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Congress 2017

Manless operation of aerial ropeways

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Operation of aerial ropeways without present staff

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- Definition / introduction / examples
- Regulations
- How to ensure the same safety level as with an operator in every station ?
- Feedback from STRMTG on such systems

Operation of aerial ropeways without present staff

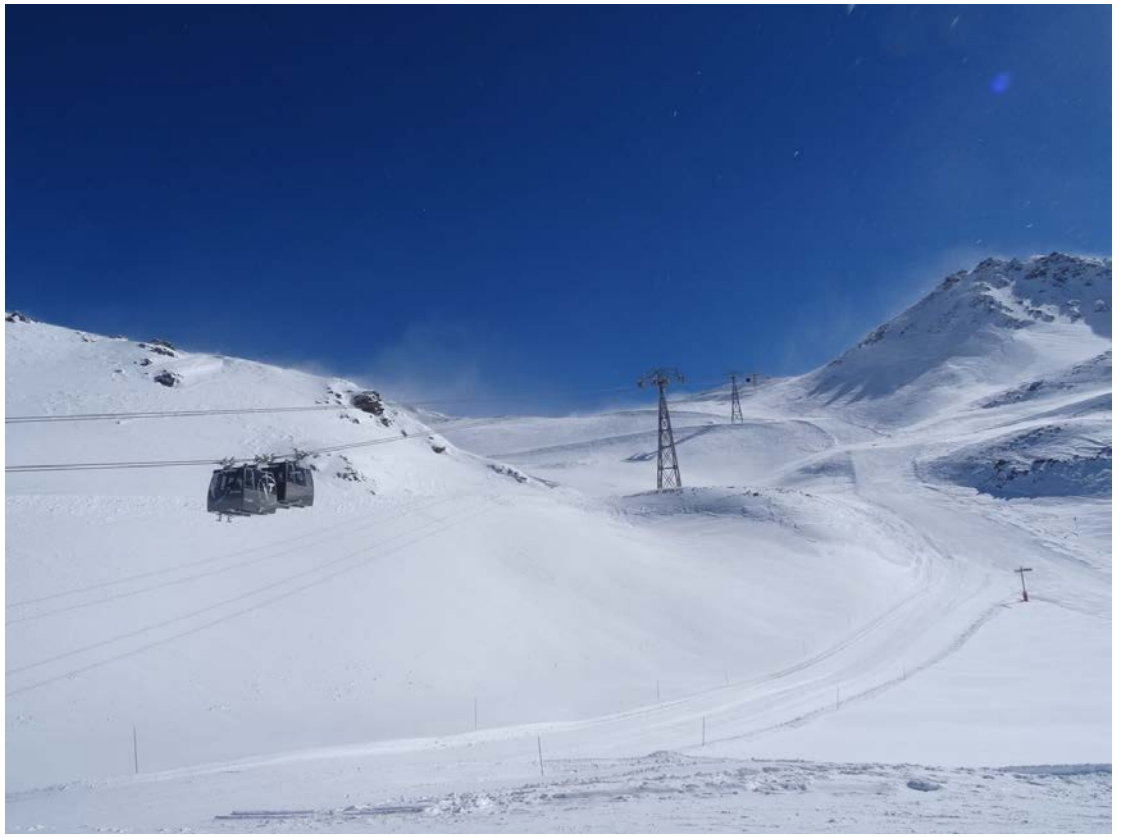
- On « usual » installations, one or more operators in every ropeway station, and in certain cases in big vehicles
- On the more rare installations without present staff, it doesn't mean that the operation is totally manless, but there isn't an operator in every station
- Main question : keeping the same safety level as with the operator, on the various aspects of her/his monitoring/management missions :
  - Safety of passagers in the stations :
    - In link with the installation,
    - Interface with cabins, loading/unloading,
  - Embarked weight,
  - Weather conditions,
  - Alarms and automatic stops, and resetting them,
  - Evacuation,
  - Fire risk.

