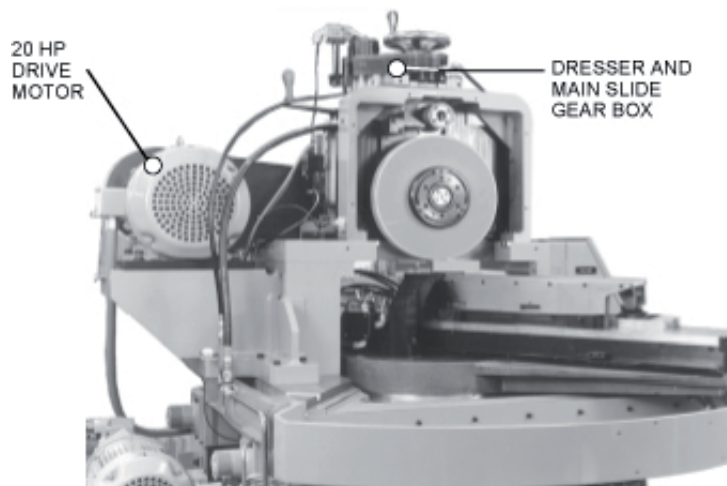
The SS25 uses a 45 mm (1-3/4") wide grinding wheel and a plunge grinding method.

The grinding wheel is dressed with the tooth form, with every second tooth left out.

The grinding wheel plunges down, grinding alternate teeth in the first 50 mm (2") of the blade, and then returns up and clear of the blade. The worktable then advances 50 mm (2") and the grinding stroke is repeated. This process is repeated the number of times required for the saw blade length. After the entire length has been ground, the table is shifted one pitch and the entire table swivels to the opposite bevel angle.

The grinding then begins again with the table moving in 50 mm (2") increments toward the front end of the blade. The SS25 worktable assembly incorporates the blade clamping fixture and mechanism, the blade advance (indexing mechanism, the pitch shift mechanism, and a rotary table mechanism for moving the blade to the desired bevel angles. The blade advance and pitch shift motions are controlled by a single axis closed loop servo drive and linear encoder feedback with 1 micron resolution.

The SS25 employs a unique blade positioning and clamping system. For loading, a blade is pushed forward to a stop. When the clamping push-button is depressed, the blade is automatically positioned and clamped. For unloading a finished blade, the clamping mechanism opens and the blade is pushed up and back for easy removal.



### TECHNICAL SPECIFICATION:

Size Range Any pitch:	Straight, 15°, 25° or 34°
Bevel angles;	380 mm, 508 mm, 610 mm, 660 mm (15", 20", 24" or 26") long blades.
Space Requirements (W x D x H):	2 m (80") x 1,8 m (72") x 1,9 m (76") high.
Shipping Weight:	3600 kg (7,000 lbs).
Electrical Requirements:	Total connected electrical load is 19.5 KW
Coolant Requirements:	A coolant system is required but not furnished. 115 l/min (30 gal) at 100 PSI (7.0 atmospheres). Straight oil coolant is recommended
Estimated Production Rates:	380 mm blade (15") - 60 pieces per hr. 610 mm blade (24") - 40 pieces per hr. 660 mm blade (26") - 35 pieces per hr.