



**Bruno Presezzi**

# DynaPrime Casting Lines

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# 1. INTRODUCTION

## 1.1 Abbreviations

- DC/DCE                                      Dynamic Concept/Dynamic Concept Europe
- PPI    Pores Per Inch

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## 1.4 List of reference documents

## 1.5 DELIVERABLES dCE documentation

The preliminary Functional description and electrical block diagram are in separate documents.  
Below is a list of DCE documents related to this technical report:

Table 1 : Deliverable

ITEM	REF DOC
Layout 2D	A25105_0000_Operation_R00

## 2. DYNAPRIME MONO

### 2.1 SAFETY AND ENVIRONMENTAL ADVICE

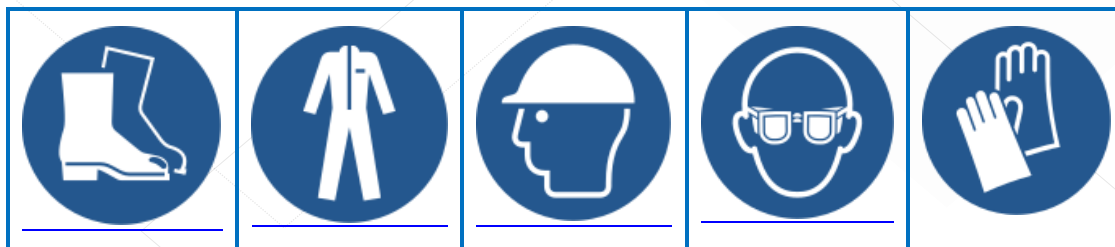


To avoid any accidents, always use the equipment with caution.

**Carefully read these safety instructions before using the system described below.**

All operators, regardless of their experience, must carefully read the equipment manual. The equipment owner is responsible for providing the necessary training to all operators to ensure the safe use of the equipment.

Wear appropriate clothing during operations of the equipment:



And all other specific safety PPE (Personal Protective Equipment) required at customer plant.

### 2.2 BEFORE USING THE EQUIPMENT

Familiarize yourself with the equipment, its functions, and its limitations. Read this installation and operation manual thoroughly before operating the equipment.


- 1- **Pay close attention to hazard, warning, and caution labels** affixed to the equipment and its accessories.
- 2- **Do not operate or use equipment if safety is compromised.** Before use, ensure all safety devices (guards, machine protections, seals, etc.) are properly installed and in good working condition. Consult the manufacturer regarding any operational anomalies affecting components or subcomponents.
- 3- **Never modify the structural components of the equipment** (e.g., by welding, drilling, bending, grinding, or cutting), as this may weaken the structure and compromise safety. Replace damaged parts rather than attempting repairs.
- 4- **Do not install additional equipment, accessories, or tanks** that increase the machine's weight beyond the limit specified on its nameplate.
- 5- **Never operate the machine** when fatigued or under the influence of alcohol or other substances.
- 6- **Inspect the equipment and its components daily** to identify and address any damage that could impact proper operation.
- 7- **Only operate the equipment** after receiving proper training.
- 8- **Do not perform manual operations** while the equipment is in motion

- 9- **Ensure all safety features are active** before performing manual operations.
- 10- **Always apply a zero-energy lockout** before performing maintenance.
- 11- **Only qualified maintenance personnel are authorized** to service the equipment
- 12- **Operating the machine** in maintenance mode is strictly **prohibited**.








**Consult Dynamic Concept before attempt of modify the equipment**

## 2.3 RISK IDENTIFICATION



### HAZARD SYMBOL

This symbol, used in the industry to indicate a danger, draws your attention to elements or operations which could be dangerous for yourself or other users of this machine. Therefore, carefully read the instructions marked with this symbol. It is also essential to carefully read all instructions and safety regulations before attempting to assemble or use this machine.

	<p><b>ELECTRICITY</b></p>	<p>Indicate potential risks associated with electrical equipment or installations that could result in shock, burns, or other injuries.</p>
	<p><b>WARNING:</b></p>	<p>Indicates that a highly dangerous situation, serious injuries or even death can occur if this situation is not prevented</p>
	<p><b>HOT SURFACE:</b></p>	<p>Indicate the location of a potential hot surface.</p>
	<p><b>SUDDEN LOUD NOISE:</b></p>	<p>Indicates that a noisy subsystem of the device may start without warning.</p>
	<p><b>PINCH POINT</b></p>	<p>Indicates where two objects come together and a body part (commonly fingers or hand can get caught).</p>
<p><b>IMPORTANT :</b></p>		<p>If instructions are not followed, damage to equipment or property may occur.</p>
<p><b>NOTE :</b></p>		<p>Provides relevant information.</p>

## 2.4 SOUND LEVEL

### 2.4.1 Burners sound level

# Pos.	Measurement position description	Average value (dBA)	Peak (dbC)
1	Horizontally 1m from the burner muffler, vertically at 1.6m (at the average ear level of the operators), behind the DYNAPRIME (See position No. 1, figure 1).	82,4	100,1
2	Horizontally 1m from the burner muffler, vertically at 1.6m (at the average ear level of the operators), on the side of the DYNAPRIME (See position No. 2, figure 1).	79,0	96,7
3	Horizontally 1m from the burner muffler, vertically at 1.6m (at the average ear level of the operators) at the front of the DYNAPRIME (See position No. 3, figure 1).	80,0	98,9