Examples of aerial ropeways in France without present staff

- Jigback operation :
  - Funitel « Trois Vallées (Bouquetin) » in Val Thorens – POMA – 2003
  - Gondola « Télébuffette » in Montchavin – Leitner – 2008
  - Funitel « Thorens » in Val Thorens – BMF – 2011
  - Gondola « Petit Moriond » in Courchevel – POMA – 2012
  - Jigback cable car « Dahu » in les Arcs – BMF – 2015
  - Jigback cable car in Brest – BMF – 2016
  - *Jigback cable car project in Orléans – POMA – 2018*
- Continuous movement operation :
  - Gondola « Cairn-Caron » in Val Thorens – Doppelmayr – 2007
  - *Gondola project « Moraine » in Val Thorens – Doppelmayr – 2017*
- Installations used as examples throughout the rest of the presentation

Where is the operator ?

- Only one operator in a station for several stations on the installation
- (Cairn-Caron, Trois Vallées)
- Operator positionned and already supervising another installation
- (Thorens, Moraine project)
- Operator in a remote control room
- (Dahu, Brest, Orléans project)
- Choice sometimes possible between these options
- (Télébuffette, Petit Moriond)



- FT Thorens : photo taken from chairlift Portette top station, operator position

Regulations

- No special mention or treatment in the EN standards
- In french texts, a few recent evolutions in RM1 regulation guide :
  - Possibility to operate with cabins >40people without staff on board, but with bidirectionnal communication equipments with an operator
  - Not referring to the installation driver anymore, but to the driving missions, in link with the Safety Management Systems
  - But otherwise, no particular explicit specifications on systems without present staff
- French control authorities (STRMTG) ask for a special risk analysis for operation without staff, with the following main attention points...

Passenger safety in stations in link with the aerial ropeway

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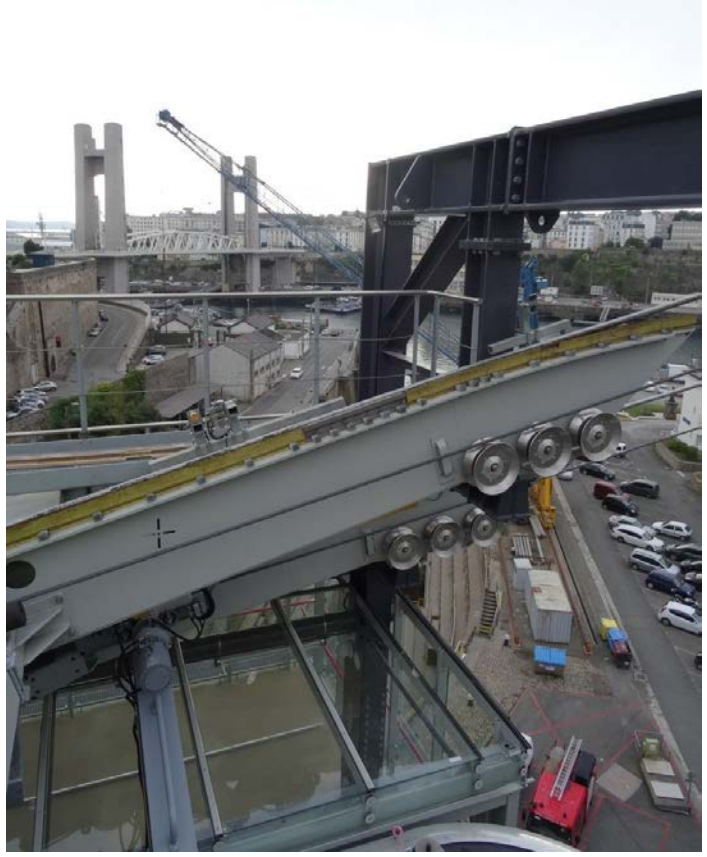
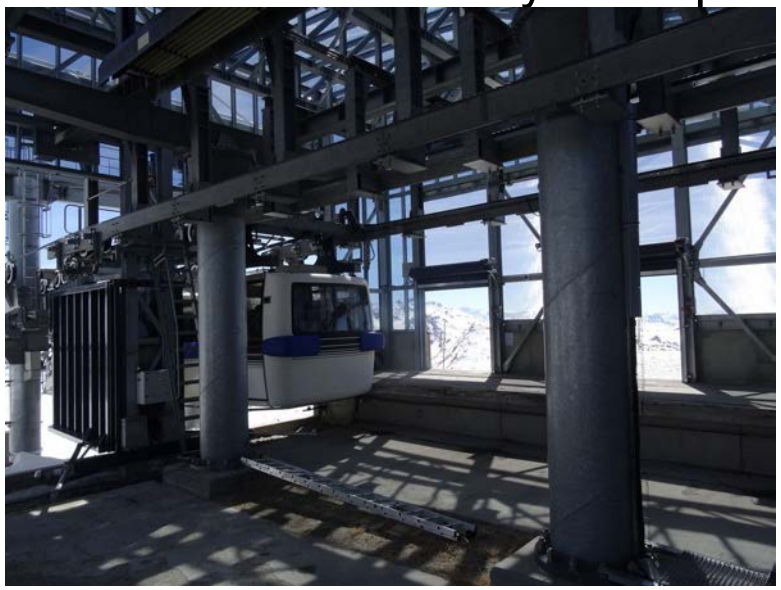
- Turning parts must be unreachable
- (Prevention of abnormal behaviours, especially for urban uses)

