USER MANUAL
ZPB PAYLOAD GONDOLA

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Applicabilité aux Véhicules Aérostatiques (cocher les systèmes concernés) :

AEC	BPCL (Inclut NANO)	BPL	BPS	BSM	BSO	BLD	CAPTIF
					X		

Applicabilité aux Projets (cocher les projets concernés) :

APLS	ATT	BPSR	DICOS	FIRBL	HEMERA

ISA	MEDOR	OKL	PILOT	STR2	NOSYCA

Document géré en configuration :	par :	à compter du :

MOTS CLES

User manual, payload gondola

MODIFICATIONS

Version	Date	Objet
1	25/11/2022	Initial version based on BSO-DCI-NCU-4921-CN

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1. PURPOSE OF THIS DOCUMENT

The purpose of this document is to describe the services provided by the CNES payload gondola and their interfaces.

When written "on request", please precise in your QT of FSA document your needs and constraints on the needed services.

⚠ For new payload flying under balloon, an integration test (mechanical, electrical, … interfaces) is highly recommended in Toulouse before the campaign (as early as possible, usually 4-5 months before the campaign).

2. APPLICABLES DOCUMENTS AND REFERENCES DOCUMENTS

Référence		Titre du document
DR1	BSO-MU-0-4793-CN	User guide of CNES zero pressure balloon
DR2	BSO-MU-PASTIS-11527-CN	User Manual PASTIS
DR3	No reference	QT – Questionnaire technique FSA – Flight Support Application

3. ABBREVIATIONS

Sigle	Définition
ATA	Admission Temporaire (Temporary Admission)
CAD	Computer-Aided Design
FSA	Flight Support Application
GPS	Global Positionning System
ICU	Interface Charge Utile (Payload Interface)
IMU	Inertial Measurement Unit
IP	Internet Protocol
MCA	Module de Commande d'Axe (Axis Control Module)
MDE	Module de Distrubution d'Energie (Power Distribution Module)
PASTIS	Passerelle Technologique d'interconnexion (Interconnection Technology Gateway)
PPS	Pulse Per Second
QT	Questionnaire Technique
TC	TeleCommand
TM	TeleMetry
UDP	User Datagram Protocol
ZPB	Zero Pressure Balloon (= BSO / Ballon Stratosphérique Ouvert)

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5. GENERAL PRESENTATION OF THE PAYLOAD GONDOLA

5.1. GONDOLAS

The gondolas are built based on a bar-sphere assembly.

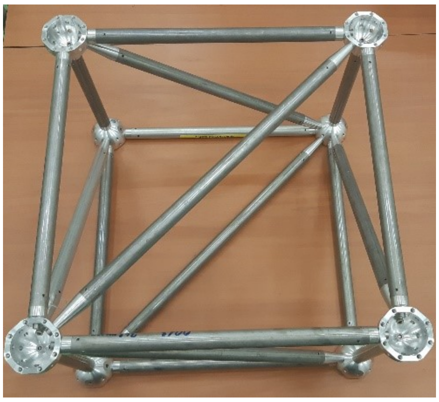


Figure 1 – Bar/sphere system

For the flight, they are equipped of cardboards crash pads covered with aluminum protections or an all-aluminum shock absorber system. The best solution considering the mission will be chosen.

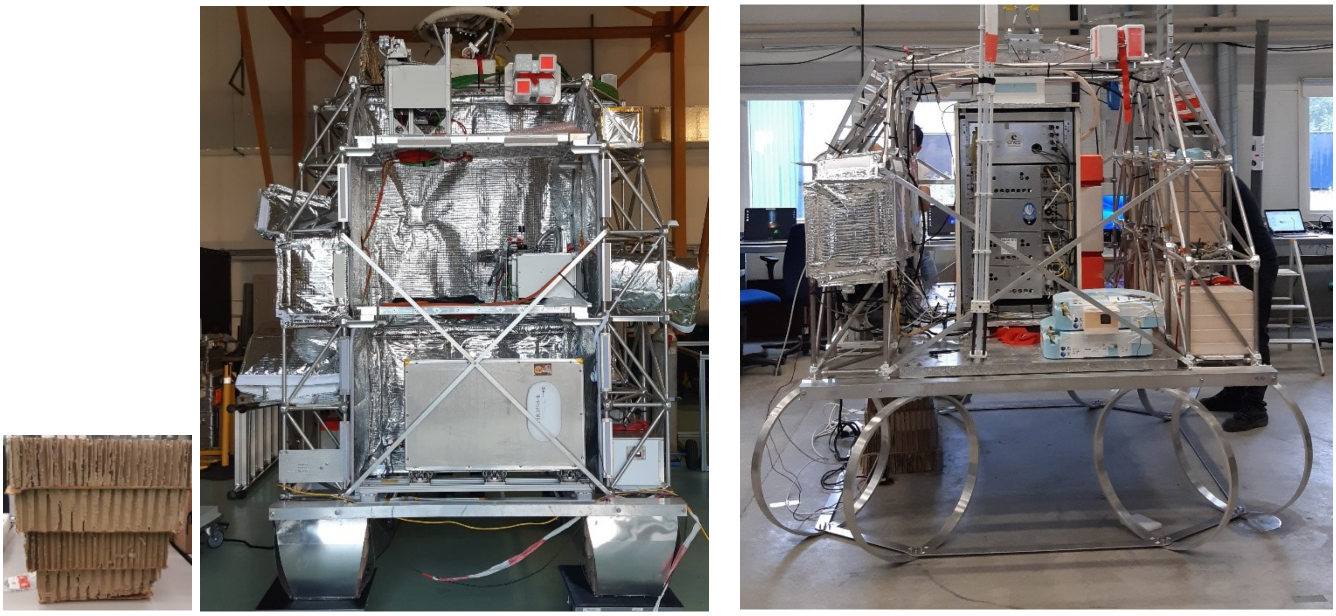


Figure 2 – Crashpads (left) & shock absorbers (right)

Several accommodations can be proposed to integrate the payloads and will be described in 5.2.

5.1.1. CARMEN GONDOLA

The CARMEN gondola is represented below:

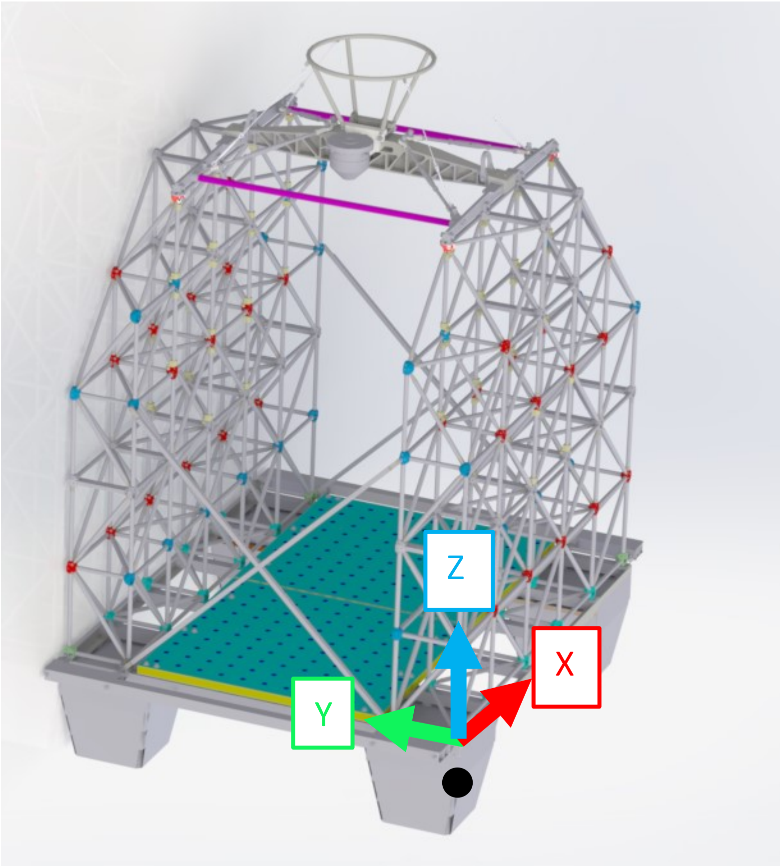


Figure 3 – CARMEN gondola

The dimensions are as follows:

	Length	Width	Height
Overall dimensions	2430 mm	1846 mm	2687 mm (without swivel, with crashpad)
Inside dimensions ***(available for payload)***	2051 mm	1114 mm	1962 mm

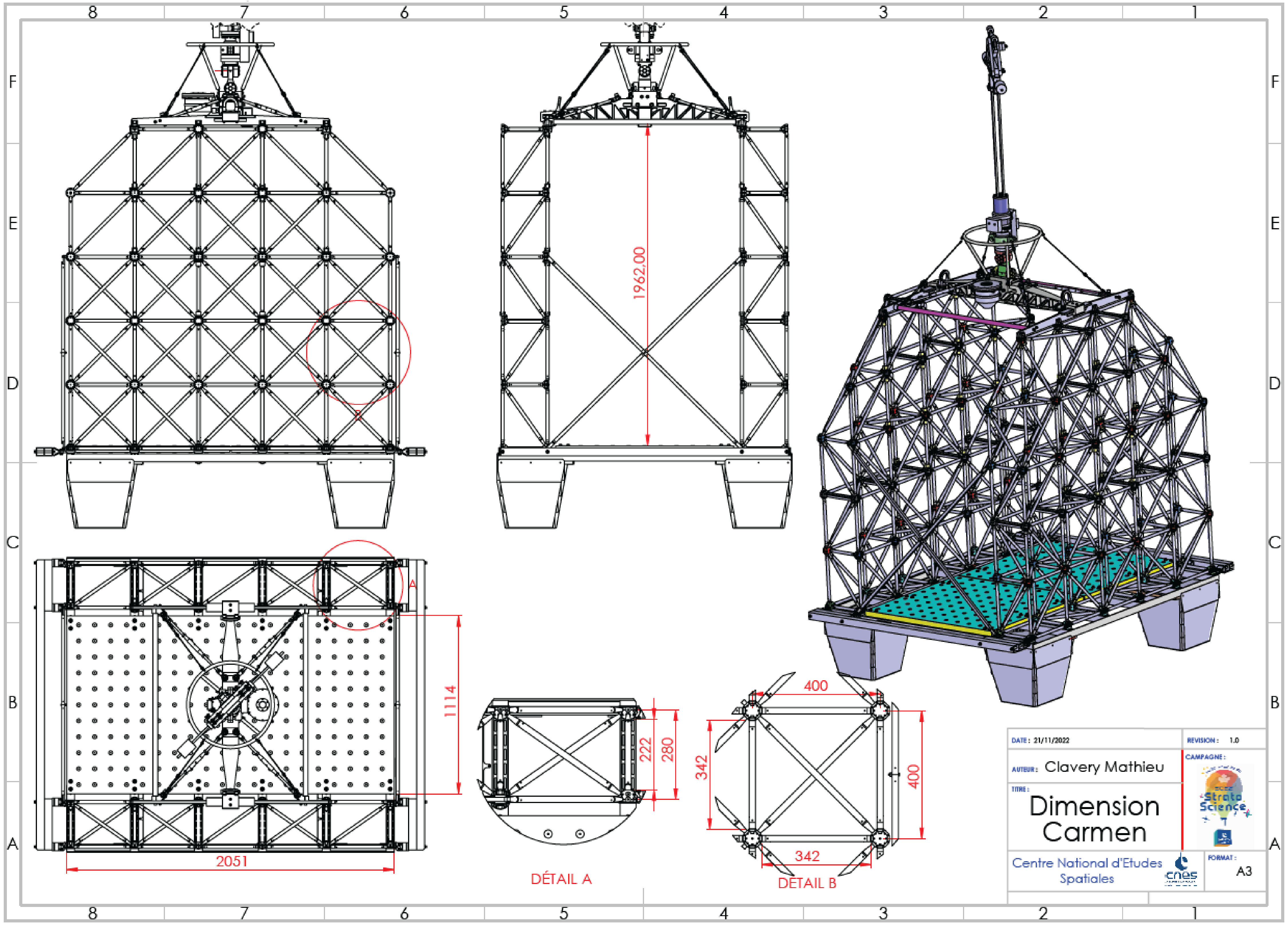


Figure 4 – CARMEN dimensions

5.1.2. CARMENCITA GONDOLA

The CARMENCITA gondola is represented below:

