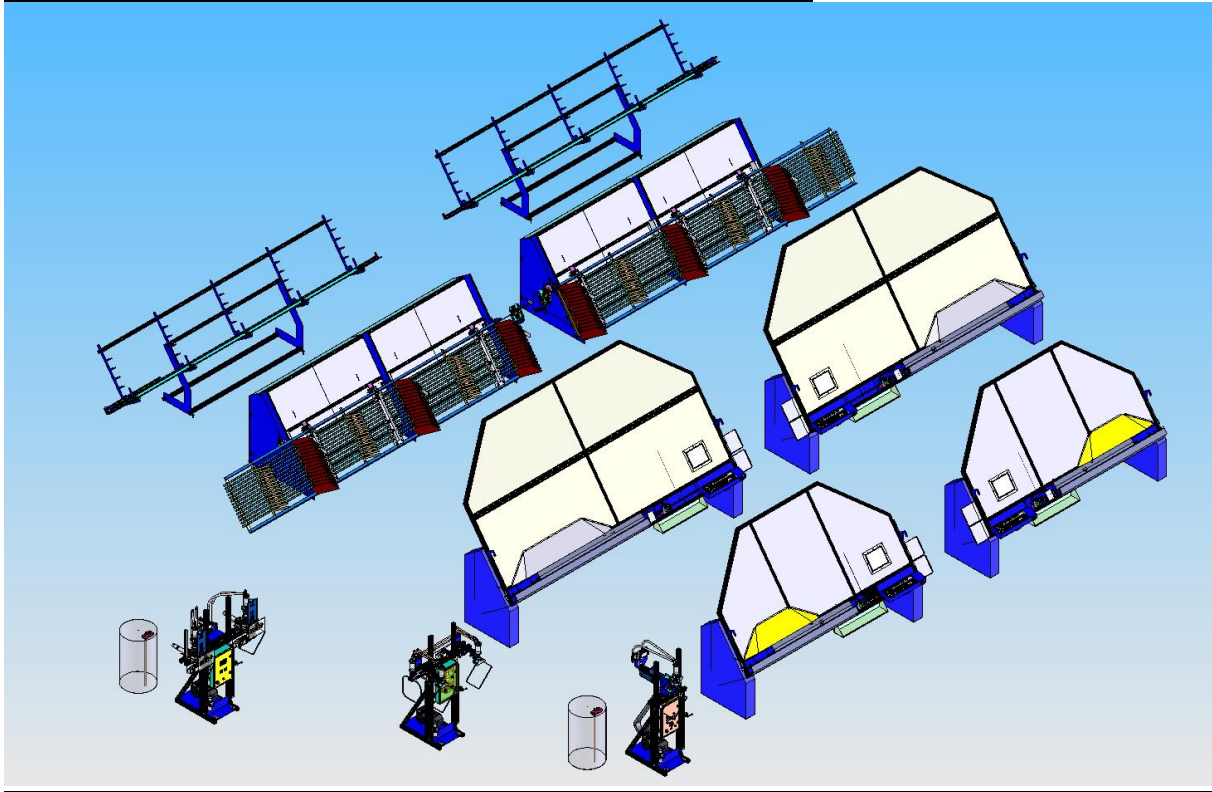


Introduction to Rjukan Metal machinery



Rjukan Metall is a family company established by Aage Dahl in 1945.

We have been producing bending machines for more than 20 years, and have 400 machine groups spread all over the world.

Our main market is Europe and the USA, but we also have machines in Africa, South America, Canada, India, China, Korea and Russia.

Product

Spacer frame production machinery for the double glazing industry, hereunder spacer bending machines magazines and desiccant-fillers.

Our machines are known for their simplicity and stability.

Some of the first machines we made, more than 20 years ago are still turning out frames.

Service

It is a long way from Norway to most of our customers.

That is why we believe it is important to have an uncomplicated solution.