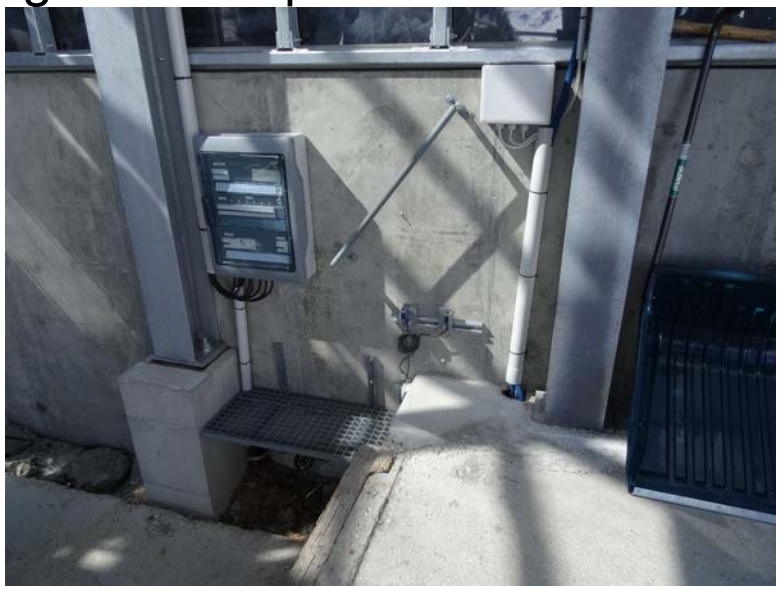


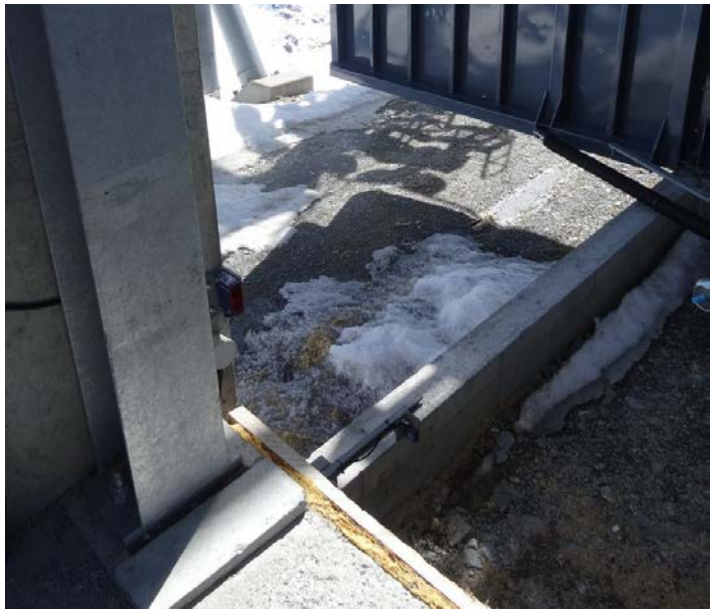
- TPH Brest, Jean Moulin station

Passenger / cabin interface for jigback operation

- Risks : passenger falling from the platform, going under a cabin, stuck in the doors while cabin departing
- Most obvious solution : Platform Screen Doors (PSDs)
- Or combination of:
  - Immaterial barriers detecting falls (not too high) from the platform
  - Detection of bad loadings
- In both cases, alarm / stopping buttons accessible to users on the platforms, discussion on what they do depending on cabin position