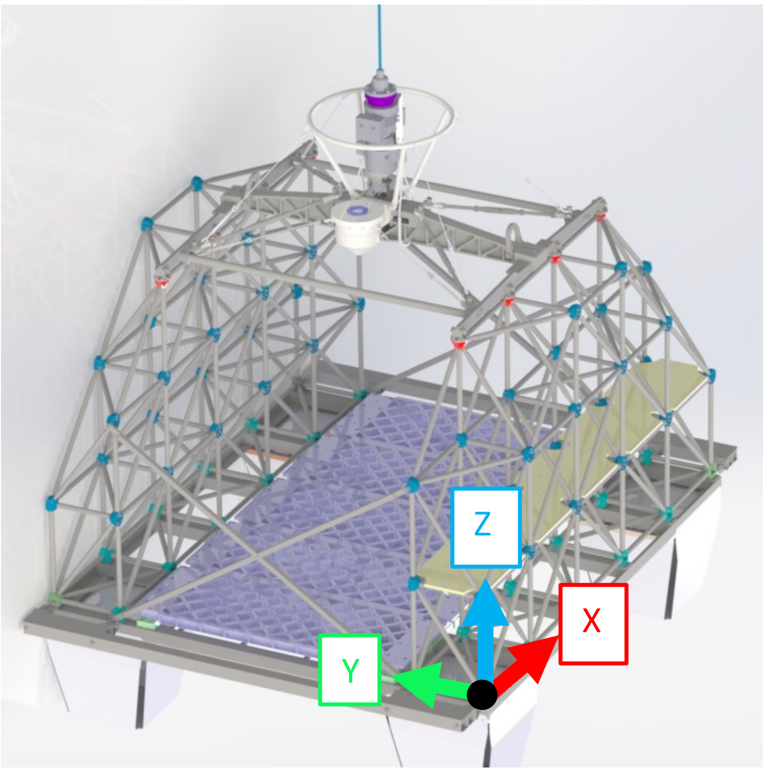


Figure 5 – CARMENCITA gondola

The dimensions are as follows:

	Length	Width	Height
Overall dimensions	2430 mm	1846 mm	2029 mm (without swivel, with crashpad)
Inside dimensions	2051 mm	1114 mm	1175 mm

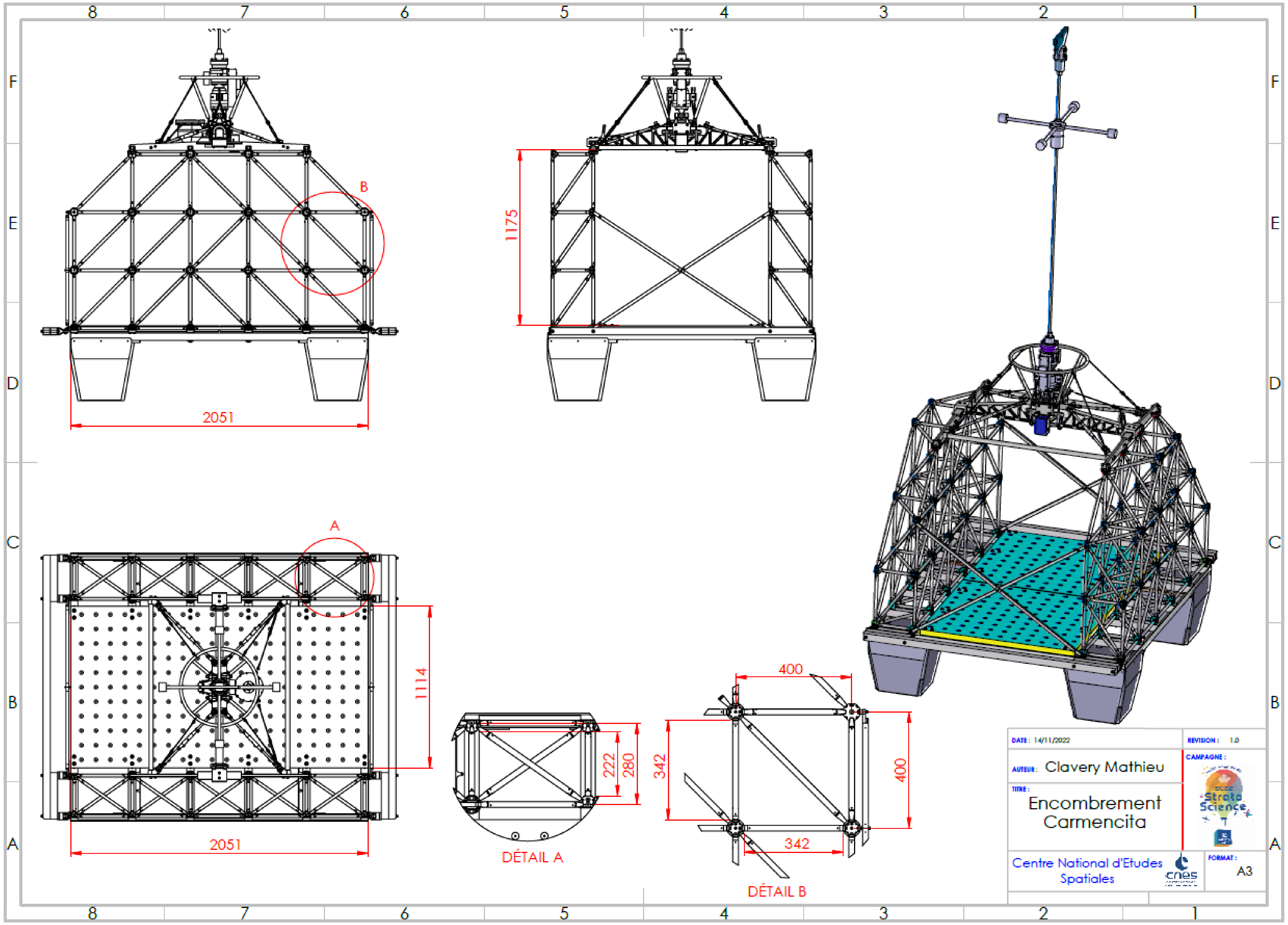


Figure 6 – CARMENCITA dimensions

5.2. ACCOMMODATIONS (FLOOR, SHELVES, WALLS)

The details for the mechanical interfaces are given in chapter 6.
The accommodations will be decided by CNES depending on the mission constraints and considering payload needs.

5.2.1. FLOOR

The floor of the gondolas can be accommodated with different panels:

- **NIDA panels**
  2 panels are necessary to cover the floor
- **ASC panels**
  5 panels are necessary to cover the floor

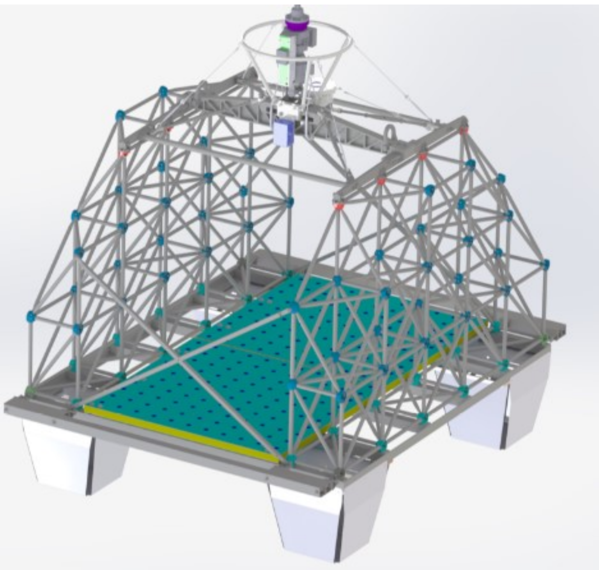


Figure 7 – NIDA panels

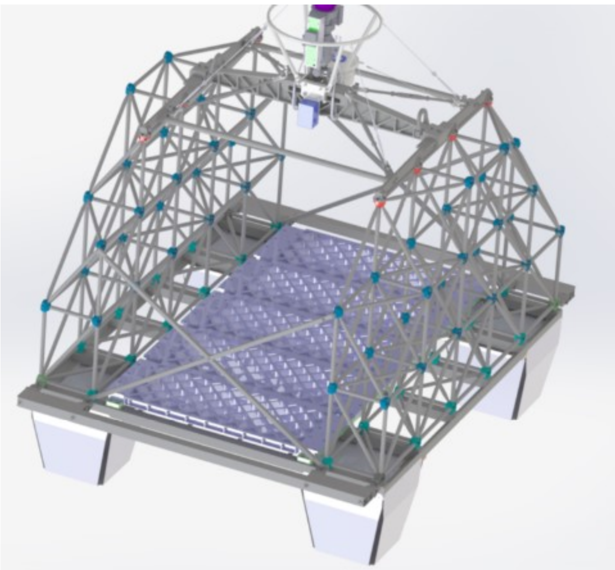


Figure 8 – ASC panels

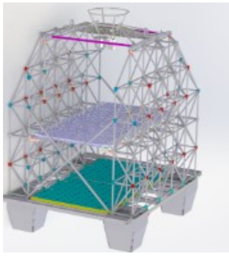
A mix of theses accommodations can also be implemented, depending of the constraints of the payloads.

Technical details in chapter 6.1.

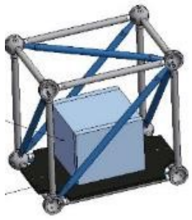
5.2.2. SHELVES INSIDE THE GONDOLA

The NIDA and ASC panels can also be integrated as shelves inside the gondola.

Technical details and pictures in chapter 6.2



5.2.3. CELLS IN THE GONDOLA WALLS

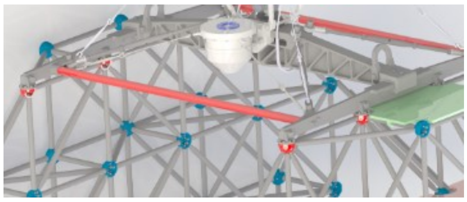


If the payload is small, it can be integrated inside the cell of the gondola wall. *(Applicable also to parts of a bigger payload that is integrated inside the gondola or for several small parts of a payload)*

In this case, the integration can be done directly on the bars of the gondola or on a shelf that the CNES can provide.

Technical details and pictures in chapter 6.3.

5.2.4. UPPER BARS OF THE GONDOLA



Lights payloads can be integrated on the upper part of the gondola.

Technical details and pictures in chapter 6.4.

5.3. CONTROL-COMMAND SERVICES

CNES can provide various services using the command-control system integrated on the gondola such as:

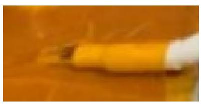
- **Power distribution**
  - Several lines dedicated to payloads
  - Powered by lithium rechargeable batteries or lithium-sulfur dioxide batteries
  - Solar panels can also be implemented to recharge the batteries if necessary (long flight for example)
  - Safe towards radiations environment

- **Date and localization**
  - Based on several constellations
  - Synchronized the on-board clock for the control-command
    Date and localization messages broadcasted on telecom network (i.e available for payload)

- **Azimuth pointing**
  - Using a swivel on top of the gondola and an IMU
  - Controlled from the ground during the flight

- **Platform stabilization**
  - Reaction wheels available to damp the wobbling motions of the gondola
  - Used for high performance pointing requirements

- **Temperature measurements**
  - PT100 probe
  - “Button” temperature loggers



- **Axis actuator (jack)**
  - Door opening, elevation motorization, …
  - Controlled from the ground during the flight

The details of each service and its interfaces are described in chapter 7.

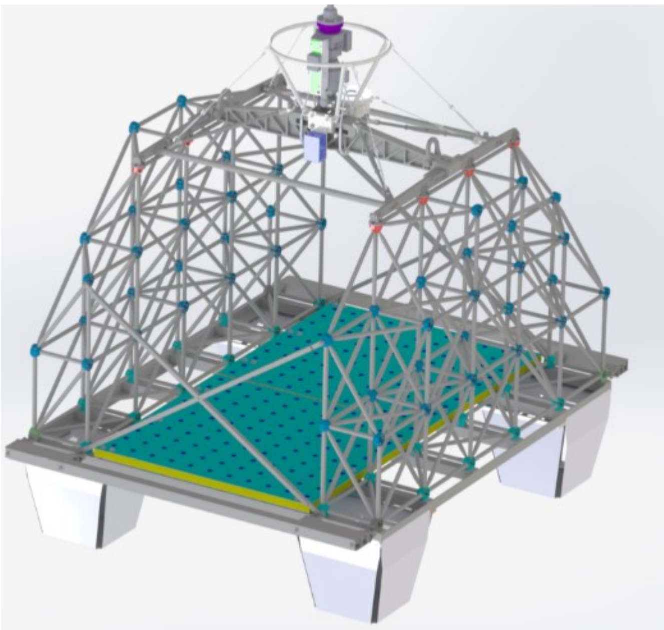
6. MECHANICAL INTERFACES

Note: CAD models are available on demand (step files).

6.1. FLOOR (CARMEN & CARMENCITA)

The floor of CARMEN and CARMENCITA gondolas is made of two NIDA panels or five ASC panels.