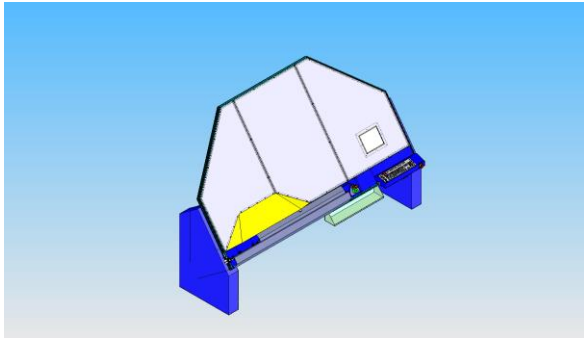
Most services on our machines are done locally, by local technicians with support from Rjukan. All commercial parts have the original marking from the supplier, enabling the customer to source most parts locally.

R&D

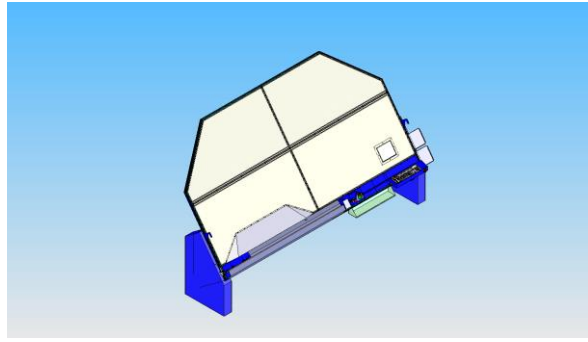
We spend yearly approximately 10% of the turnover on R&D

Most of it is customer initiated.

Bending machines:



MB840 Table length 3750mm



MB850 Table length 5000mm

There are more than 400 bending-machines from Rjukan spread around the world..

The MB840 and MB850 is our new model for high production.

A 12mm frames 1000x1000 four bent corners can be produced in less than 16 seconds.

The improvements are:

1 New drives:

3 times longer lifetime.

Feed accuracy $< \pm 0.1\text{mm}$

Better acceleration and retardation curves.

Stronger.

2 Interactive faultfinding and repair.

The program is reporting its activity to a line on the screen.

Ex: **Saw trans is activated. Waiting for "saw is out" sensor.**

If there is an error in the system (mechanical, sensor, valve, wire) this message will be on the screen until the sensor signal is achieved.

The technician can at this point activate a help screen, giving him suggestions on errors and solutions. (Under development)

3 On line support

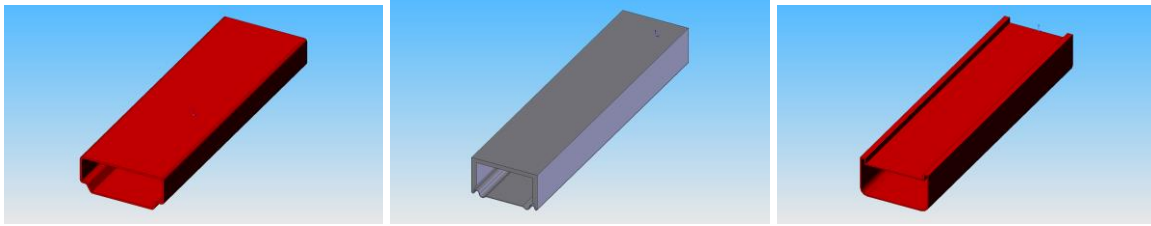
The machine has the facility for RMMP to go on line with it from Rjukan.

4 The wiring has been reduced to a minimum.

5 The valves are labelled and marked, reducing the need for technicians to use the wiring diagrams.

Output (8h) is from 1000 to 1500 units dependent of profile change and frame size.

Production direction can be Right to Left or Left to Right.



Profiles:

Aluminium, Steel, TGI, Thermix, Stainless

With a height of 6.5mm \pm 0.2mm and the normal form can be produced on the standard setup of the machine with the standard tools.

The frames can be rectangular models or curves (needs a curving tool)

TGI

The bending head has been specially designed to compensate for bending of softer profiles like TGI

Thermix

The profile need a heating unit.

The frames can be rectangular models or curves (needs a curving tool)

Stainless with out wings (Cromatec)

Stainless without wings can be bent without any special tools.

Stainless with wings (Cromatec + and Nierotec)

The profile will need special bending plates (radius increased fro $\text{Ø}6$ to $\text{Ø}12$).

Be aware of the automatic butyl machines, it should take “round corners”.

