

Spray Pattern Lubrication System

SAGOMA 1000

with Infeed and Outfeed conveyors

and

BRUSH CLEANING MODULE



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1. GENERAL DESCRIPTION

The scope of supply for this quotation consists in the detailed design, procurement, fabrication and assembly of auxiliary elements related to the below description of material and in-house testing.

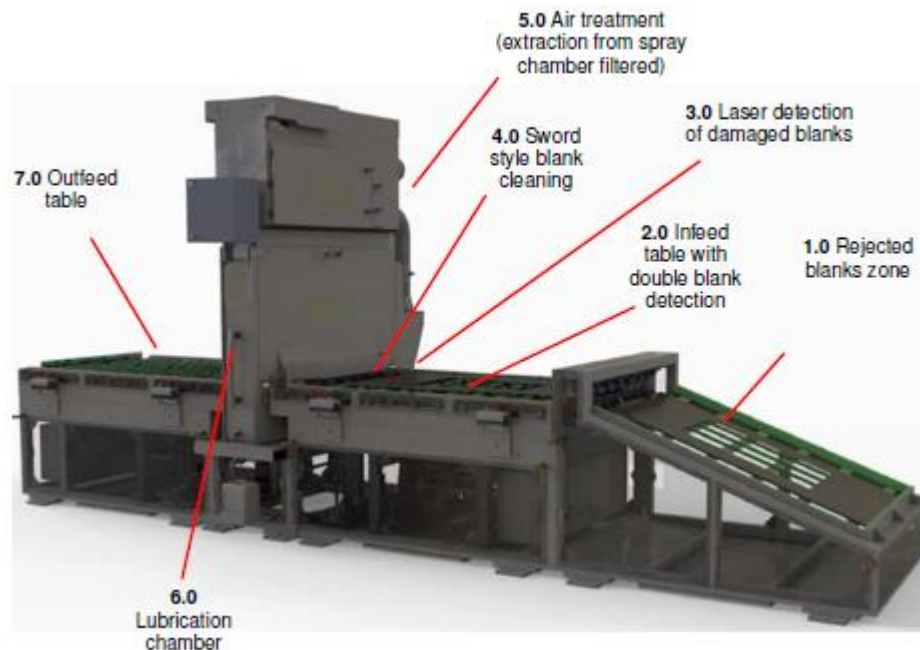
The machine is suitable for the installation in the FOL-area in front of a press line. The blanks are fed by means of an infeed driven conveyor unit with centering unit and they pass through the brush cleaner and the oiler keeping the correct movement by upper crushless wheels that grip the material. This system is designed to precisely know (using an encoder on the motorization) the exact position of the lubrication area, in feed direction. When leaving the spray box, the blanks are picked up by a driven outfeed conveyor with centering table. The superior control provides the signal for the belt speed.

While the blanks are running through the spray box the upper and lower side can be sprayed with most of kind of oil media with 8 programmable quantities on the same blank and minimum pattern of **50x50 mm**. No special programming knowledge is required to draw up the spray programs from the panel thanks to also the shape and size automatic teaching of the blanks. The special design of the suction system will prevent contaminated air from escaping through infeed and outfeed slot and the oil collected returns back into the oil reservoir. The special design of the suction system also prevents the spray oil mist drops accumulation on the inside walls of the spray chamber from dropping on the passing blanks. For easy maintenance, the upper and bottom spray heads are extractable from the side of the machine.

1.1. TECHNICAL DATA

Blank thickness	min 0,45 max 1,2 mm
Blank length Front to Back	min. 400 max. 1500 mm
Blank width Left to Right	min. 435 max. 750 mm
Shape of blanks	--
Material of blanks	Uncoated, Zinc-coated, Steel, Aluminum, Stainless Steel
Conveyors speed	Adjustable from 25 to 50 m/min
Standard Passing height	See Preliminary lay out
Total installed power approx.	15 kW
Electric equipment	380V, 50 Hz, 3 phases, N,PE (multiple voltages are available)
Valve voltage	24 V DC
Control voltage	24 V DC
Oiler air consumption	3000 NI/min minimum 5 bar
Teleservice	yes
Labelling	Standard Dietronic
Numbers of oils	2
Oil 1 details	Neat oil
Oil 2 details	Basic water product
Cleaning	DIWash

2. MAIN HOUSING



Frame

The machine's substructure is a solid and waterproof welded steel construction, standard color RAL 2004.