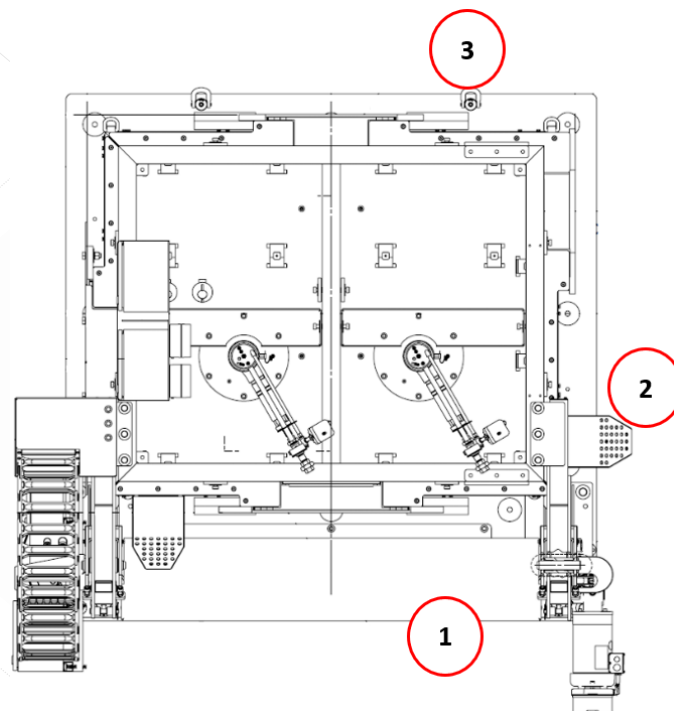


Figure 1 : Identification of the s of noise measurement on the Dynaprime

## 2.4.2 Vibrators sound level

Measurement position		Average value (dBA)	
1	Horizontally 1m from the vibrator, vertically at vibrator level	113,5	128,2
2	Horizontally 1m from the vibrator, vertically at 1.6m (at the average ear level of the operators)	110,8	124,1

### **Note:**

These values are obtained exclusively during the molten aluminum priming process within the DYNAPRIME. The priming duration must not exceed 70 seconds. It is the customer's responsibility to calculate the exposure rate per work shift for their employees, in consultation with an industrial hygienist.

## 2.4.3 MACHINE DESCRIPTION

The DYNAPRIME is a high-performance filtration system for molten aluminum in casting lines. With its patented priming technology and integrated preheating system, the DYNAPRIME is a fully integrated and automated filtration unit.

Filtration is achieved using cartridge of ceramic foam filters (CFF). Thanks to its pneumatic vibration-based ignition system, the DYNAPRIME allows the use of filter with pore densities of up to 70 PPI. The preheating of the filter and the refractory bowl is ensured by four electric heating units, which operate via convection.

The heating units are integrated into the cover. To facilitate filter replacement and refractory bowl cleaning, the cover opens and closes using electric actuators.

### **Identification:**

Model: DYNAPRIME

Serial number: A00-25105-0000-001 and A00-25105-0001-001

Machinery type: Molten aluminium filtration system



## 2.5 Instructions for operator training

**IMPORTANT:** Automatic sequence, stay away from the equipment during the movement.

### 2.5.1 Before preheating

All steps below are linked to color-areas. All areas are explained on chapter: *6.Appendix 1*

All tools mentioned are explained on chapter: *4.TOOLING*

#### Red Area (1 and 2):

**Preliminary Step:** The refractory bowl of the DYNAPRIME must be clean, without any aluminum residue from the previous pour. The bowl should be coated with a layer of boron nitride to prevent the molten aluminum from sticking to the walls. Boron nitride should not be applied to the filter seats. If the seat is covered with boron nitride, the filter gasket will not grip to the seat and the filter can float during the cast. The preheating lid must be fully open with the safety pin in place.

#### Red Area (2):

**Filter Installation:** The operator must install a ceramic filter on the seat provided inside the refractory bowl. A slight force should be applied to compress the filter's seals. If any seal is damaged, do not install the filter, as it could lead to potential leaks.

#### Red Area (1 and 2):

**Visual Inspection:** The operator must conduct a visual inspection of the lid seal to ensure there is no risk of hot air leakage during preheating. The cover gasket is made of flexible fabric with insulation wool inside. The operator can move the seal with his hand to ensure that the lid is sealed.

#### Red Area (1):

**Safety Pin Removal:** Remove the safety pin and place it in its sheath. If it is an automatic mechanism when the closing lid sequence will active, the pin will be removed automatically.

#### Red Area (1 and 2):

**Install Plugs:** Place the plugs on the inlet and outlet. The outlet plug has a hole to allow the hot air to escape. Be sure to install them so the cover seal will be on those plugs. Ensure that the draining dam is closed before closing the lid.

**Close Preheating Lid:** Using the HMI close the preheating lid. After the lid is in place, with insulating wool or seal, cover the gap between the lid and the dam. This gap is not an exit for the hot air.

### 2.5.2 Preheating

**Select Recipe:** Using the HMI, select the recipe based on the filter's density (expressed in PPI – Pores Per Inch). The START button can be pushed to preheat the DYNAPRIME.

When the preheating value is obtained, the equipment switches to holding mode until the beginning of the cast.

**Too long holding mode:** The ceramic filter itself is durable and resistant to damage. However, the vermiculite gasket surrounding it can weaken over time. Prolonged holding periods expose the gasket to deterioration, which compromises the seal's integrity. In such cases, there is a risk of the gasket detaching, causing the filter to lose its seal and potentially float on the surface of the molten metal.

### 2.5.3 Before casting

Prior to send metal in the troughs, the operator needs to do some tasks.

**Stop the preheating:** Using the HMI, press the **STOP** button to interrupt the preheating process.

**Red Area (1 and 2):**

**Remove the plug:** Remove the plugs from both the inlet and outlet to allow the metal to flow through the equipment.

At this point, the equipment is ready for the filtration of aluminum. The priming sequence is fully automated. During the casting process, no human intervention is required.