6.1.1. NIDA PANELS



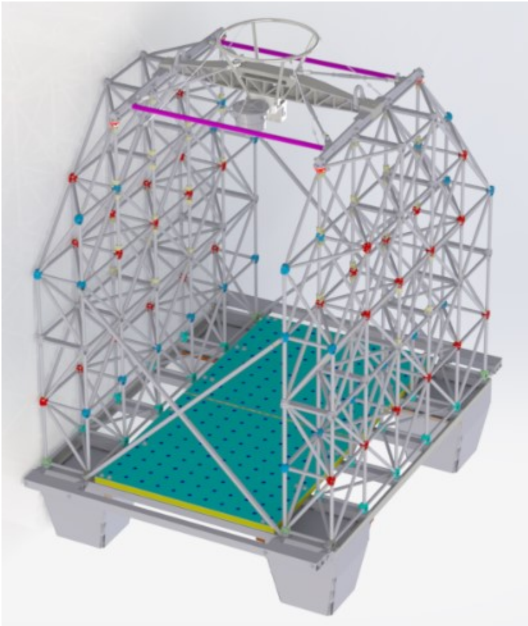


Figure 9 – NIDA panels on CARMENCITA & CARMEN floors

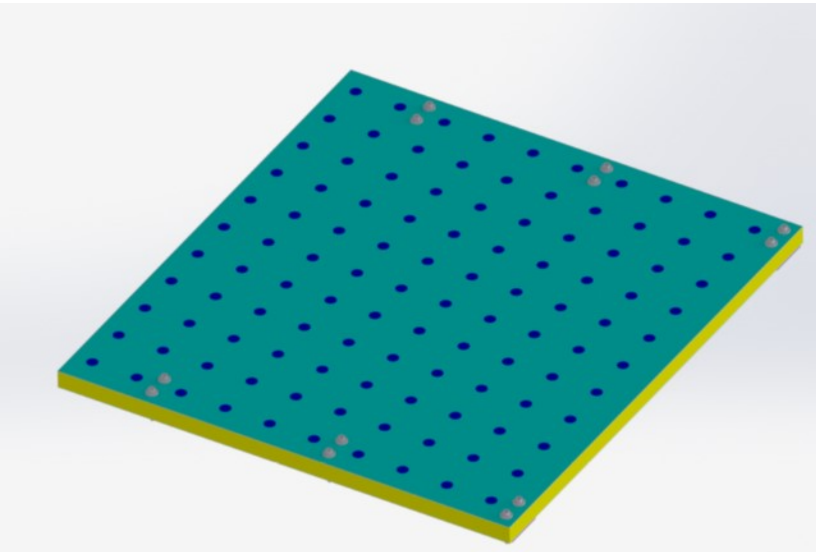


Figure 10 – NIDA panel alone

The floor has two panels. Each panel is independent. The maximal mass is 120 Kg per panel.
The size of the panel is:

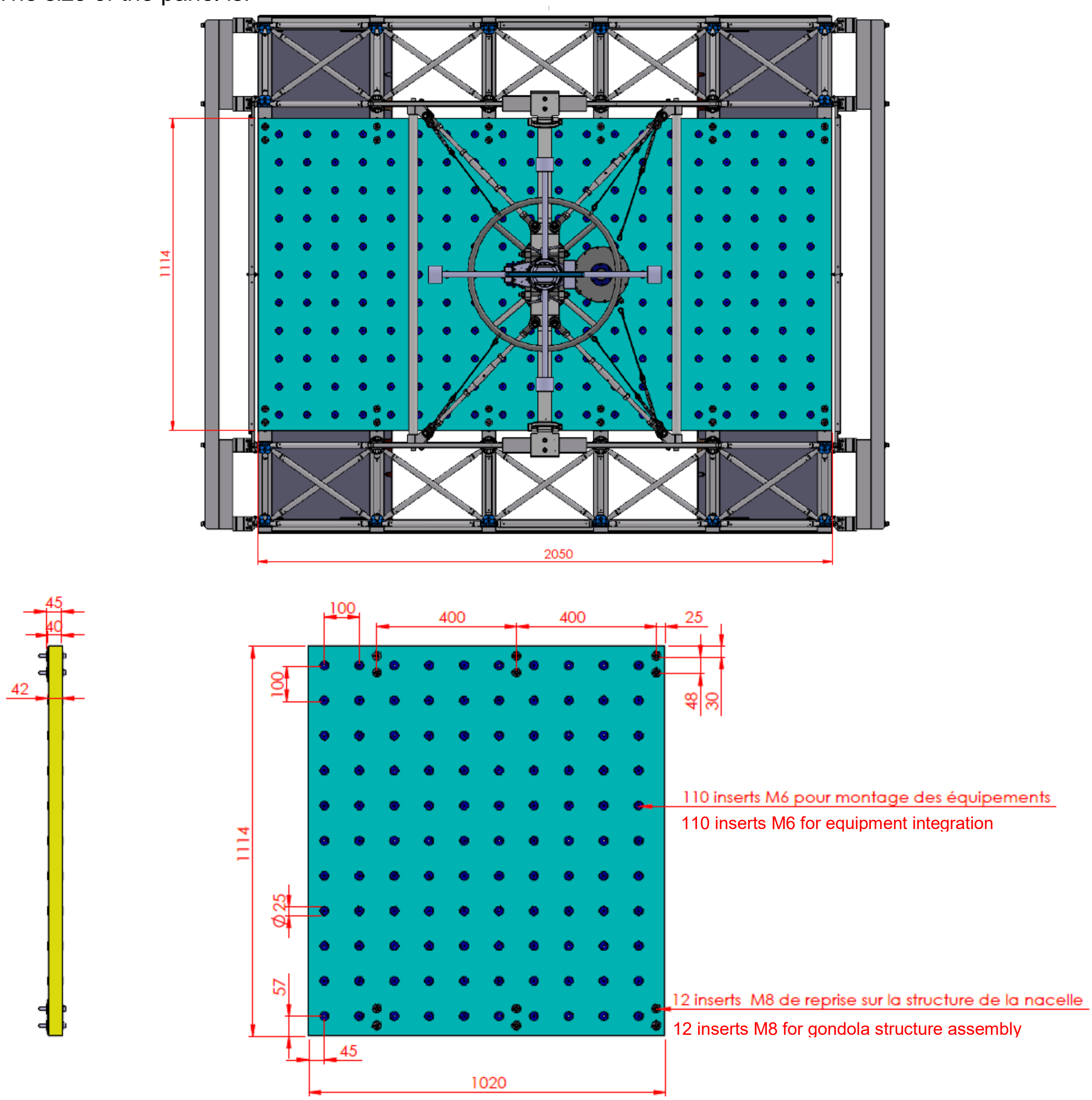


Figure 11 – Dimensions of NIDA panel

The payload should be fastened with M6 fasteners A4-80 or better on insert's panel (σ_e > 600 MPa; σ_{rm} > 800 MPa).

The torque of the fastener M6 A4-80 is 7.4 Nm. The minimal length of the fastener is 20mm.

The panel has three types of inserts:
- The structural inserts to fasten the panel on the gondola (red circle)
- The equipment inserts close the structure inserts to fasten the equipment on the gondola (blue circle)
- The equipment inserts (all the others)

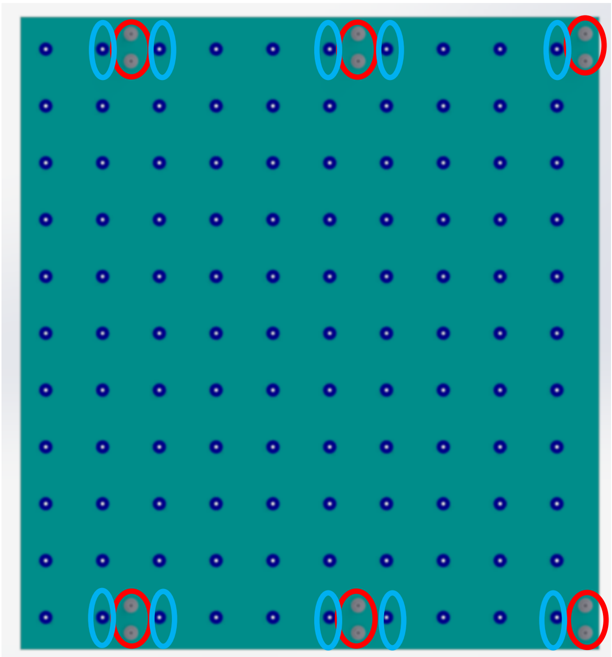
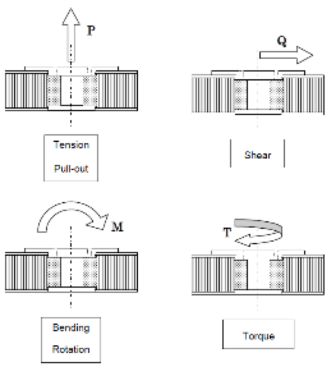


Figure 12 – NIDA inserts

The following equation must be verified by the equipment on the equipment inserts:

$$\left(\frac{P \times FS}{P_{crit}}\right)^2 + \left(\frac{Q \times FS}{Q_{crit}}\right)^2 + \left(\frac{M \times FS}{M_{crit}}\right)^2 + \left(\frac{T \times FS}{T_{crit}}\right)^2 \leq 1.00$$

P, Q, M and T are calculated from mechanical analyses and are visually the following ones :



FS is the safety factors and P_{crit}, Q_{crit}, M_{crit} and T_{crit} are the allowables.

The following equation has to be verified for the position of centre of gravity per panel :

$$m \times h \leq 60Kg.m$$
$$m \leq 120Kg$$

with m the mass (Kg) and h the height of the center of gravity (m)

The allowables of the equipment inserts are:

	Internal equipment inserts	**Equipment Insert close to the structural insert**
Traction P_{crit} (N)	11715	6699
Shear Q_{crit} (N)	12203	12203
Bending moment (M_{crit}) N.m	318	318
Torsion (T_{crit}) N.m	28	28

6.1.2. ASC PANELS

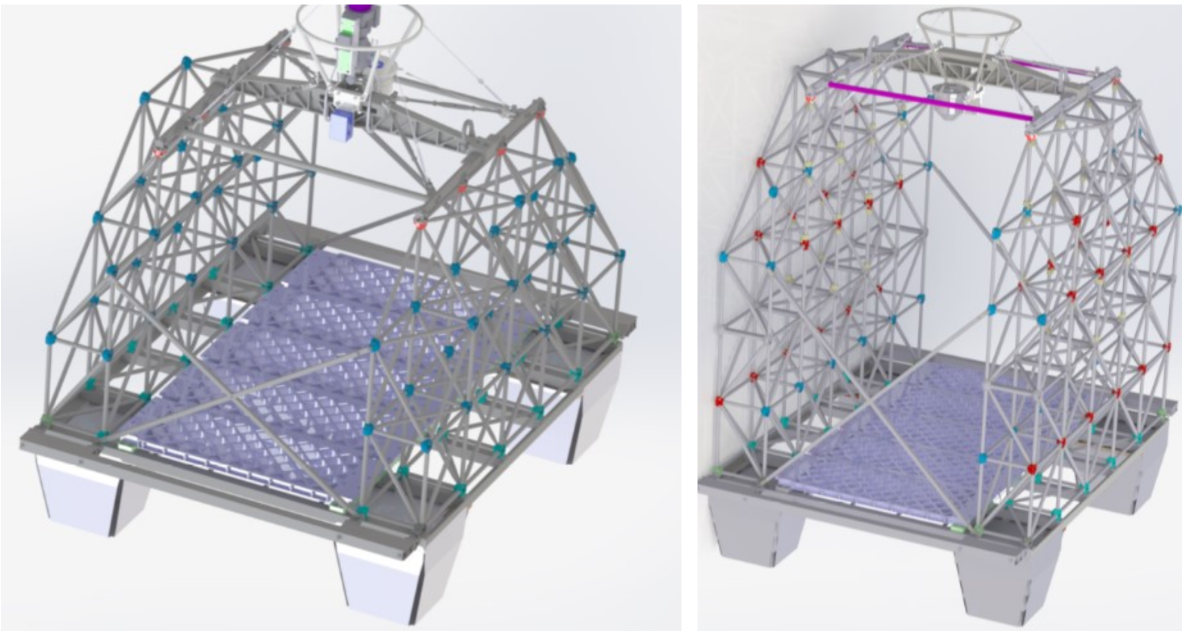


Figure 13 – ASC panels on CARMENCITA & CARMEN floors

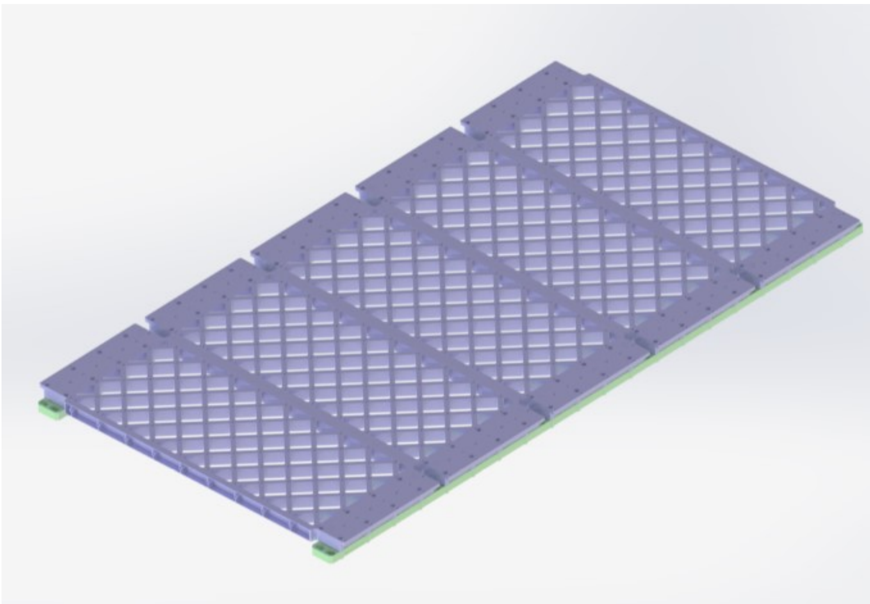


Figure 14 – ASC panel alone

The floor is made of five independent panels. A panel could be removed for nadir view.