Electrical control

The control cabinet can be placed on the structure of the machine or separately with standard length of cable 20 m included. The machine operating panel is placed on the machine or separately according to the line layout.

The control is equipped by Siemens CPU 1516 which is placed in the control cabinet.

Spray Visualization is programmed in WIN CC-Flexibel in English or German language.

For easy programming of the spray areas, the blank shape is detected and shown on the screen. There is no need for sketch uploading.

The HMI is a 19" Siemens TP1900 client touch screen.

The PLC-I/O's are Siemens ET 200S. The Safety circuit is done by Siemens safety relays.

All the motor are Motovario.

Spray synchronization

For blank application the machine uses the same sensor of the automatic teaching of the shape and size of the blanks detect the front of the material and by an encoder on the transport conveyor inside the lubrication system the nozzles are activated according to the program selected.

Blank Transportation with centering units

The blanks can be placed in certain position of the infeed conveyor and the centering unit guarantee the movement always from the same position. Smart Conveyor ensures 100% of sheet movement without slitting by motorized pinch rolls transport inside the lubrication system.

On the infeed conveyor is added the double blank sensor.

The outfeed conveyor receives the blanks oiled and transport it until the centering unit to pick up it always in the same position. Special “V” design of wheels in two half parts (for easy replacement) minimize the contact with the blanks in the bottom side.

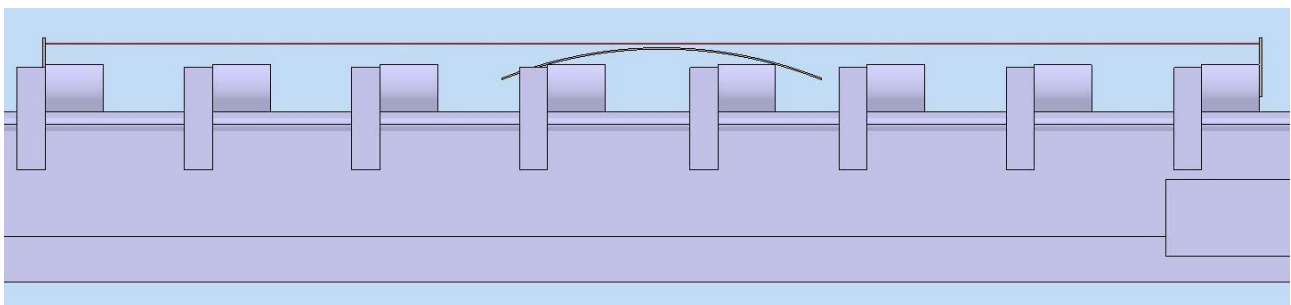
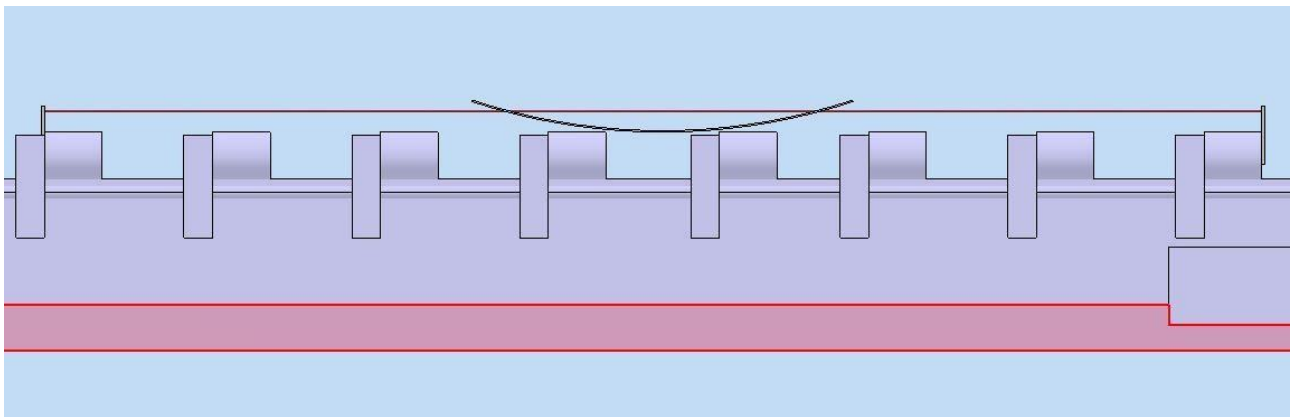
This system is designed to precisely know (using an encoder on the motorization) the exact size of the lubrication area, in flow direction.