### 2.5.4 Priming

The priming sequence should be initiated only when the metal in the filter bowl has reached a sufficient level over the filter tiles. This will avoid the filter media to get clogged by oxides and will help in avoiding the filter to "pop up" by keeping a static pressure.

If there is not direct measurement of the metal level in the filter bowl, as the reading is often located before the entry gate, the time of filling must be measured and validated so that this sufficient level is reached in the bowl.

The sufficient and appropriate level for initiating the priming is set at the lower edge of the entry underpour dam. For clarity, the priming should be initiated after the metal level has reached the underpour dam.

### 2.5.5 End of casting

#### Steps After Casting Completion:

- **Initiate the End-of-Casting Sequence:** Before performing any tasks, start the end-of-casting sequence to open the lid automatically. The drain dam will open once the lid is confirmed as "open," and the locking mechanism is engaged.

**Red Area (2):**

- **Skimming:** With a skim tool like one supplied, to help the draining of the equipment, manual skim the remaining metal inside.

**Red Area (2):**

- **Filter Breakup:** Using the dedicated tool, pierce the filter before the metal trapped inside solidifies. Ensure the hole is small enough to facilitate lifting with the same tool. The filter can remain inside the equipment for a certain period. The aluminum will help maintain the filter's integrity when removed from its seat.

**Red Area (2):**

- **Filter Removal:** Attach the dedicated tool to the filter and connect it to a lifting crane for safe removal.

#### Equipment Cleaning and Inspection:

**Red Area (1 and 2):**

- **Refractory Bowl Cleaning:** Use scrapers to remove any remaining aluminum sheets inside the bowl. A simple aluminum shovel can be used to clear debris. Ensure the seat is not damaged during scraping.

**Red Area (1 and 2):**

- **Refractory Inspection:** Inspect the cleaned bowl for any scratches or damage. If scratches are detected, contact the refractory team for necessary repairs.

**Red Area (2):**

- **Cleaning the Filtration Box Lid Area:** Clean the seal area of the box flange and lid thoroughly. Ensure no debris is left behind, as it can reduce the lifespan of the cover seals.

### 3. HANDLING AND STORAGE

#### 3.1 Storage

The DYNAPRIME assemblies must be stored in a covered area.

The storage area temperature must be at minimum -20°C and maximum 60°C.

#### 3.2 Handling

##### 3.2.1 General assembly handling

The lifting of the DYNAPRIME general assembly must be done using the spreader beam provided by Dynamic Concept.

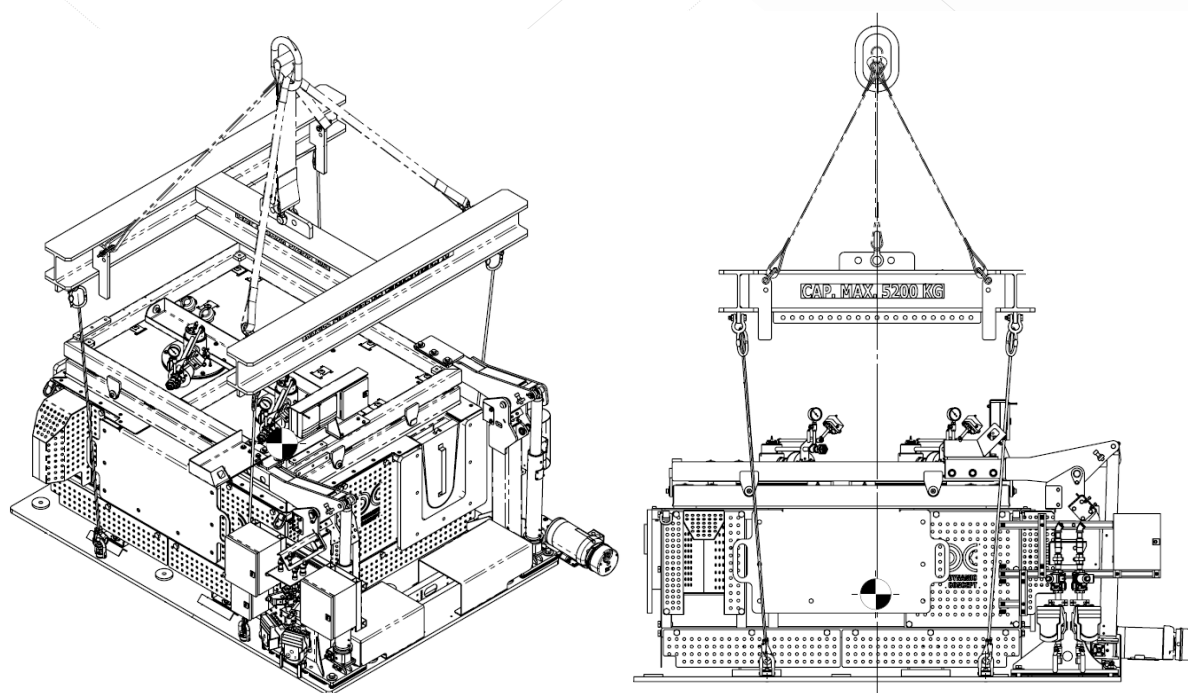
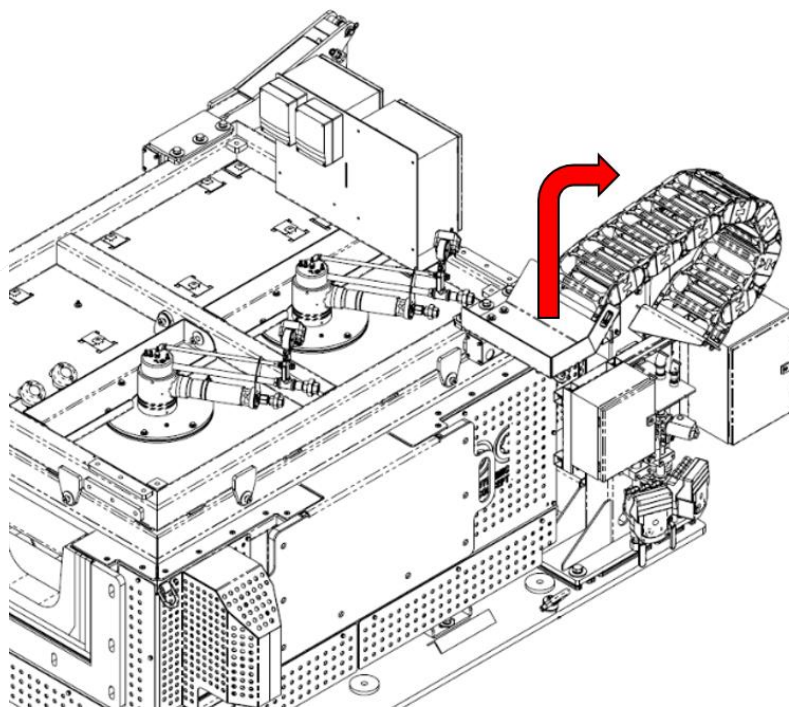
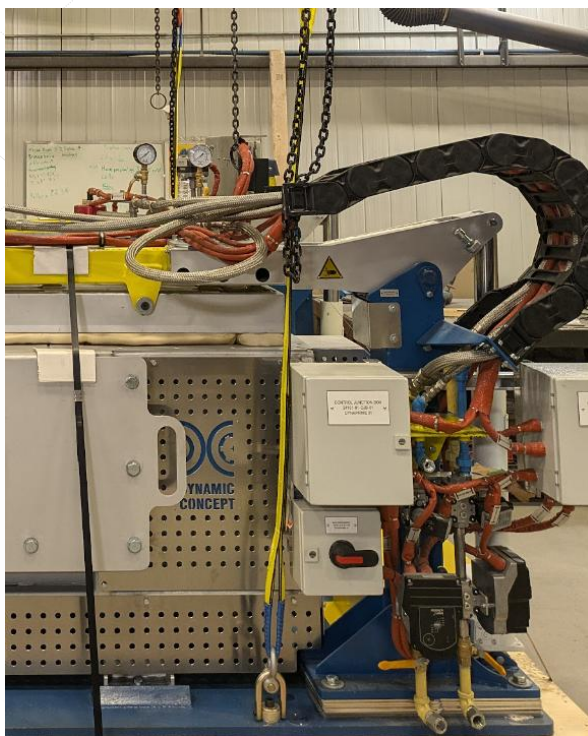