The size of the floor is:

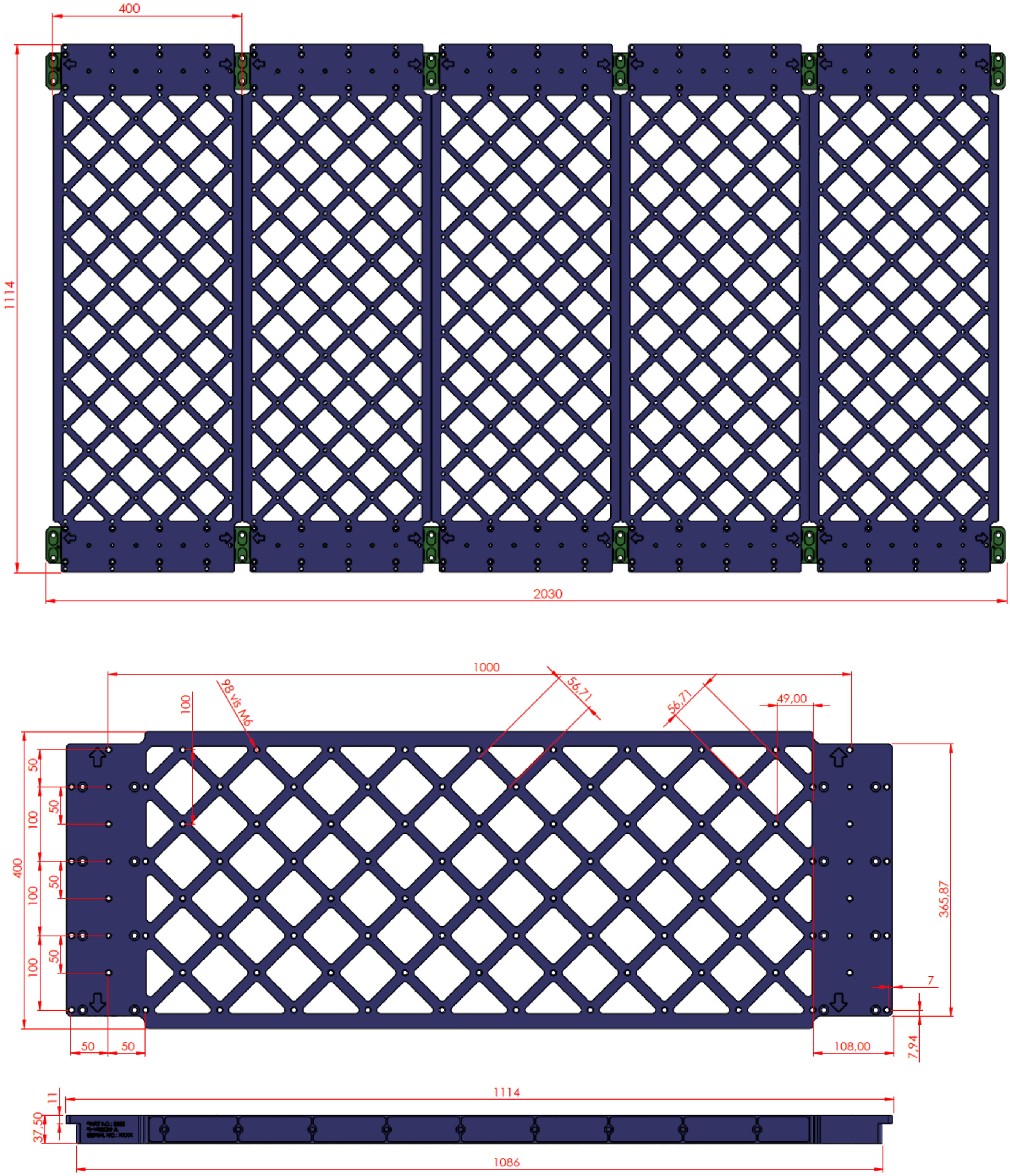


Figure 15 – Dimensions of NIDA panel

The payload is fastened with M6 fasteners A4-80 or better on panel's Helicoils (σ_e > 600 MPa; σ_{rm} > 800 MPa).

The torque of the fastener M6 A4-80 is 7.4 Nm. The minimal length of the fastener is 20mm.

The following equation has to be verified for the position of centre of gravity per panel :

$$m \times h \leq 15Kg.m$$
$$m \leq 50Kg$$

6.2. SHELVES INSIDE THE GONDOLA

The panels used for the floor can also be put inside the gondola as shelves and can be mixed between NIDA and ASC panels.

These shelves can be put every 400mm height on the sphere but their position will be adjusted depending on the mission needs:

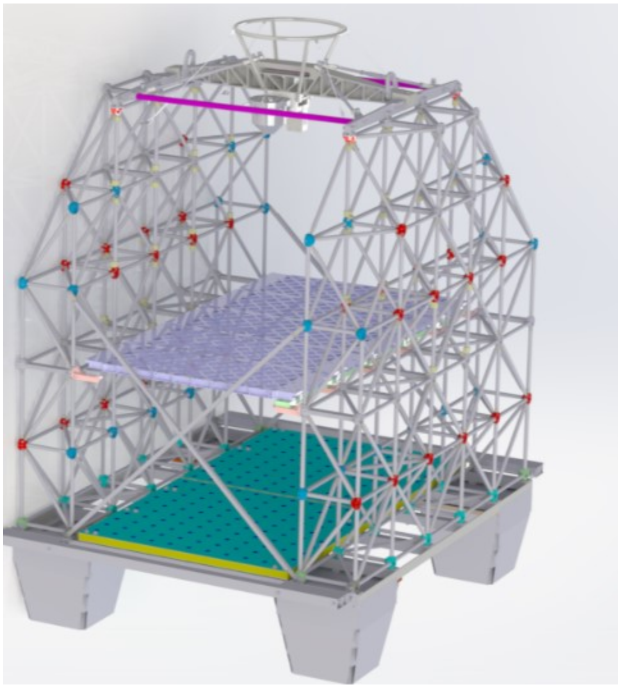


Figure 16 – Shelves inside the gondola

The characteristics and constraints are the same that are described in chapter 6.1:

- The fasterners are M6 A4-80.
- For NIDA panel, the same insert allowables have to be used.

6.3. CELLS IN THE GONDOLA WALLS

The available cell volume is 342 mm x 342 mm x 222 mm as shown below and each cell can support maximum 21 kg including the clamping device (straps, fasteners, fitting, etc.):

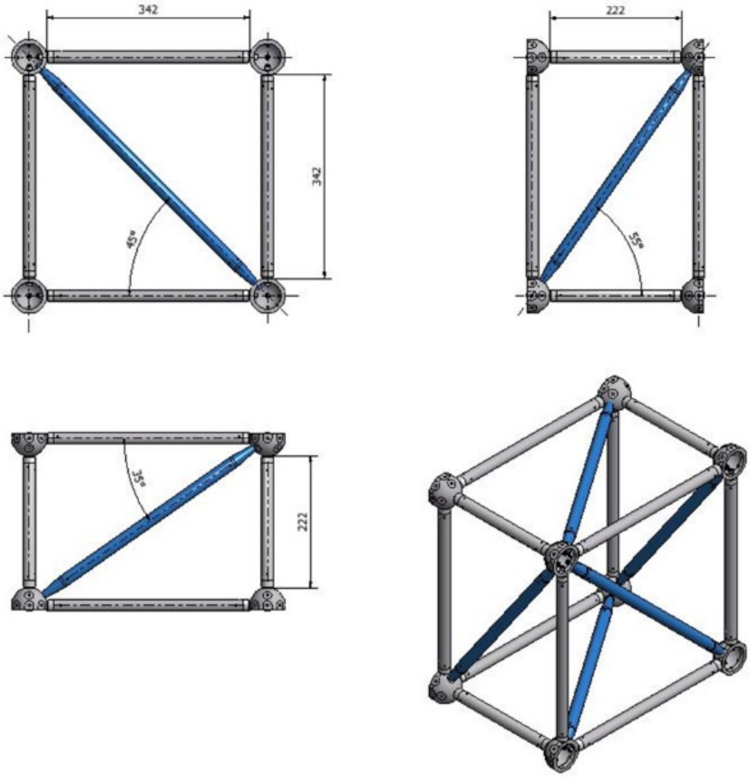


Figure 17 – Gondola cell dimensions

The payload can be integrated in different ways: with shelf or on the bars of the cell.

6.3.1. SHELF

The payload can be put on a shelf provided by CNES, fastened with flight straps provided by CNES or with M6 fasteners A4-80:

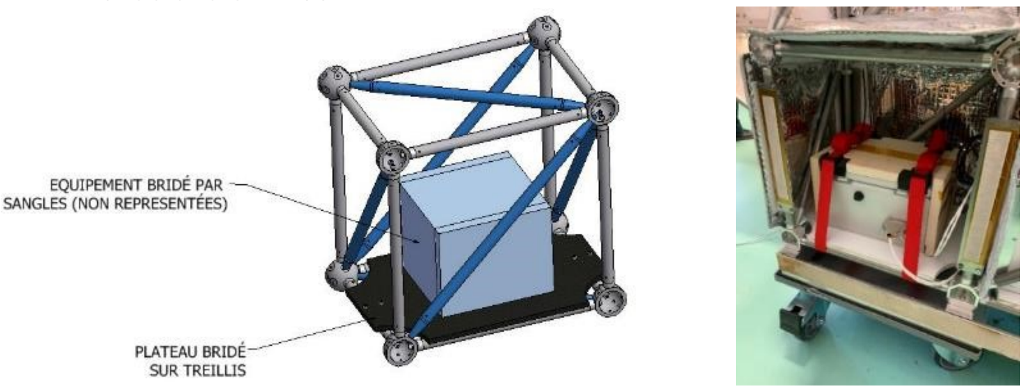


Figure 18 – Example of equipment integrated on cell shelf

Three types of shelves can be used: 1U (in green), 3U (in red) or 5U (in yellow).

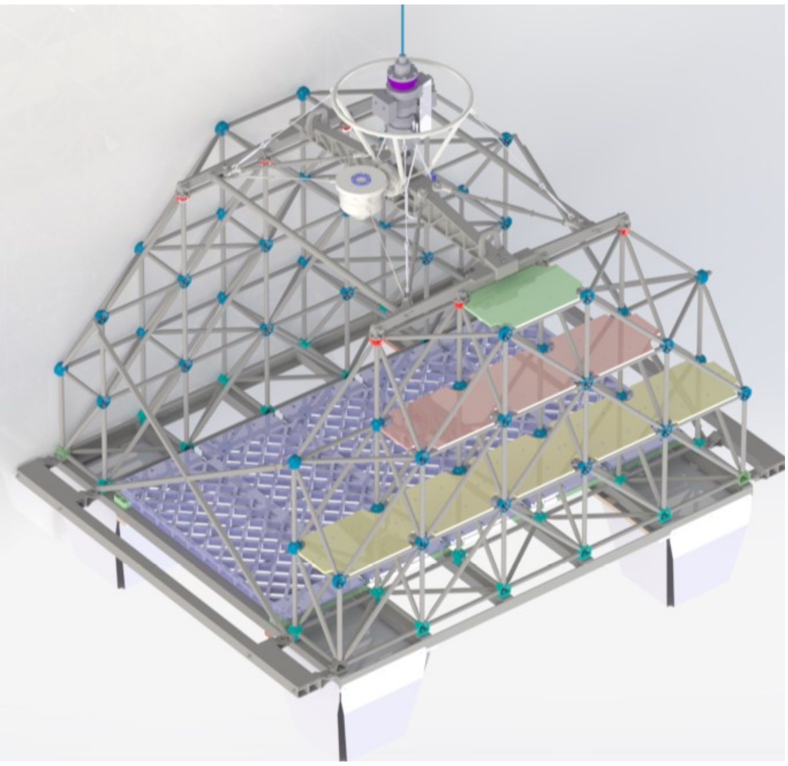


Figure 19 – Different lengths for integration in a cell

Fasteners M6 A4-80 can be used instead of straps, located on the red circles:

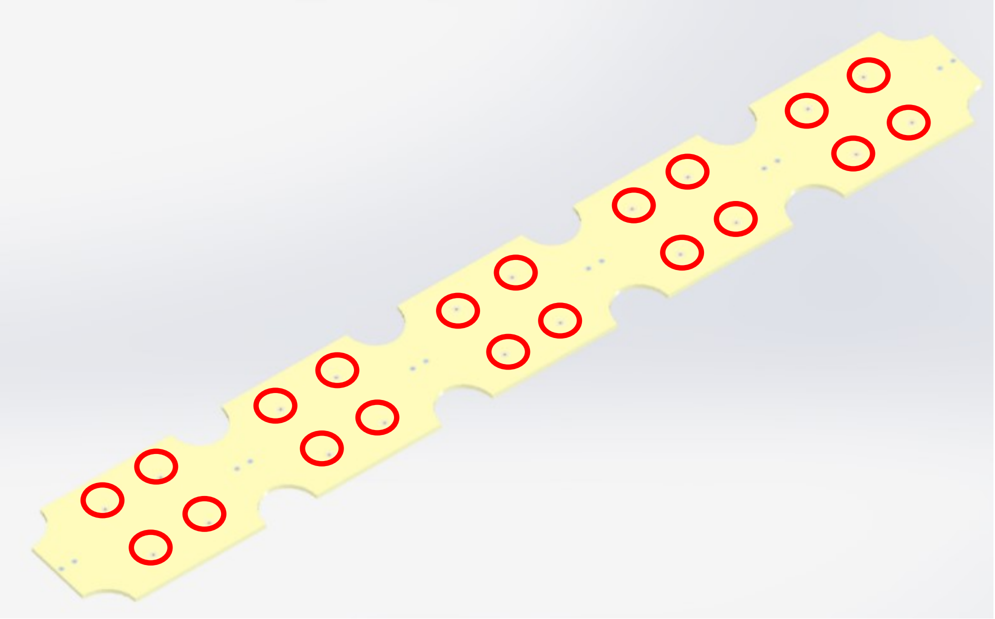


Figure 20 – Fasteners on cell shelf

The dimensions of the shelves are:

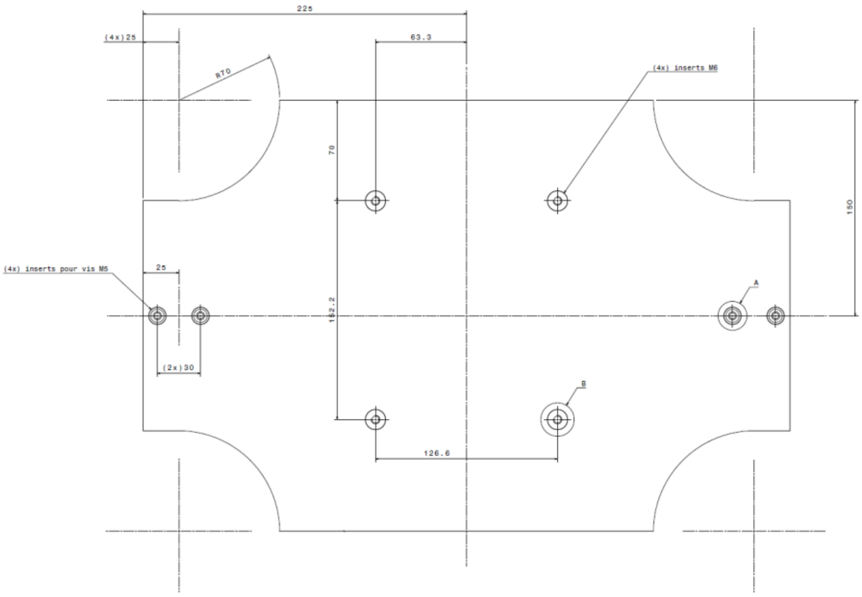


Figure 21 – 1U shelf

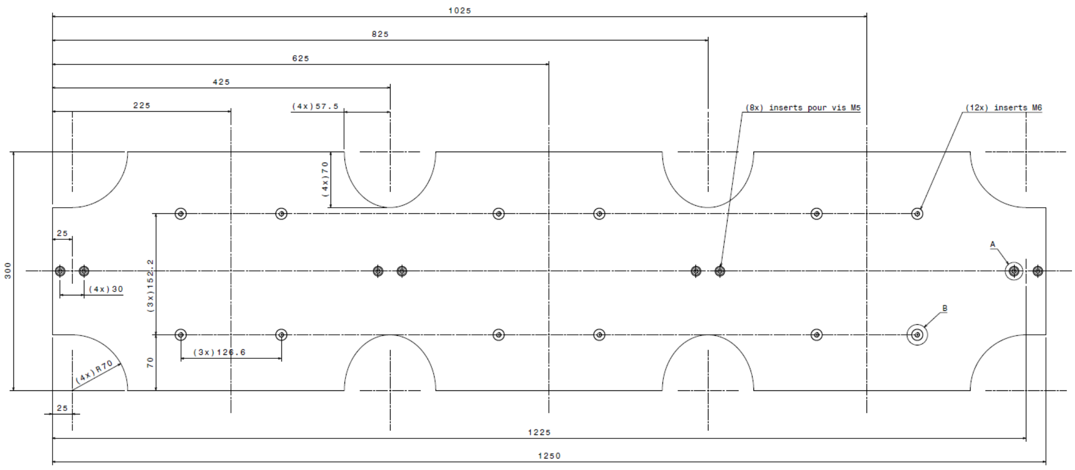


Figure 22 – 3U shelf

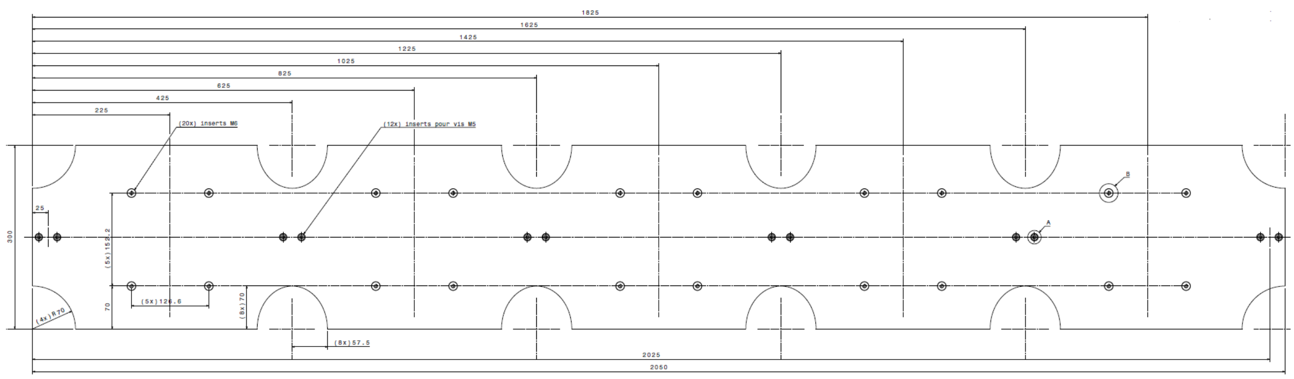


Figure 23 – 5U shelf

6.3.2. BARS

The bars of the wall can be used:

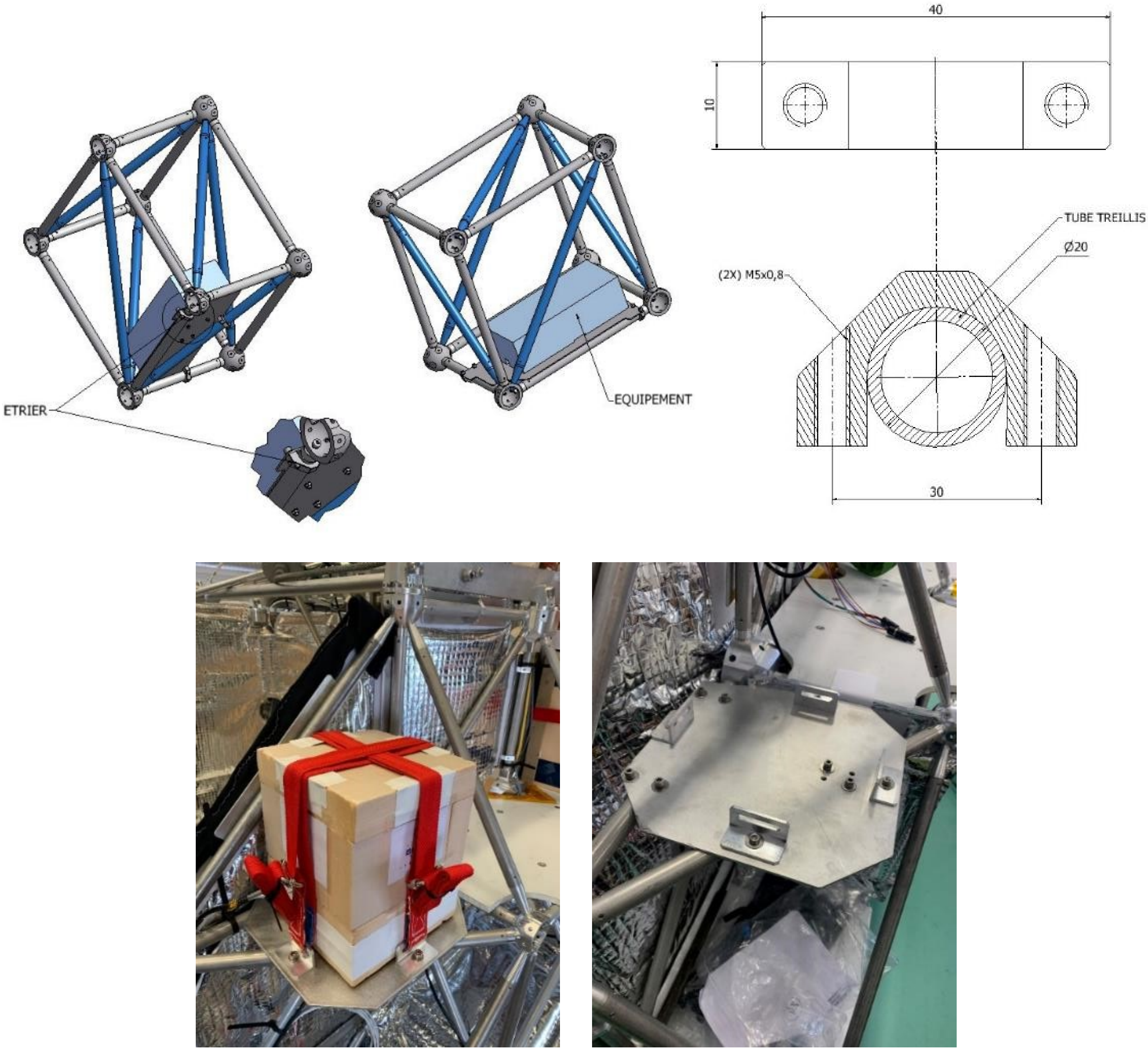
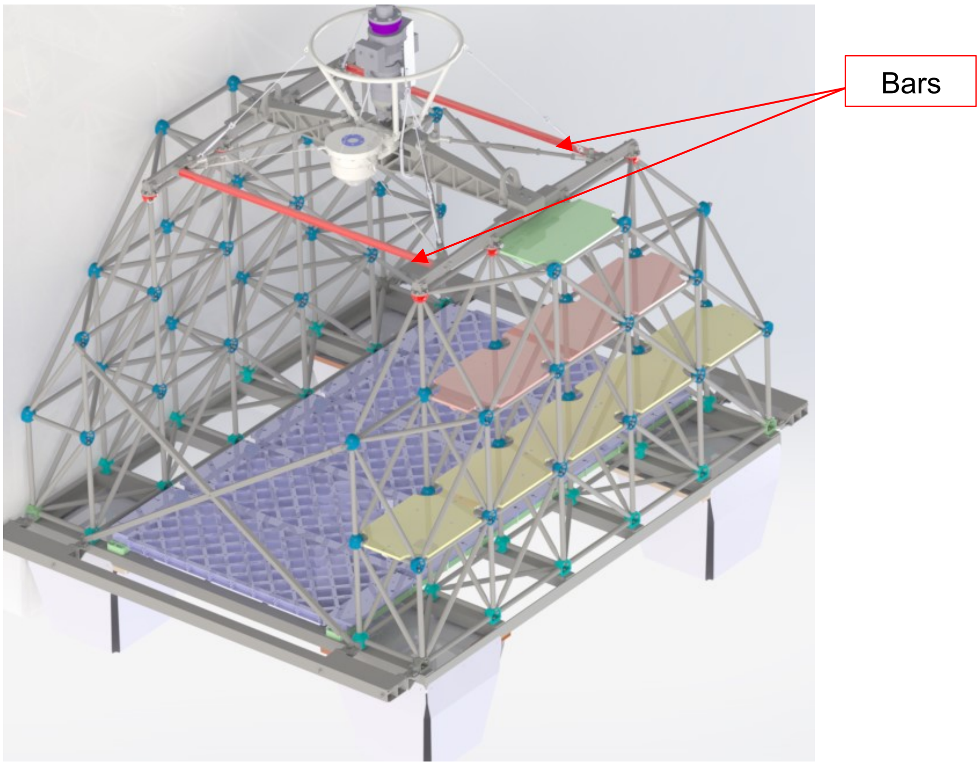


Figure 24 – Example of equipment integrated on cell bars

Note:
⚠ The orientation of the diagonal bars can vary depending on the cell in the wall.