Rejected blanks zone

On the end of infeed conveyor there is a tilt conveyor to receive the rejection of double blanks detect from the sensor on the infeed conveyor

Laser detection

On the infeed conveyor there will be a laser sensor to detect the edge bended material (tolerance + 3 mm)



3. SNOW BRUSHES CLEANER

On the entrance of the lubrication system there will be place a double brushes for the blank cleaning

The linear brush wipes transversally across the product surface. Particles will cling to the micro-moistened filaments which will thus remove them effectively and transport them to the suction connection.

These results are possible thanks to:

- mechanical brush effect by the linear brush
- capillary adhesive forces between micro- moistened filament and particle
- reduction of electrostatic charges brought about by the antistatic liquid.

Linear Brushes

Two Sword Brushes wipe transversally across the material surfaces. The micro-moistened brush filaments remove even the most minute particles from the subject surface. The integrated pressure buffer provides for a constant wiping pressure and a premium cleaning result. The adjustment frame VE 25. allows a vertical adjustment of the Sword Brushes e.g. to adapt them to the material's thickness or to remove them from the material surface for maintenance purposes.

Pneumatic Height Adjustment

The cleaning module may be mounted on an adjustment frame to integrate a height adjustment:

1. Manual adjustment via crank (HVM)
2. Electrical adjustment via actuator (HVE). An automatic thickness adjustment is possible if HVE is linked to the overall control
3. Pneumatic adjustment via pneumatic cylinder (HVP).

Quick removal of module from material surface, e.g. in crash situations. The mechanical and the electrical height adjustment may be combined with the pneumatic adjustment.

The brushes are supported by pneumatic pistons for fast opening.

A safety device before on the entrance of the machine is connected to the signal to open fast the brushes. The upper brush can be open for 50 mm and the lower for 25 mm.

Self Cleaning of the Brushes

At the deviation, the linear brushes widen, so that particles may be detached more easily. Rotating steel elements (racks) remove the particles mechanically from the filaments. Additionally, there are com-pressed air driven nozzles, that blow into the brush filaments to cancel the capillary adhesive forces be-tween the particles and the filaments. The suction system will absorb the particles.

Benefit: Improved self-cleaning and automatic cleaning process

DTBR Cleaner 300 Cleaning Liquid Applicator

The DTBR Cleaner 300 is an antistatic cleaning agent. The brush filaments are micro-moistened with DTBR Cleaner 300, this providing an effective removal of even very fine dust particles

1. Micro-moistened brush filament with DTBR Cleaner 300
2. DTBR Cleaner 300 sprayer SQL 51.
3. Distributor block VTB 100.
4. DTBR Cleaner 300, regulator and filter unit IR 100. DTBR Cleaner 300, filter, dosage and display of inner pressure of pressure buffer
5. DTBR Cleaner 300, central supply pump, e.g. IS 102

The DTBR Cleaner 300, liquid is supplied by a pneumatic from on frame tank of 20 lt tank with electric filling level control as well as pump and connections for refilling the reservoir.

Automatic refilling unit for the DTBR Cleaner 300, tank from barrel or IBC Container 1000 lt.

The unit is provided with level sensor switch displayed on the HMI of the machine.

Calibrated nozzles control the amount of liquid applied on the single brush.

The consumption of the DTBR Cleaner 300, is estimate in about 2L for hour.

Extraction System Control

The brushes are connected to an extraction system for the collection of the particular removed from the material.

4. SPRAY SECTORIAL OILER

The machine is created to apply forming lubricant onto blanks of uncoated or zink-coated steel as well as aluminum blanks and stainless steel. While the blanks are running through the spray box, the upper and lower sides of the blank can be sprayed most of kind of oil media as per a programmed spray pattern.