Each profile dimensions needs separate supports.

Capability

All bending machines go through a capability test before shipment.

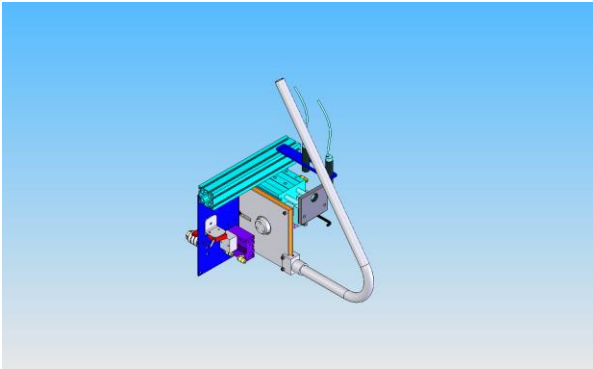
We produce 50 single lengths of 500mm and 50 frames of 500 x500mm

Each side is measured in 1/100mm in a special jig.

Capability test	Side 1	Side2	Side 3	Side4	Single
Tolerance +/-	0.1950	0.2750	0.2400	0.1350	0.0750
Tolerance down	-0.1891	-0.2796	-0.2543	-0.1243	-0.0691
Tolerance up	0.2009	0.2704	0.2257	0.1457	0.0809
Lowest	499.7800	499.7100	499.7800	499.8800	499.9800
Highest	500.1700	500.2600	500.2600	500.1500	500.1300
Average	499.9691	499.9896	500.0343	500.0043	500.0491
Capability +/-mm	3.2913	2.3853	2.7332	4.9959	7.4800
Sigma	0.1013	0.1397	0.1220	0.0667	0.0446

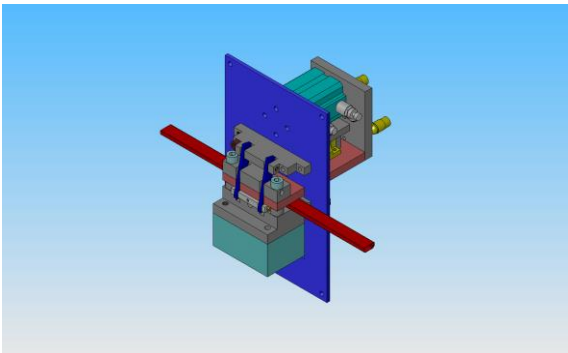
The minimum acceptable capability value is 1.67

Additional tools



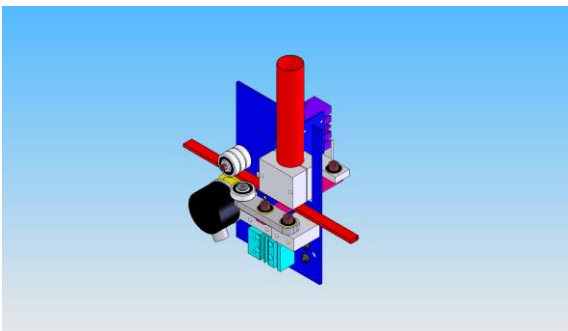
Cutting:

Cutting can be done with one motor and a variable speed. (No activity from operator)
We have blades that work with Aluminium and Stainless.
Alternatively the machine can be setup with up to 3 different saws.



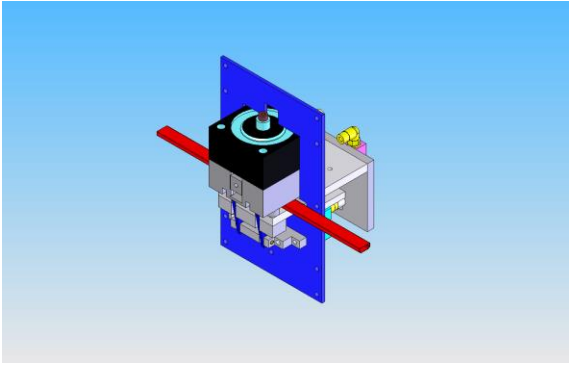
Gas hole:

The gas hole can be punched in Aluminium, steel, TGI and Thermix
The gas hole can be drilled in all materials