6.4. UPPER BARS OF THE GONDOLA

The following upper bars (red) can be used but the position on the bar could be shifted due to the position of TM/TC antenna:



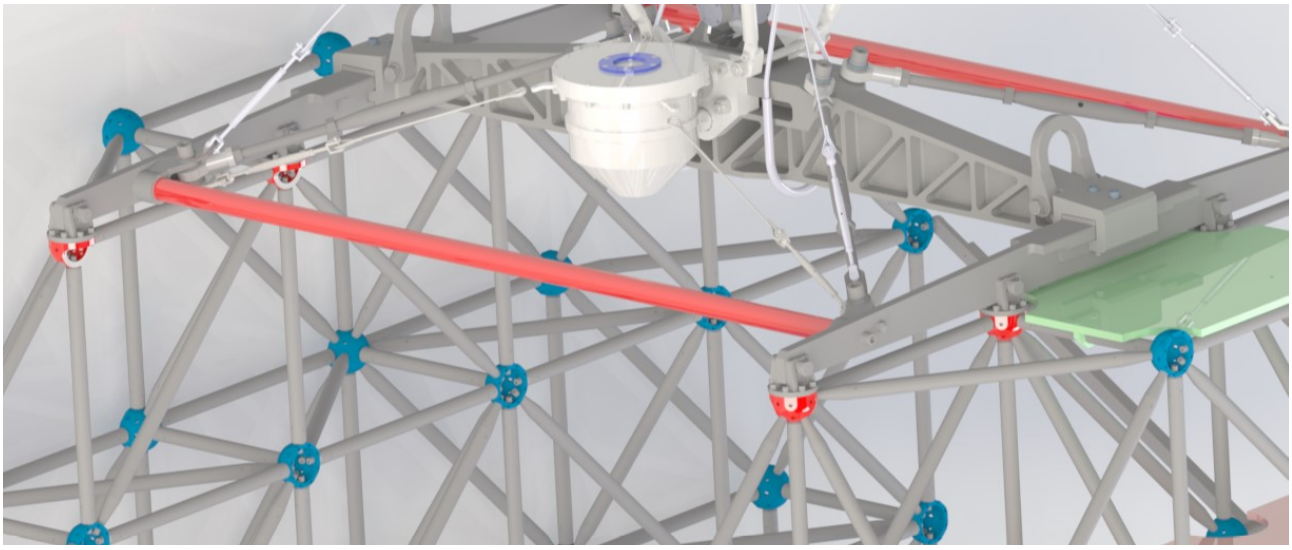


Figure 25 – Upper bars of the gondola

The mass of the equipment and its mechanical interface must be lower than 1Kg. The diameter of the bar is 30mm.

6.5. THERMAL ASPECTS

Heat protections

To protect the gondola command-control equipment, CNES integrates sun protections named SOLARIS as follow on both CARMEN & CARMENCITA gondolas:

- Protection on each inside wall
- Protections around each wall cell containing command-control equipment
- Optional: a vertical protection between payloads that are located front and rear of the gondola

Figure 26 – SOLARIS protections *(wall, wall + central separation, wall + cells)*

SOLARIS is a multi-layer (11) thermo-reflective insulator. Its characteristics are:

- 2 reflective reinforced films with anti-UV treatment
- 4 reflective separating films with anti-UV treatment
- 5 high density polyester fibers

Cold protections

For the cold, many gondola command-control equipment have internal heaters for night flight especially.

⚠ Consequently, If the payload is sensitive:

- to heat ⇒ you must implement your own protections from the Sun in case of a day flight.
- to cold ⇒ you should add heaters to your payload in case of a night flight

7. CONTROL-COMMAND INTERFACES & SERVICES

7.1. POWER

The power distribution is handled by the equipment named MDE (Module de Distribution d'Energie).

Main characteristics

Voltage	21 V – 36 V *(not regulated)*
Current	0 A – 40 A *(shared between payloads and gondola control-command)*

⚠ If you use DC/DC converters, be sure that they are compliant with the voltage range.

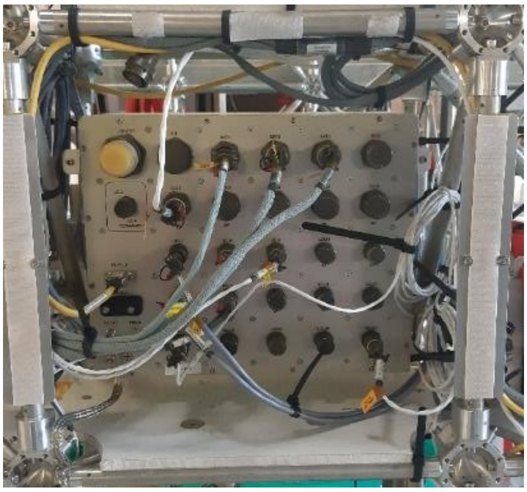


Figure 27 – MDE integrated in a gondola

Inputs
The power can come from different sources:

- Rechargeable lithium batteries (54,4 Ah)

- Lithium-sulfur dioxide batteries (36,8 Ah)

- Optional (for long and/or high powered flights): renewable energy throughout solar panels and rechargeable batteries

The best solution for the battery configuration is provided by CNES taking into account the power consumption of each payload and the flight constraints.

Outputs

The MDE has 20 outputs available for the payloads and the gondola control-command system with two different hardware limitations:

- 5 with a current limitation at 8A
- 15 with a current limitation at 5A

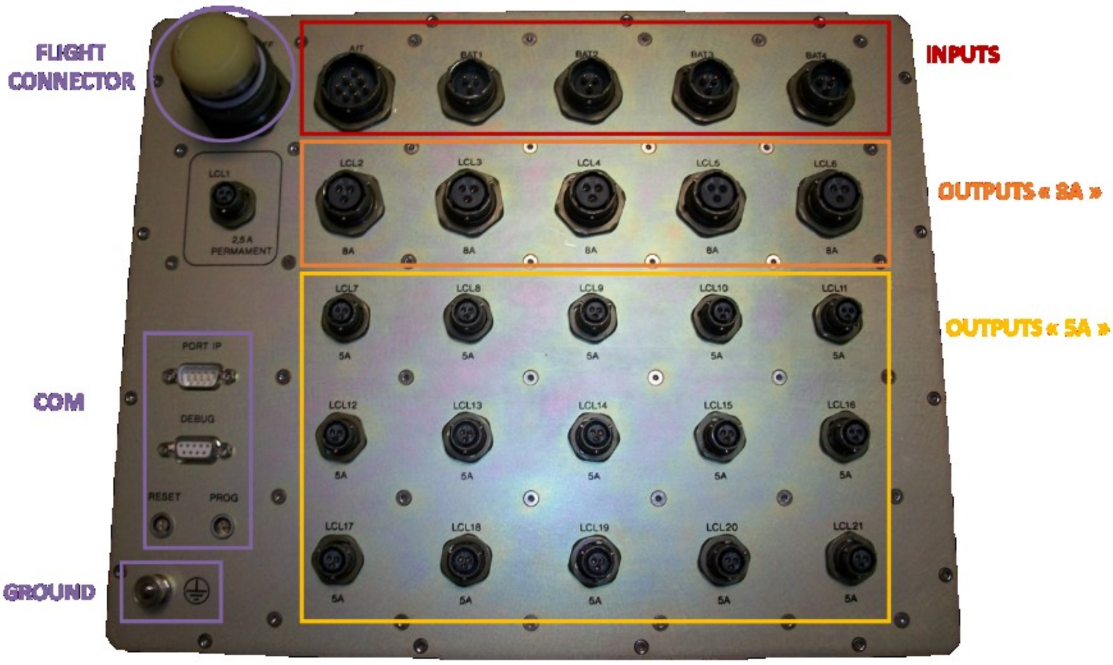


Figure 28 – MDE description

It is also possible to implement a software limitation lower than 5A or 8A on payload request.

The connectors (payload's side) are the following:

	Connector reference	Photo	Cabling
8A limitation	SOURIAU 851 06 EC 12-3 P 50 (male)		A = 0V B = not connected C = "28V"
5A limitation	SOURIAU 851 06 EC 8-3 P 50 (male)		

Figure 29 – Souriau connectors for Power

Each output can also be configured in different ways for the end of the mission:

- Manually OFF by the CNES team before cut-off
- Automatic OFF 20 minutes after cut-off

In both case, the payload will be OFF for landing. The second option allows the payload to get data during the descent under parachutes.

7.2. DATE AND LOCALIZATION

Two date and localization systems are used by CNES:
- one with only the US GPS constellation
- one with several constellations (US GPS, Galileo, Glonass)

Only one of them is integrated on the gondola. The choice is made by CNES depending on the gondola constraints.

Every second, a date message and a localization message are broadcasted in UDP mode on the telecom IP network on the port 50030.
The format of the both messages is little endian.

Date message:

Byte Nb	Type	Definition
1	Unsigned char	Message identifier (equal to 0)
4	unsigned int	Number of seconds from the 1st January 1970
4	int	Number of nanoseconds within the current second
1	char	Indicates the status of the date - 0 : the date is not forced by the ground - 1 : the date is forced by the ground

Localization message :

Byte Nb	Type	Definition
1	Unsigned char	Message identifier (equal to 1)
4	float	Longitude (degree)
4	float	Latitude (degree)
4	float	Altitude (meter)
4	float	Magnetic Declination
1	Unsigned char	Quality • 0 : Latitude, longitude and altitude are not significant • 1 : Only altitude is not significant • 2 : Latitude, longitude and altitude are significant
1	Unsigned char	Indicates the status of the localization • 0 : The localization is not forced by the ground • 1 : The localization is forced by the ground
1	Unsigned char	Indicates the status of the magnetic declination • 0 : The magnetic declination is not forced by the ground • 1 : The magnetic declination is forced by the ground

In addition, if the payload needs a high performance time synchronization; a PPS (Pulse Per Second) signal is available on demand.

Figure 30 – PPS connections

Its characteristics are:

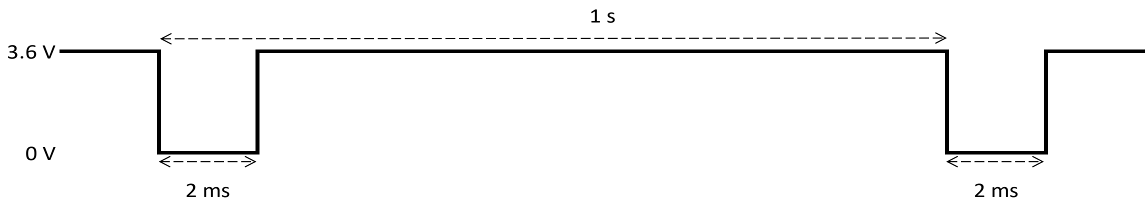


Figure 31 – PSS signal characteristics

Two connections are possible:

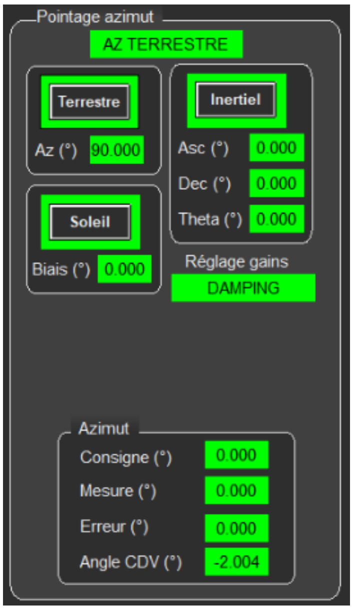
	Connector reference	Photo	Cabling
TTL	BNC (male)		Pin 1 = PPS
RS422	SUB-D9 (male)		Pin 3 = PPS+ Pin 4 = PPS-

7.3. AZIMUTH POINTING

The azimuth is defined as the orientation of the gondola with respect to its vertical axis (given by gravity), North being the origin of azimuth and azimuth increases clockwise (North=0°, West=90°, South=180°, East=270°).

It is controlled by CNES ground segment and on board actuated by a swivel localized between the gondola and the flight chain.

The azimuth pointing system provides several guidance strategies:



- **<u>Standard pointing</u>** *(implemented on all pointed missions)*
  - Fixed azimuth pointing
    Constant azimuth with respect to geographical North.
  - Solar and Lunar pointing
    Follow an azimuth of the Sun or the Moon based on GPS and IMU data, and a 1 arcmin precision onboard orbit propagation. A bias can be added with respect to the instrument line of sight (to point anti-solar or 90° with respect to the Sun for instance).
  - Inertial pointing
    Follow an inertial target with right ascension and declination as an input.
    Such pointing can also be used to track a planet during a small time span (knowing that the planet will have a limited motion with respect to the inertial background).
- **<u>Optional pointing</u>** *(on request, to be asked in the QT or FSA document)*
  - Ground tracking: an azimuth pointing towards a point on the ground (given as GPS coordinates, such as a city) can be tracked.

<u>Performances</u>
The stability achieved by the azimuth pointing ranges between 0.05° to 0.01° at one sigma and the absolute pointing precision is estimated at maximum 0.2°.

<u>Notes:</u>
- The azimuth pointing is available only at float, not during the ascent.
- The perturbations coming from the flight environment can change from one flight to another, depending on altitude flight profile, weather conditions, launch site, anatomy of the whole flight system...

<u>Gondola controlled by a payload (ICU) (optional)</u>
If the payload requires a high frequency modification of pointing directions or specific sweeps, it is possible to implement an interface between the payload ground system and the CNES ground system. This interface allows the payload to send directly the azimuth order to the gondola.
This service is provided on request in the QT or FSA and is subject to CNES approval.

7.4. PLATFORM STABILIZATION (ROLL AND PITCH)

In addition to the azimuth pointing, an extra stabilization is possible for high performance pointing requirements: reaction wheels can be used to damp the wobbling motions of the gondola.
The use of these wheels will be subject to CNES validation depending on the mission and the payload needs.

Roll and pitch are defined as the rotations around the transversal axis of the gondola floor.