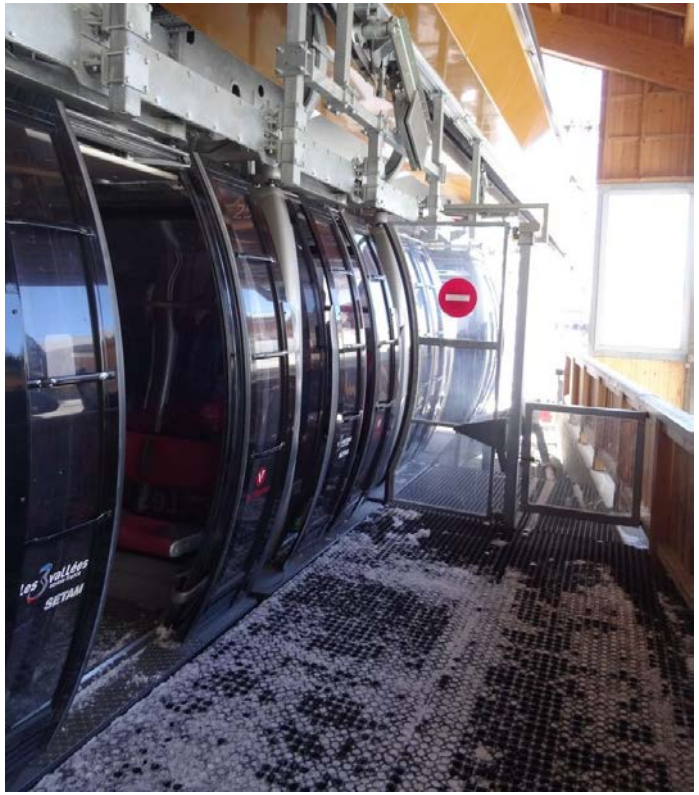




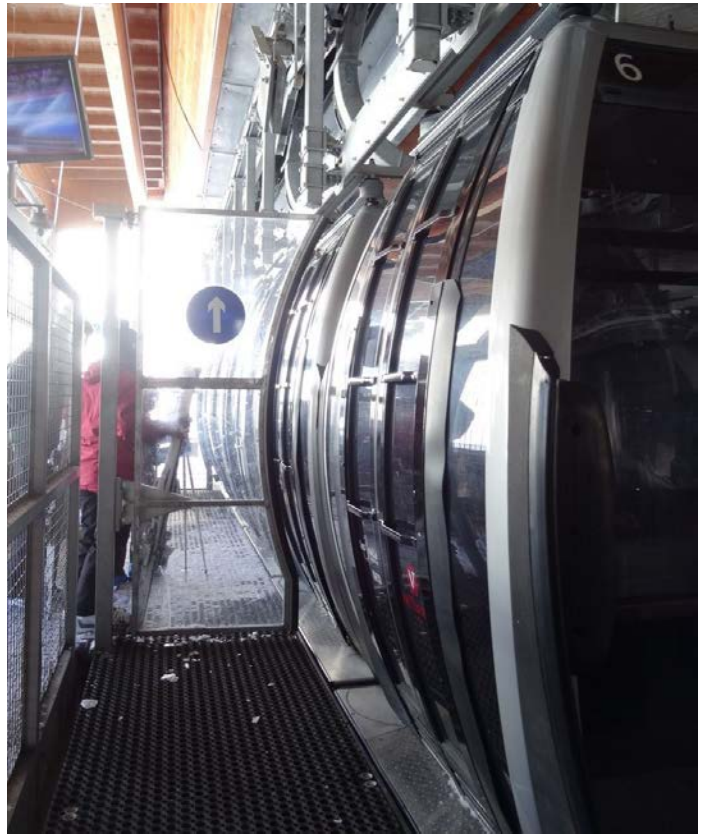
- FT Trois Vallées – Bouquetin : bottom pit and platform detection cells