Figure 2 : Lifting assembly for the Dynaprime



*Figure 3 : View showing the bracket to be removed for lifting the Dynaprime*



*Figure 4 : View of the Dynaprime assembly without the bracket*



### 3.2.2 Filtering box handling

The lifting of the DYNAPRIME filtering box must be done using the spreader beam provided by Dynamic Concept.

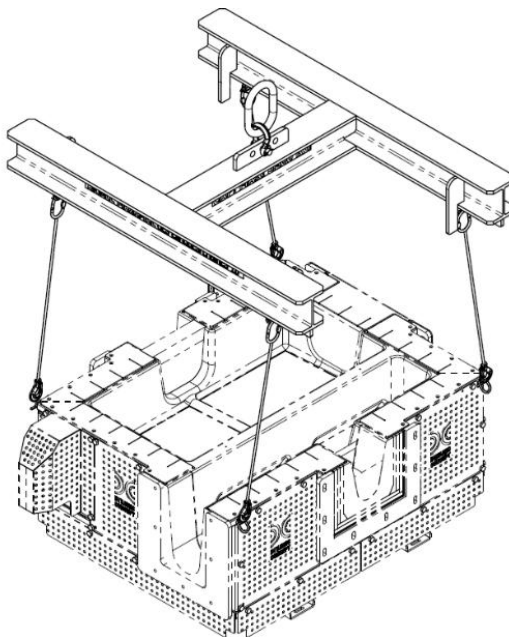


Figure 5 : Lifting assembly for the filtering box

Before lifting the filtering box, you must follow the steps below:

- 1- Remove the vibrators covers then remove the vibrators from the filtering box