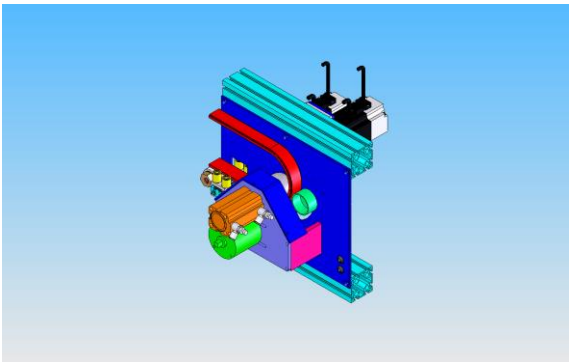
Printer

The printer will automatically be centred in the middle of the profile.
Protocols available are for: Domino, Willet, Videojet, Mathews, Tiara and Leiblinger.



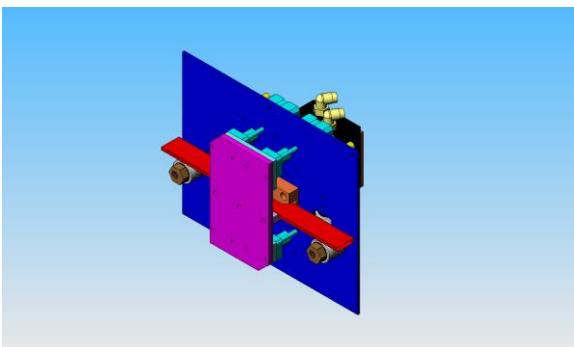
Georgian punch

The punch is suitable for aluminium and steel.
It will punch the holes for the anchor.



Curve tool

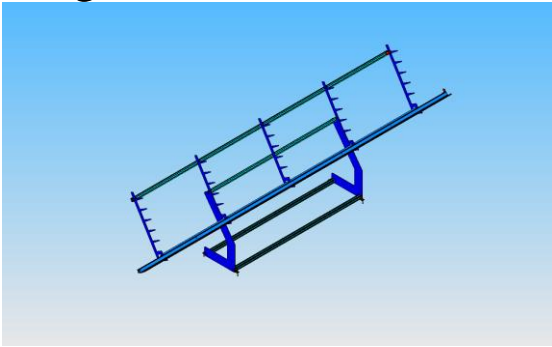
The curve tool is needed if the frame has a side that is to be curved.
The tool automatically adjusts to the different profiles sizes.
The standard tool makes a radius down to 200mm
The additional curve tool takes the minimum radius down to 60mm.
Profile with from 6 to 20mm



DFIP

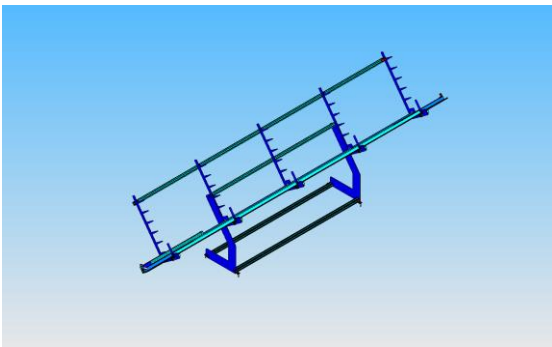
The DFIP is an internal punch unit for DF301 (2)
The unit is suitable for aluminium profiles.
The unit is built into the bending machine.

Magazines



AM00 Manual magazine

The AM00 is a manual magazine, and is suitable for production up to 600 frames/8hours.

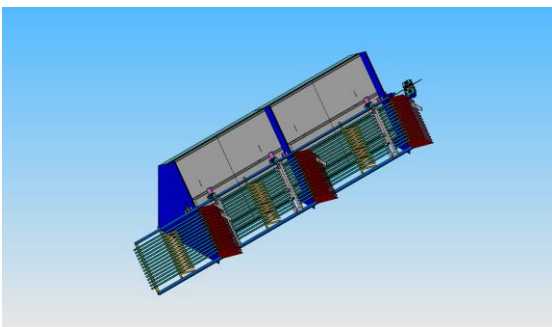


AM01 Semi automatic (12-18mm).

The AM01 is a semiautomatic magazine with one automatic slot.