Lubrication System Specification	
Number of spray nozzles	1 nozzle every 50 mm (for example a machine of 1000 mm size has 20 nozzles on the top and 20 nozzles on the bottom)
Couple of spray heads	Upper side and Bottom side
Smallest single spray grid	50 x 50 mm
Spray oil application	0.5 – 5 g/m ² on each side
Number of freely programmable intensities upper and lower sides [g/m²]	8 programs, at the same time
Spray oil reservoir for the first oil	40 lt tank integrated
Spray oil reservoir for the second oil with automatic mixer unit	40 lt tank integrated
Spray oil reservoir for the cleaning product	40 lt tank integrated
Waste oil reservoir	20 lt tank, integrated
Spray nozzles bar heating	Included - upper/lower side max 60° C
Spray oil filter	Included 10 µm, single cartridge filter
High efficiency suction filters	Included (number 1) – 0.35 kW each; 2500 m ³ /h with analogic pressure gauge
Extraction of the spray head	from the side of the machine
Internal cleaning wiper	Included
Autolearning of the blank shape and visualization on the operator panel	Included
Manual nozzles check	Included
Blank transport	On driven rollers
Infeed and Outfeed conveyors	Motorized
Centering unit Infeed Conveyor	Included
Centering unit Outfeed Conveyor	Included
Double blank sensor on the Infeed conveyor	Included

The machine is supplied with the complete mechanical, electrical, hydraulic and pneumatic equipment, however, without spraying agent.

Blank Teaching System

The machine is provided with a system of autolearning of the blank shape and visualization on the operator panel. There is a sensor for each nozzle that detects the front end of the blank and recognizes the sheet shape to facilitate the operator with the choice of the areas that need lubrication. The oiling is carried out either on the full surface or on individual streak segments or patterns. No special programming knowledge is required to draw up the spray programs on a touch panel. The spraying process to be released for every first, second or X- blank is programmable.

After the first blank moves through the oiler automatically we display the size and the shape of the blank/s.

Oil Mist Extraction System

An extraction suction system is mounted on the top of the machine or on the side. Air is extracted from the machine housing by means of a fan. This will prevent contaminated air from escaping through infeed and outfeed slots. Oil-mist separators clean the extracted air and return the oil back into the reservoir.

The inside of the spray box is designed to prevent spray-oil mist drops depositing on the inside walls of the spray box from dropping onto the passing blank.

A high efficiency filter (the combination of polyester fabric and Teflon), also allows the removal of smokes and vapors, providing filtration efficiencies reaching the remarkable value of 99,9%, IFA-BGIA Certification. All models are equipped with a differential pressure gauge to monitor the filter life.

Internal Cleaning Wiper

Automatic device to clean the inside walls of the spray chamber. The wiper is activated from the operator panel and moves along the edge of the walls preventing the accumulation of oil drops.

Oil Quantity Programmability and Spray Intensity

The usual intensity application of most of kind of oil in a approx. quantity of $< 0.5 - 5\text{g/m}^2$.

This variation is connected to the electronic signal (PWM) that allows, for each single

50x50 mm area, to apply up to **8 different quantities** on the same blank sheet.

The quantity in g/m^2 has to be determined according to the type of lubricant by a calibration of the machine; from there, an algorithm is created to calculate the exact values.

Spray Head Composition

The inside of the spray box is designed to prevent spray-oil mist drops depositing on the inside walls of the spray box from dropping onto the passing blank. Inside the spray box there are an upper and a lower extractable and isolated spray head that contains the Modular Manifolds. The extraction of the spray heads is from the front of the machine and the bottom one is also routable for very easy maintenance.



The Modular Manifold is Patent Module with 4 nozzles where each nozzle covers 50 mm, with a perfect quality of spray application and minimum overspray, due to the minimum distance from the blank (just 50 mm). Instead of a conventional spray machine that uses 100 or 125 mm distance, there is a substantial reduction of spray-oil mist area to control. Each Manifold covers 200 mm surface so the number of manifold depends of the size of the machine.