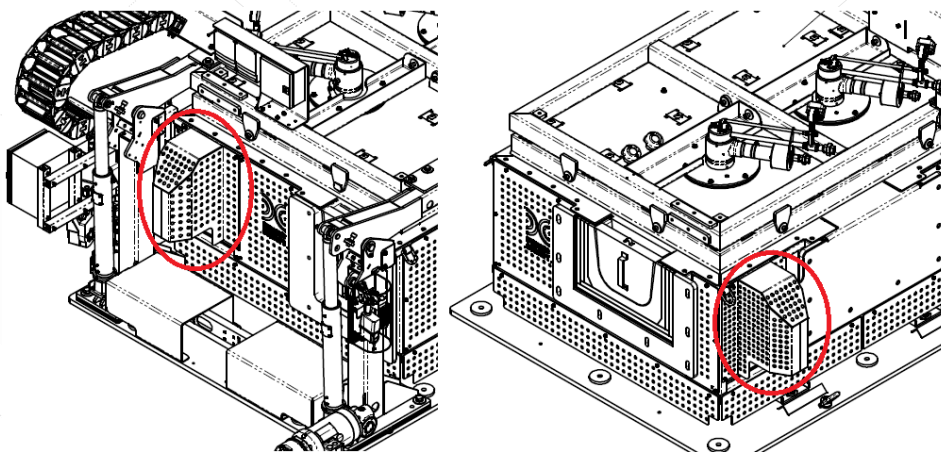
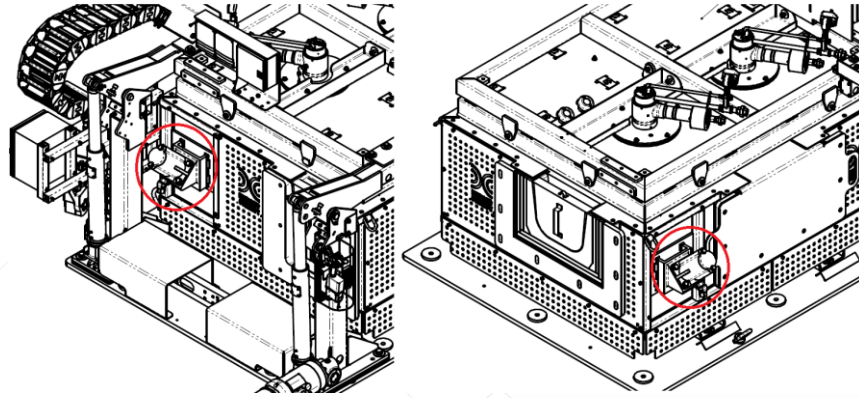
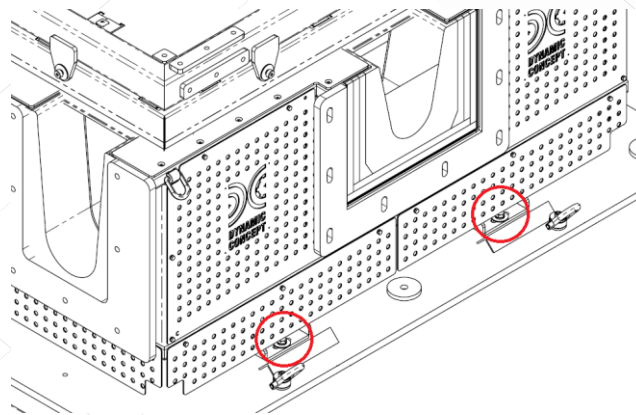


Figure 6 : View showing the covers to be removed for lifting the filtering box



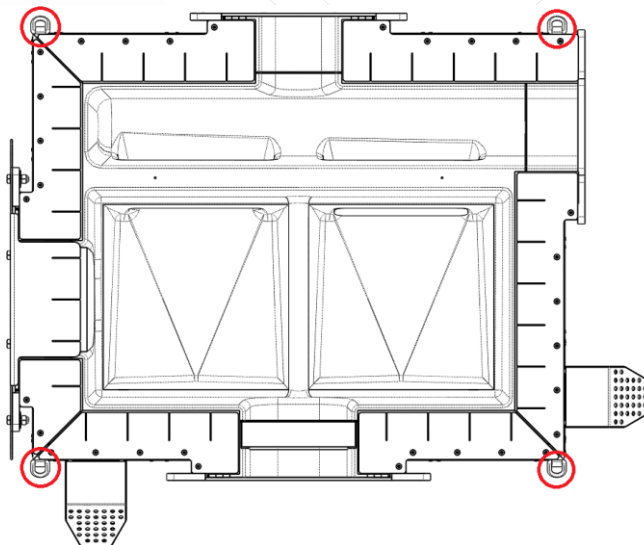
*Figure 7 : View showing the covers removed for lifting the filtering box*

- 2- Detach the filtering box from the spouts
- 3- Place the lid in the open position. Make sure the lid is locked by the locking pin
- 4- Unbolt the cross members to free the enclosure from the floor



*Figure 8 : View showing the cross members to unbolt*

- 5- Attach the lifting rings



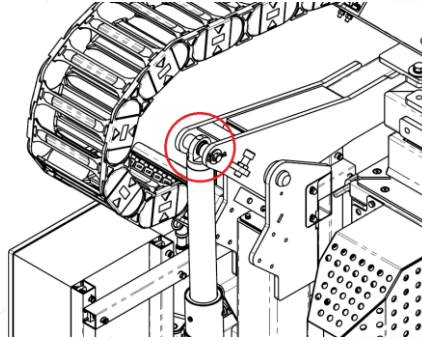
*Figure 9 : View showing the lifting point on the filtering box*

- 6- Using compliant lifting equipment, carefully lift the filtering box

### 3.2.3 Lid handling

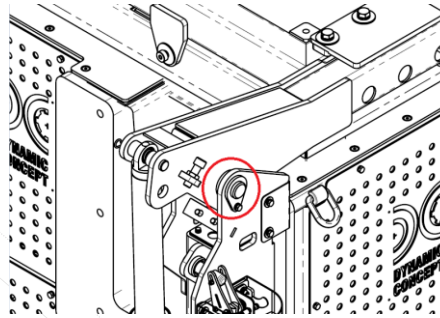
Before handling the DYNAPRIME lid:

- 1- Place the lid in the closed position
- 2- Disconnect every electrical, pneumatical et gas connection.
- 3- Detach the 2 electrical actuators from the lid.