The wobbling motion is described as gondola oscillations around its attach point with the flight chain and have a 2s period. This platform stabilization option will help to damp those specific oscillations.

Notice that the pendulum oscillation of the system (25s period) cannot be actively damped, this slow oscillation motion naturally reduces after float altitude has been reached.

Some average values of the order of magnitude of the pendulum and wobbling motions seen by the gondola around its roll and pitch axis are given below.

Early float altitude environment (rough environment)

Mode	Period (s)	Amplitude peak to peak (°)
Pendulum	25 s	0.1° = 6 arcmin
Wobbling	2 s	0.01° = 0.6 arcmin

The early float altitude environment is related to the beginning of pointing activities (damping of the gondola and rough pointing, no science pointing).

Mid-flight environment

Mode	Period (s)	Amplitude peak to peak (°)
Pendulum	25 s	0.02° = 1.2 arcmin
Wobbling	2 s	0.005° = 0.3 arcmin

Note:
The perturbations coming from the flight environment can change from one flight to another, depending on altitude flight profile, weather conditions, launch site, anatomy of the whole flight system...

7.5. TEMPERATURE MEASUREMENTS

Real time measurement

18 temperature sensors (PT100) are integrated on the gondola structure, electronic modules, batteries, actuators …

Some of these sensors can be also provided for payload needs.

They allow the payload team to have a view on the temperature on their equipment.

The information will be available in real time on CNES ground computer.

Non-real time measurement

“Button” temperature sensors can be provided and programmed at different sampling rate (1 to 255 min)

The data will be available after the gondola recovery and return to the launch base.

7.6. AXIS ACTUATOR

7.6.1. DOOR

A door has been design to protect the gondola from ballast balls for example:

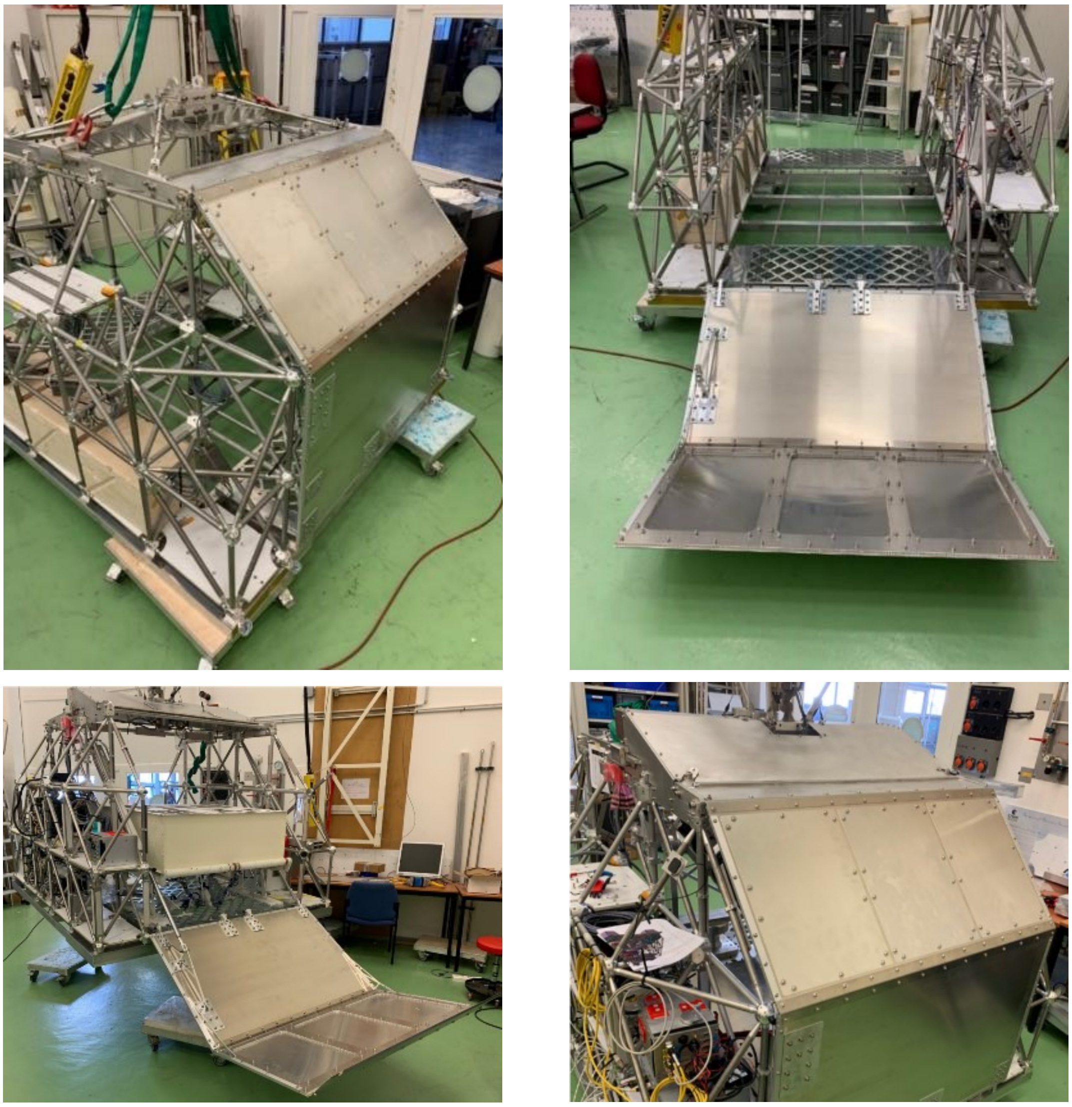


Figure 32 – CARMENCITA gondola door

It is available on demand (at the latest 6 months before the campaign) and will be subject to a faisability study by CNES.
Note: The door is now available only with the following configuration: CARMENCITA gondola + ASC panels.

The doors is made of aluminum sandwich panels and it is opened/closed with a linear actuator 700mm from CNES ground computer.

A roof is also design to protect from the top of the gondola (see last previous picture).

7.6.2. ELEVATION MOTORIZATION

An elevation structure has been made with a 200mm axis actuator. It is controlled from CNES ground computer and have magnetic lockers. This structure is set up on the floor of the gondola (ASC panels or NIDA panels). The payload has to be fastened on 2 interface rails (in red) at 300mm from the floor with 10 M6 A4-80 fasteners tighten to 5.4 Nm. The rails have 10 M6 2D Helicoil.

Depending of the payload and its needs, the elevation angle is between 0° à 90°. The maximal payload mass is 42Kg with a center of gravity backward at 270mm from the center of rotation.

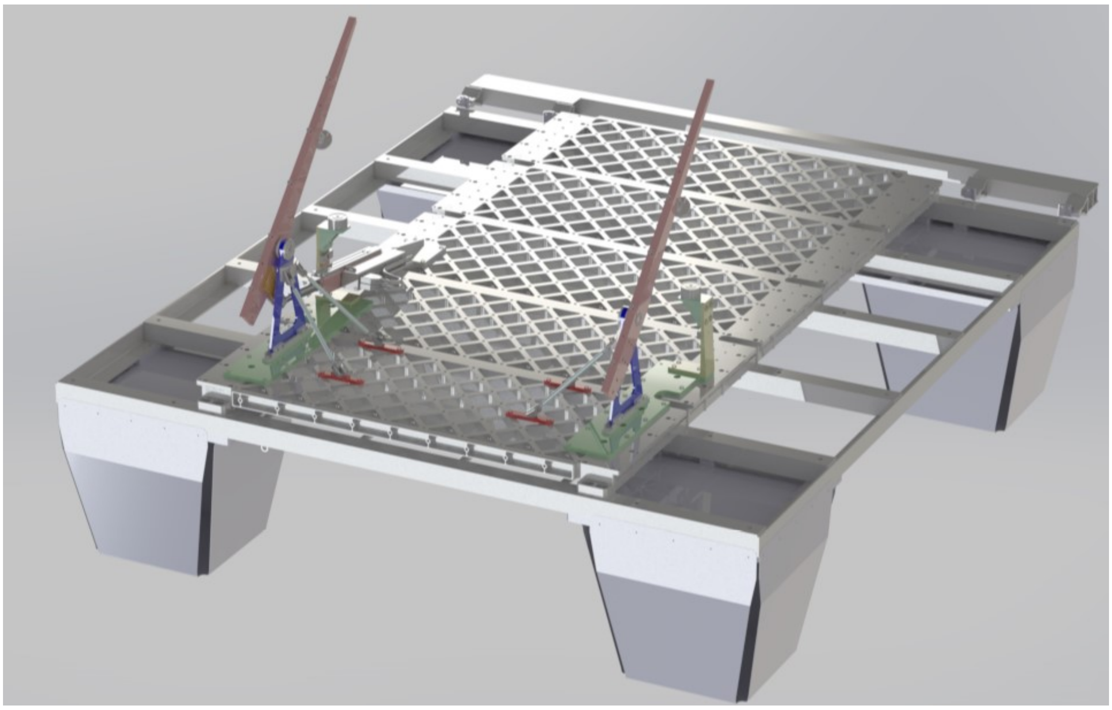


Figure 33 – Elevation structure

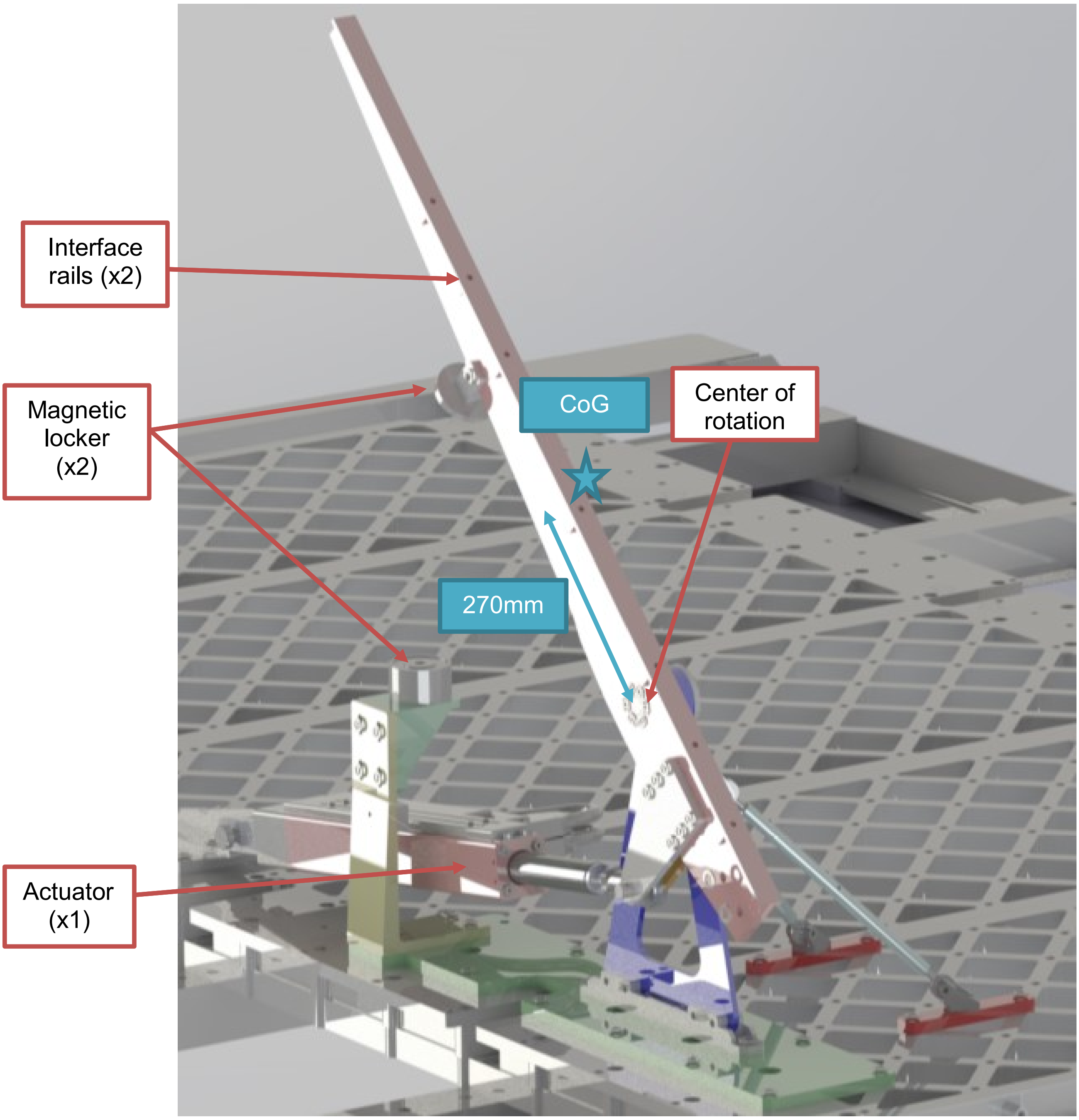


Figure 34 – Details of the interface rail for elevation structure

The size of the rails is presented below:

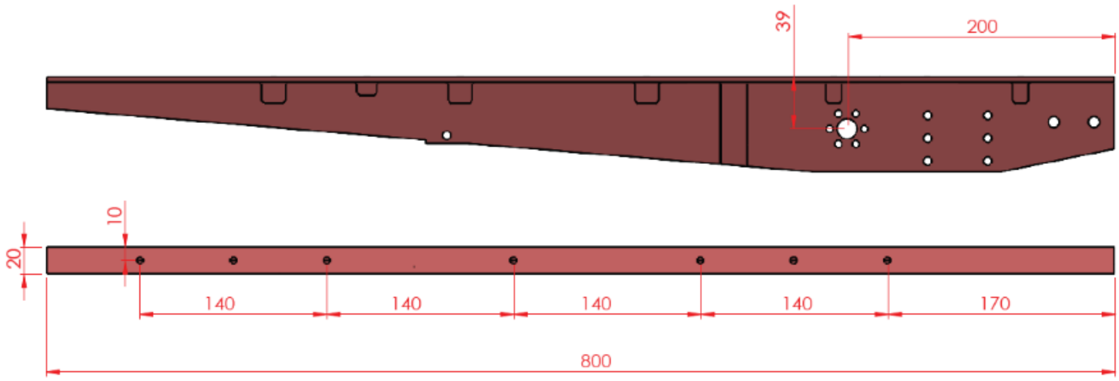


Figure 35 – Dimensions of the elevation structure rail

The distance between the fasteners of the 2 rails are 949mm by default but can be 929mm:

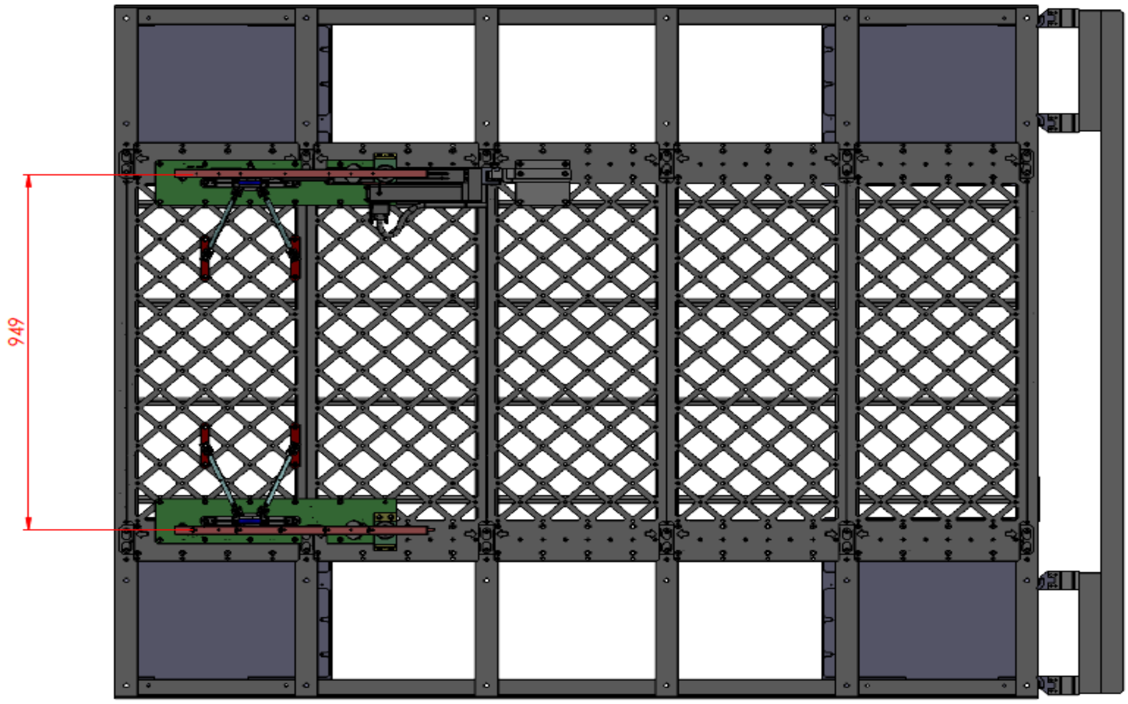


Figure 36 – Distance between elevation structure rails

<u>Control of the elevation</u>

The elevation is controlled by CNES:

- On board through the on-board software using a MCA (Axis Control Module) connected with the actuator
- On ground, by sending elevation angle command from CNES ground computer.

This service is available on request and has to be asked in the QT or FSA at the latest 8 months before the campaign.

8. TM/TC LINK

The TM/TC link is managed by the PASTIS system. All details are provided in the document [DR2].

<u>Note:</u>
For a transatlantic flight, the TM/TC link will be partially with the PASTIS system and a ground S-band antenna and partially with a satellite link. For this second link (under development), specific constraints will be implemented. It will be detailed in the next version of this document.

9. TRANSPORTATION TO/FROM LAUNCH BASES

For the transportation to/from launch bases, 3 options are available:

- CNES can transport the payload and its associated equipment
- The scientific team manage the transportation (both directions)
- A mix of the 2 options

9.1. CNES TRANSPORTATION

CNES uses road and/or maritime transports. The maritime transport brings a time constraint: the departure is early considering the beginning of the campaign.

When travelling with CNES, the payload team will be asked to provide:

- a volume and mass estimation of the equipment (6 months before the campaign)
- the packing list (3 months before the campaign)

Numéro de conteneur:	DJCU 261042-3
Nombre total de colis:	0
Poids total marchandises (hors conta	1872.10
Valeur totale marchandises (hors con	837150.00

Entité de référence - Institute	Responsible	N° référence projet - Internal reference	Type de colis - Type of parcel	Référence du colis - Reference of parcel	Dimension du colis - Parcel size LxlxH (cm)	Poids net - Net weight (kg)	Poids brut - Gross weight (kg)	16 - Pays d'origine - Country of origin	17 - Description d'article	17 - Item description	18 - Code de marchandise HS - HS commodity code	19 - Qté et unité de mesure - Qty and unit of measure	20 - Valeur FOB bureau de sortie - FOB	Composition	Fabricant - Manufacturer	Matière dangereuse - Hazardous good (Y/N)	CNES Chrono	Numéro de Série - Serial number	Export temporaire - Temporary export (Y/N)	Etat du matériel (Neuf,Occasion) - Hardware status (New/Used)	Contained into
CNES	RICHARD Julie	STRATO SCIENCE 2022	CONTAINER 20' HC	DJCU 261042-3	606x244x259	2030.0	3852.6		Container 20 pieds	Container 20 feet	8609009000	1	2420	Metal	CNES	N			Y	Used	
CNES	RICHARD Julie	STRATO SCIENCE 2022		TRAY 3	300x165x20	415.0	415.0	France	Plateau nacelle	Tray for gondola	7326909890	1	25000	Inox	AEGIS	N		3	Y	Used	DJCU 261042-3
CNES	RICHARD Julie	STRATO SCIENCE 2022	GONDOLA	CARMEN	185x210x200	400.0	468.4	France	Nacelle CARMEN	GONDOLA CARMEN	8801001010	1	50000	Metal	CNES	N			Y	Used	TRAY 3

- the safety sheets (in case of dangerous material such as gas, batteries, …)
- all the equipment (3 months for Timmins / 1,5 months for Kiruna / 4 months for Alice Springs)

The equipment will be sent to the CNES balloon team in Aire-sur-l'Adour:

Point of contact for shipment management:
Mr Stéphane LOUVEL : stephane.louvel@cnes.fr
(+33 682 65 68 11)

Adress
CNES
10 Route du Houga
40800 AIRE SUR L'ADOUR
FRANCE

Point of contact for shipment monitoring:
Mr Frederic BLON and Mr Gauthier LAVIGNE
Frederic.blon@cnes.fr (+33 607 51 61 01)
Gauthier.lavigne@cnes.fr (+33 680 90 35 14)

The following pieces of information can help you for a good understanding of the rules:

- All the columns have to be filled and the yellow columns are mandatory
- Column I: One country code is mandatory (cf. table below)
- Column L: if you don't know the associated HS-code, we will find it with our custom officer
- Column R: only for CNES equipment
- Column T: « Export temporaire / Temporary export » must have a « Yes »
- Column M: « Quantité / quantity » must be a number (1 computer = "One each", 1 pair of shoes = « 2 » in this column)
- Each crates/box must have a sticker/label with a name (the name is given in column E)

Complementary information

- Do not declare each scewdriver/wrench/clamp, but declare a toolbox (voltmeter/ammeter have to be declared independently)
- Button battery (height < diameter) and batteries < 100 WH do not need a specific declaration for dangerous goods
- Crates and boxes have to be cleaned before departure
- Boxes for dangerous goods (batteries, liquid, …) have to be compliant with international regulation (photos before and after box closure are needed and safety data sheet are mandatory)

9.2. PAYLOAD TEAM TRANSPORTATION

The payload team is autonomous to choose the transporter, to manage the customs …
The mission director will give during the preparatory meetings the point of contact on the launch base for delivery.

TIMMINS

Timmins Stratos Balloon Base (600 Hangar Road)
Timmins Airport
4599 Airport Road
Timmins (Ontario)
P4N 7C3
CANADA

KIRUNA

Esrange Space Center
SE-981 91 Jukkasjärvi
SWEDEN
Email: LogistikEsrange@sscspace.com
Phone: +46 7305 89399
Tax ID/VAT No.: SE556166583601

For the return transportation, please identify clearly your boxes on launch base before leaving and if possible, program the collection before your departure.

9.3. MIX OF TRANSPORTATION

In this case, usually, the departure transport is manage by the payload team due to the early departure of CNES containers. And the return transport is made by CNES.

In case you choose this option, please note that custom declarations have to be discussed before the departure transportation.
(For example, CNES does not us ATA carnet for Canada, there is a specific custom process with the Canadian Space Agency.)

DIFFUSION

NOM	SIGLE/SOCIETE	NB	NOM	SIGLE/SOCIETE	NB
DUBOURG Vincent	**BL/D**		**TESSARIOL Laurent**	**BL/OB**	
VARGAS André	**BL/DA**		JOUHANNET Nathalie	BL/OB	1
BEZ Pascale	BL	1	BATAILLE Thierry	BL/OB	
LOUVEL Stéphane	BL	1	BELLANGER Brice	BL/OB	
SOSA-SESMA Sergio	BL		BERGOS Pierre	BL/OB	
VACHER François	BL		BESSES Francis	BL/OB	
VENEL Stéphanie	BL		BLON Frédéric	BL/OB	
MIRC Frederi	**BL/NB**	1	BOTTIER Grégory	BL/OB	
NICOLLE Eliane	BL/NB	1	CAZALET Mathieu	BL/OB	
ALIAS Grégoire	BL/NB		CLEMENT Grégory	BL/OB	
BAUSCH Denis	BL/NB		CRUZEL Serge	BL/OB	
BRAY Nicolas	BL/NB	1	DOULIEZ Alain	BL/OB	
COGHE Thomas	BL/NB		JURQUET Bastien	BL/OB	
GALY Cyril	BL/NB		JUSTE Thibault	BL/OB	
GUILBON René	BL/NB		LACOURTY Michel	BL/OB	
HARMAND Fabien	BL/NB		LAVIGNE Gauthier	BL/OB	
NICOT Jean-Marc	BL/NB	1	LUZE Patrick	BL/OB	
PEUS Alain	BL/NB	1	REBIERE Patrick	BL/OB	
REGNIER Bruno	BL/NB	1	SABLON Igor	BL/OB	
RICHARD Julie	BL/NB	1	THOUMIEUX Frédéric	BL/OB	
SOUBERCAZE-PUN Geoffroy	BL/NB		VERGNAUD Antoine	BL/OB	
VALDIVIA Jean-Noël	BL/NB	1			
VALERO Colette	BL/NB		**QUEVAREC Erwan**	**BL/VP**	1
ZENONE Isabelle	BL/NB		BEHAR Jean-Baptiste	BL/VP	
BOAN Pierre	DTN/AVI/AV		CLAVERY Mathieu	BL/VP	
BASQUIN Thomas	THALES pr DTN/AVI/CC		CONESSA Huguette	BL/VP	
DAUBAN Gilles	SCALIAN pr DTN/QE/BA		COUSINET Rémi	BL/VP	
ESTAQUE Philippe	DOA/SME/LOS		GUIGUE Pascale	BL/VP	
POREZ-NADAL Florence	DTN/QE/BA		LECTEZ Anne -Sophie	BL/VP	
HENAULT Frédéric	ALTEO INDUSTRIES pr MECANO I&D pr DTN/AVI/MT		LOSTAO Marta	BL/VP	
JOLLY Antoine	DTN/AVI/AC		PLANES Mikael	BL/VP	
PIQUEREAU Stéphane	CS pour DTN/TVO/LV		VIALANEIX Maylis	BL/VP	
TERREROS Nicolas	THALES pr DTN/AVI/CC				
THAUVIN Emmanuelle	DOA/SME/LOS				
HOURTOLLE Catherine	DTN/TVO/LV	1			
CHEVRIER Charles-Antoine	DTN/DV/AS	1			
BES Arnaud	AKKA pr DTN/QE//IM				
DUPUY Christel	SCALIAN pr DTN/QE/NEO				
MARTINEZ Béatrice	SCALIAN pr DTN/QE/BA				
BONNIN Cédric	ASO pr DOA/BL/VP				
DELECROIX Thomas	ASO pr DOA/BL/NB				