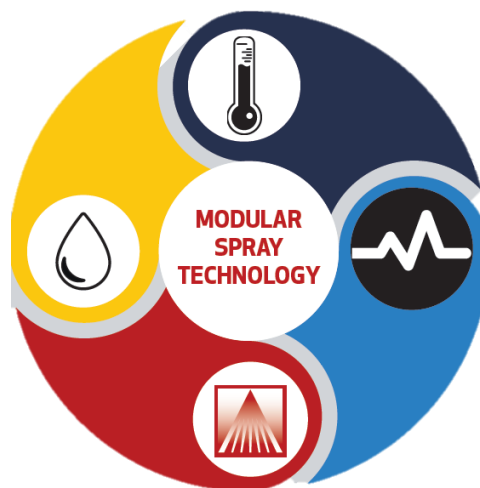
For example:

A machine of 1000 mm size has 10 Modular Manifolds equipped with 4 nozzles each for a total of 40 nozzles (5 manifolds with 20 nozzles upper and 5 manifolds with 20 nozzles lower side).

The Modular manifold is also equipped with HFV (High frequency Valve) for each nozzle to control the intensity for each nozzle, Heating system to control the temperature and the viscosity of the oil media and sensors to detect, in TEST MODE any clogging of the flow through the nozzles.

The “Patent Registered” functions of the Dietronic Manifold

- **DT SENSOR® CONTROL** Test function to ensure the performance of each nozzle
- **DT AIR® CONTROL** Air spray control valve integrated in each manifold with electronic adjustment
- **DT TEMP® CONTROL** Heating System integrated with temperature control for each manifold
- **DT HFV® CONTROL** High Frequency valves to control the volume of lubricant for the single nozzle



Air Pressure Control

The air pressure is completely automatic, no manual action is needed, adjustable from the operator panel.

Oil Media Reservoirs and Oil Media Pressure Control

The machine, for every oil used, is equipped with 40 lt oil tank with heating system (optional) and by a pneumatic pump an accumulator of 2 liters is automatically refilled and maintained at constant fix level. With air pressure on this accumulator automatically controlled from the HMI is possible to set a very constant oil pressure to the spray heads.

The oil recovered from the machine and suction system goes to the Recovery Tank controlled by a maximum level switch to avoid the overflow.

Option:

Automatic refilling unit for the Oil media tank from 200 lt **(Optional, quotation on request)**

Mixer for water basic product (Included in the oil tank)

In case of basic water product, the machine can be equipped with and additional reservoir of 40 lt. for the concentrate and automatic system to prepare the mixing according to the % required settled on the panel of the machine.

The unit must be connected to a water (demi-water preferred) line of the customer with maximum pressure of 2 bar.

In this case the machine is provided automatically with Cleaning Automatic Function.

Option:

Automatic refilling unit for the Oil media tank from 200 lt **(Optional, quotation on request)**

Oil Media Reservoirs and Oil Media Pressure Control (cleaning product)

The machine, for every oil used, is equipped with 40 lt oil tank and by a pneumatic pump an accumulator of 2 liters is automatically refilled and maintained at constant fix level. With air pressure on this accumulator automatically controlled from the HMI is possible to set a very constant oil pressure to the spray heads.

Option:

Automatic refilling unit for the Oil media tank from 200 lt **(Optional, quotation on request)**

5. GENERAL SPECIFICATIONS INCLUDED IN THE QUOTE

Certification:	QUASI MACHINE 2006/42/CE Machine Directive
Labelling:	DIETRONIC Standard
Electrical schemes and drawings:	PDF
Notes:	The software will be provided with comments only in English language. Until warranty expiration it will be provided only in readable version. Intellectual proprieties key-blocks of the program will be protected under password.
Cables Standard Length	Cable length between EC oiler and cleaner to the HMI 20 m

Electrical BOM Part List	
PLC	Siemens 1500 series, Point I/O
HMI	Siemens Comfort Panel 19"
DC Power Supply	Cabur
Cabinet Carpentry	Rittal
Protection	Siemens/Pilz
Plugs	Harting
Sensors	Ifm / Electrotech / Turck
Encoder	Leine Linde
Motor	Motovario
Armor block I/O	Murr
Pneumatic BOM Part List	SMC
Oil devices BOM Part List	Dietronic/Omal/Debem/Ufi Filter