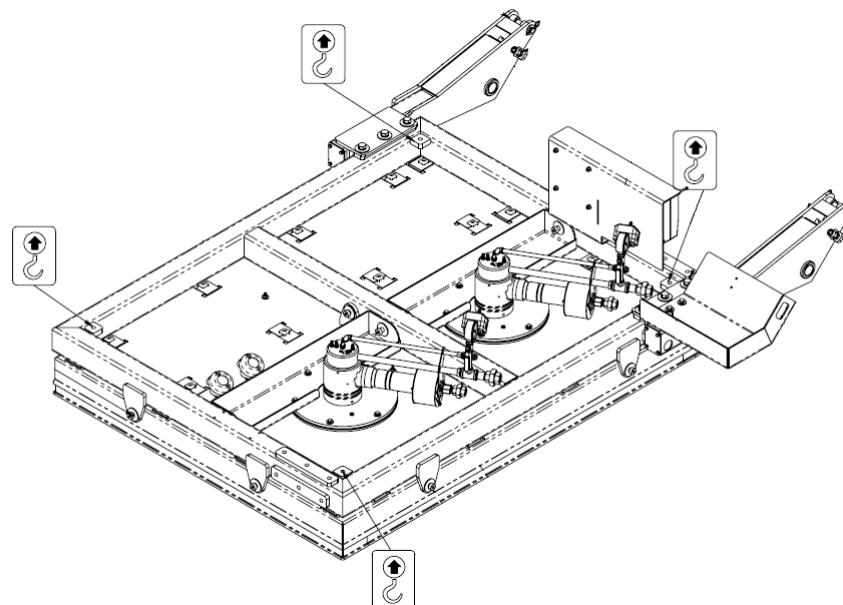
*Figure 10 : View showing the point where the actuator must be detached*

- 4- Remove the 2 pins that attach the lid to the brackets



*Figure 11 : View showing the pins to remove*

- 5- Use the lifting points as shown below to fix 4 lifting eyes of adequate capacity



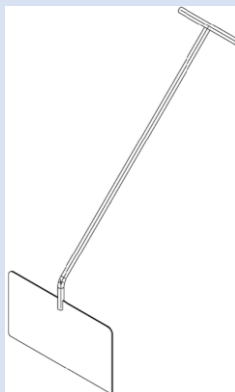
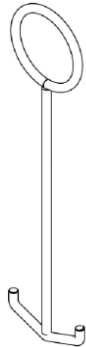


*Figure 12 : Identification of the lifting points on the lid assembly*



#### 4. TOOLING

Here is the list of the tools provided by Dynamic Concept:

Name	Ref. number	Description	Picture
<b>Entrance preheating plug</b>		Cushion allowing to block the entrance of the refractory bowl during preheating to prevent heat from escaping.	
<b>Exit preheating plug</b>		Cushion allowing to block the exit of the refractory bowl during preheating. This plug keep the lower portion of the exit open to allow exhaust air to escape the refractory bowl.	
<b>Scrapping tool</b>	1050877	Tool for scraping the refractory for cleaning.	
<b>Filter Piercing and lifting tool</b>	1050882	Tool for piercing the filters and removing them from the refractory bowl.	

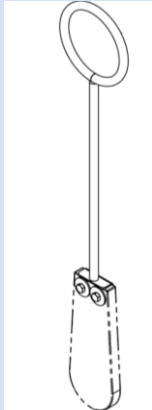
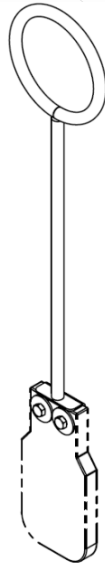
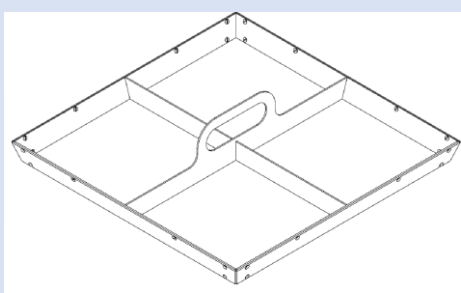



<b>Round oar</b>		Tool for skimming the liquid aluminum in the troughs towards the drainage points.	
<b>Square oar</b>		Tool for skimming the liquid aluminum in the troughs towards the drainage points.	
<b>Refractory bowl masking tool</b>		Frame to facilitate the application of boron nitride around the filter seats by masking the area that should not be coated.	



Figure 13: Plugs in place

## 5. MAINTENANCE

	<b>WARNING :</b>	Put equipment to zero-energy before maintenance.
	<b>WARNING :</b>	All equipment may be hot
	<b>WARNING :</b>	Always wear the required PPE

Maintenance mode is for trained maintenance people only.