It is the quickest magazine we have, and suitable for long production periods with the same profile width. The smallest profile dimension is 12mm.

The magazine is made for 6m long profiles; it can be modified to 5m



AM14 Full automatic magazine with 14 slots and one manual position.

The AM14 is a full automatic magazine.

It is suitable for high volume production when frequently switching between profile types or widths.

The magazine can be refilled during production.

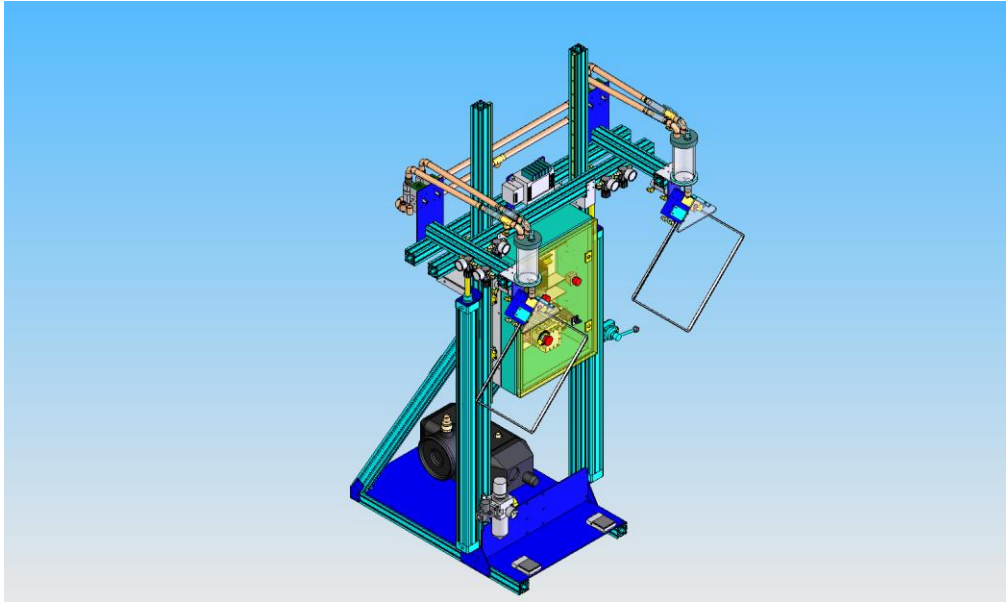
The magazine does it all.

The old profile is removed from the bending machine, the new profile is brought to the right position, and production is started without the intervention of an operator.

Desiccant fillers

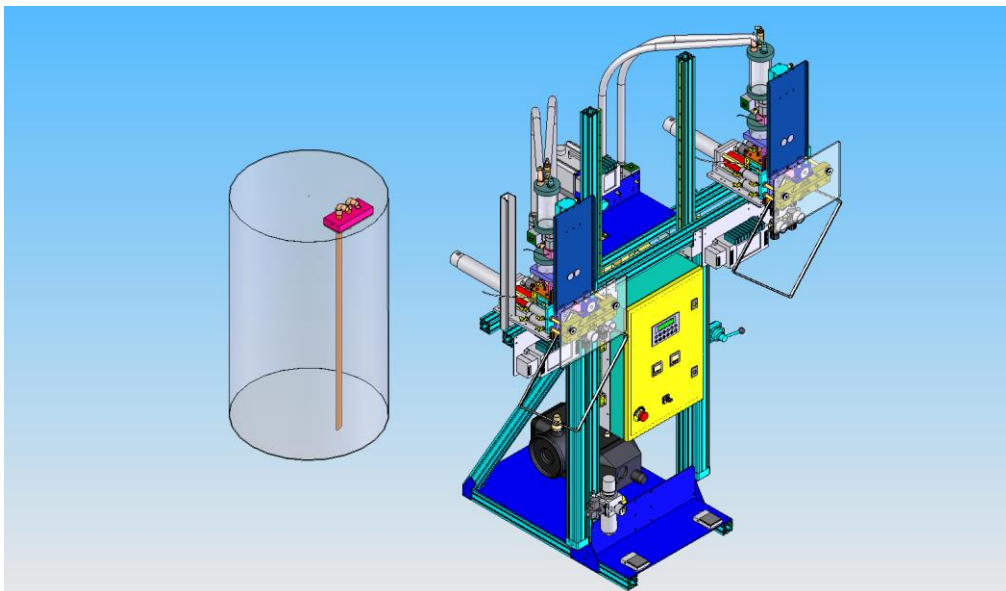
All desiccant fillers have:

- 1 Automatic transport of desiccant from drum to desiccant filling head.
- 2 A lifting unit of 1000mm
- 3 Filling under pressure unit.