### 5.1 Preventive maintenance

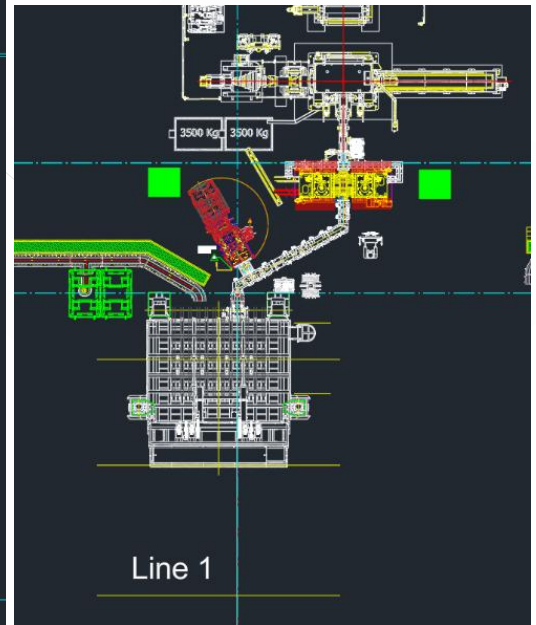
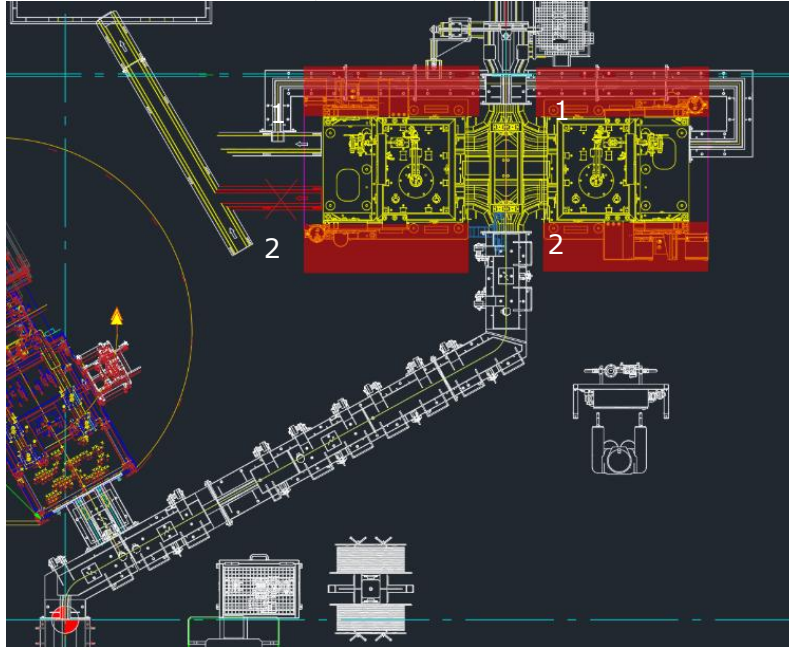
Component	Description	Frequency
Electrical actuators (nut)	Check the wear of the actuator nut (see procedure 12.1.1). Replace if needed	1 month
Electrical actuators, connecting shaft and motor	Inspect	1 month
Lid sealing pads	Check condition, check for leaks when the lid is in the closed position	1 month
Lid insulation protection plate	Check condition	1 month
Lid frame	Inspect	3 months
Lid insulation	Check condition	6 months
Lid brackets	Inspect	3 months
DYNAPRIME frame	Inspect	6 months
DYNAPRIME bolt torque	Inspect	1 month
Shock absorbers	Inspect	6 months
Vibrator steel frame weld	Inspect	6 months
Pneumatic and gas piping	Check condition and perform a leak test	6 months
Light indicator	Function test (see section 10.4.4 - 10.4.4 System Diagnostic – Miscellaneous)	1 month
Physical condition of the electrical panel	Check condition	6 months
Physical condition the wire and conduits	Check condition	1 month

## 6. APPENDIX 1

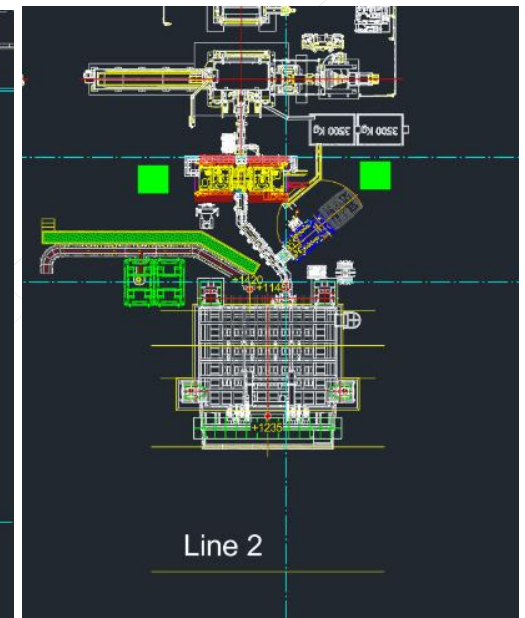
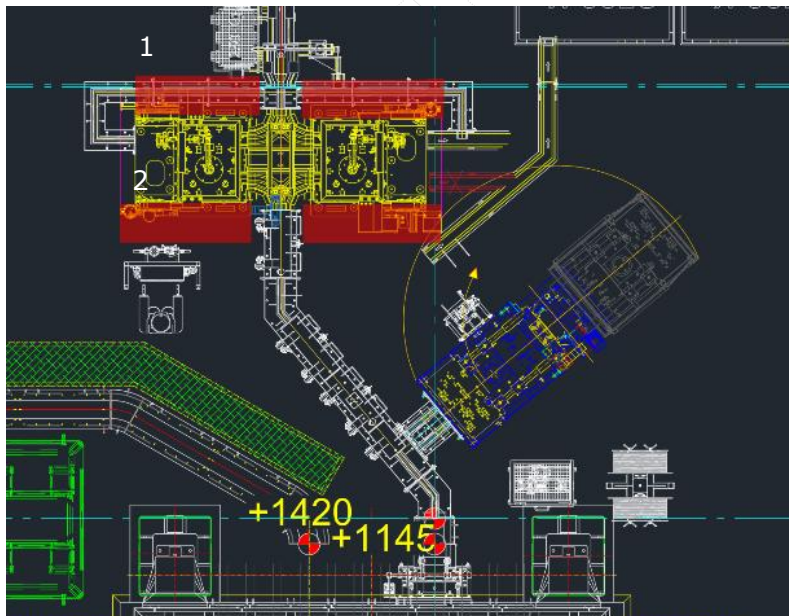
Red Area: Operator Area

Green Area: Area to store the casing during bowl change. (Proposal)