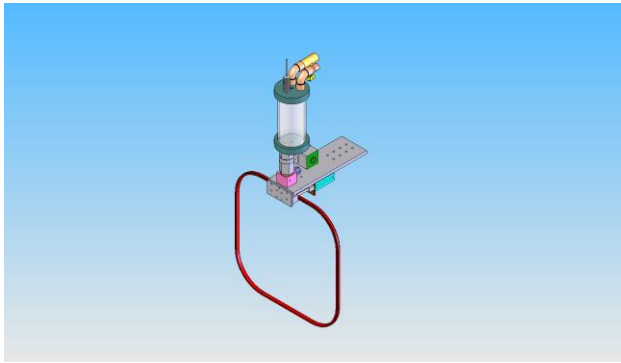
DF101 (2)

The DF101 (2) is a desiccant machine for open corner filling.
The filling is done based on time.
The corner is inserted manually.
The beads can be up to $\text{Ø } 1.5\text{mm}$.



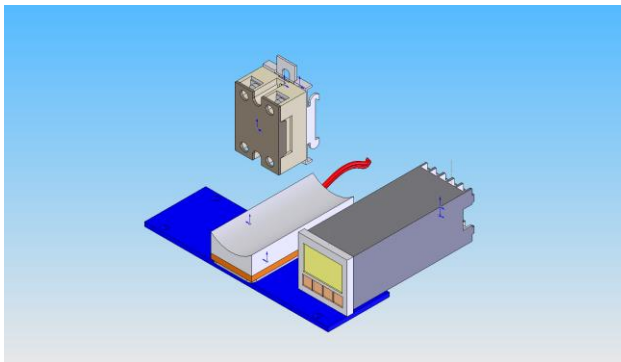
DF501 (2) Closed corner filling with butyl, inclusive drilling.
The DF501 (2) is a desiccant machine for closed frames filling.
The machine drills two holes, fills the frame and closes the holes with butyl.
The filling is based on flow, and the filling will stop when the machine does not detect a flow of desiccant. The bead should be mini beads (0.4 to 0.8mm)

Extra equipment DF



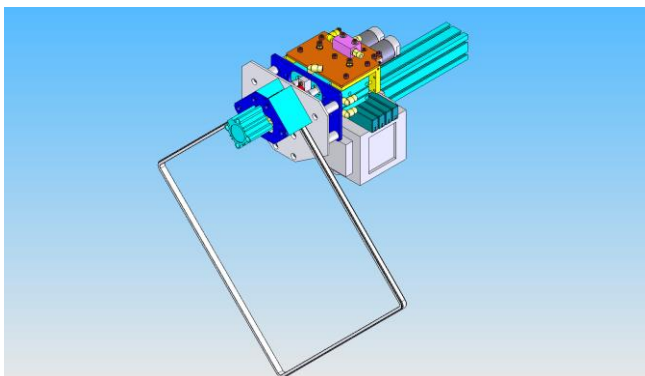
DFC

The DFC is a separate head for filling of frames with curved corners. The filling point is on a straight side, filling in both directions. Due to the curved corners the desiccant will flow through the corner. The filling is based on flow, and the filling will stop when the machine does not detect a flow of desiccant. The bead should be mini beads (0.4 to 0.8mm)



DFx01

The DFx01 is a butyl-heating unit. At a temperature of below 18 deg C the butyl is a rather slow flowing material. The heater will keep a constant butyl temperature, and lower the average cycle time by some 3 seconds. It also opens up for a wider range of butyl suppliers.



DFED

The DFED is an external drill for DF301 (2) It will drill holes in the frame for desiccant filling. The unit is suitable for all profile materials.