### 6.1 Caster Line 1

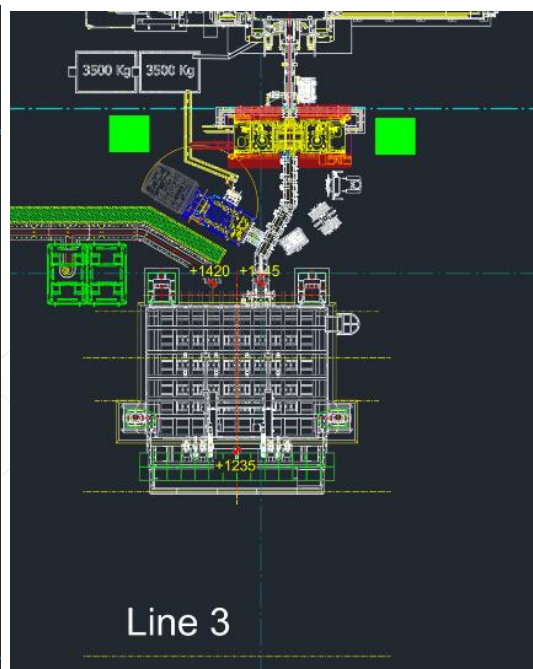
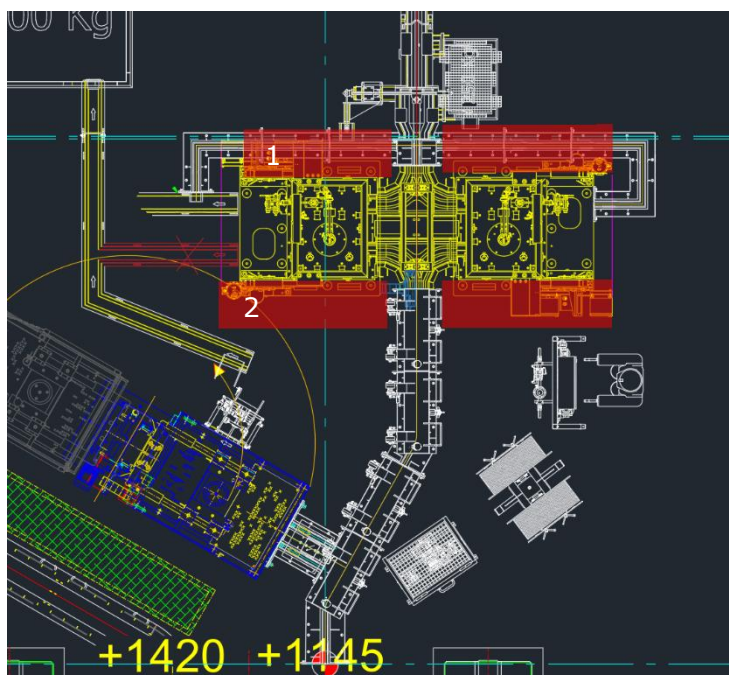


### 6.2 Caster Line 2

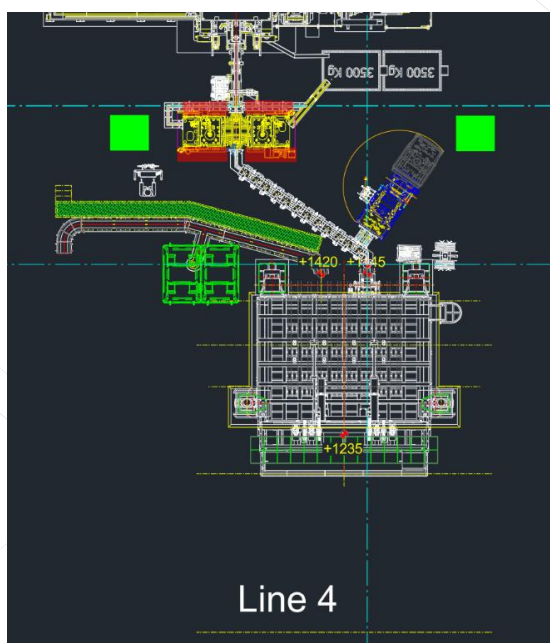
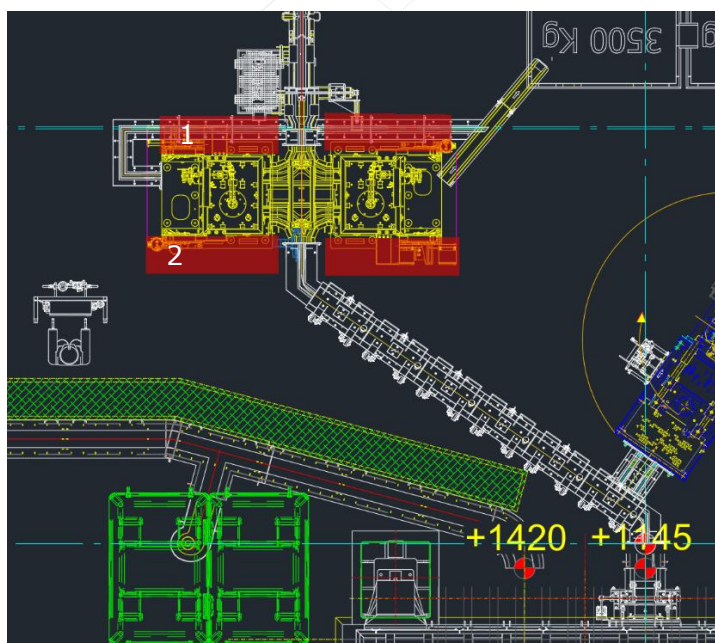




### 6.3 Caster Line 3



### 6.4 Caster Line 4





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