Passenger/cabin interface for continuous movement operation

- Gondola Cairn-Caron, managed by a « moving cabin wall » in the station :
  - Special parts on the side of the cabins avoiding gaps between cabins
  - Chain with fingers in the upper part ensuring vehicle spacement
  - Sensitive area at the end of the platform to stop in case of bad loading/unloading
- New systems in development for new projects



- TC Cairn-Caron, top of Cairn station



Embarked weight management

- Needed to ensure absence of overweight / conditions of use of the cabins
- As nobody can estimate the number of embarked passengers on-site or control people going over counting barriers for jigbacks, need for :
  - physical limitation inside the cabins,
  - and/or an integrated control system preventing departure in case of overweight (often already used to calculate cabin with 3500N/m²)

- FT Thorens

Management of weather conditions

- Compared to an usual installation, as the operator may not « feel » the conditions in every station :
  - Increased importance of wind sensors, possibly with intermediate alarms before stopping the installation,
  - Increased importance of checking weather forecast / reports daily before operation to know likely conditions to expect,
  - Increased importance of the daily morning visit before operation (for ex if it snowed the night before),
  - Video cameras in stations and possibly on the line to see what happens

- FT Bouquetin

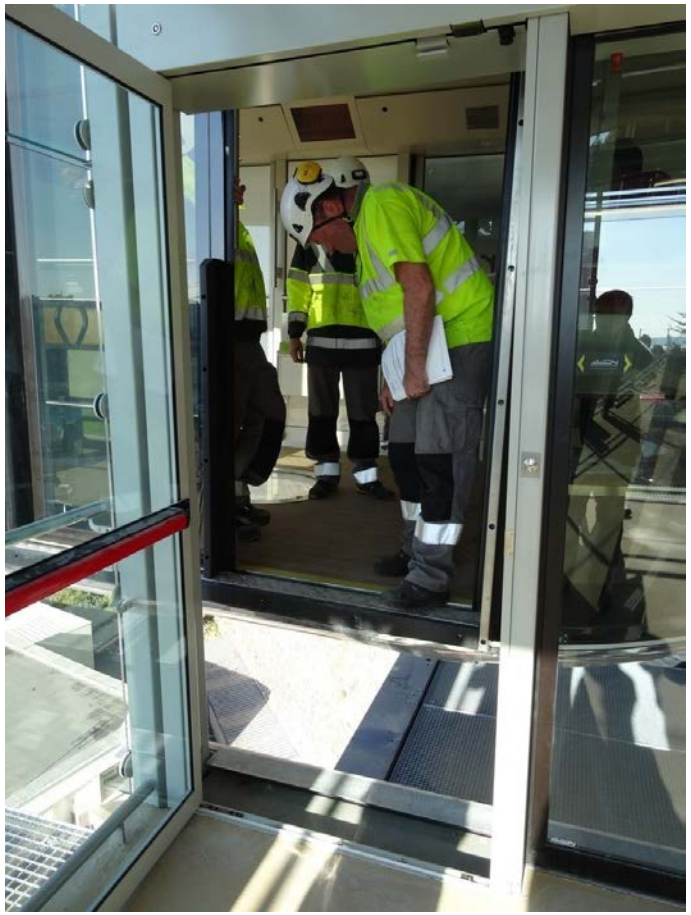
Management of alarms / automatic stops

- A few of them are resettable remotely, but the most critical are not !
- Necessity of operator on-site for many alarms / stops, and necessity of a limited / well-defined delay for the operator to come
- Examples of usual discussions on alarms on such systems :
  - Resettable remotely after a passenger alarm button on the platform (classical subject on automatic underground railway systems) ?…
  - ...and should the system stop or not depending on the cabin position ?
  - Automatic stop due to a short gust of wind : when to reset, from where, and relaunch with which speed ?

Evacuation

- With PSDs, question of passenger auto-evacuation when the cabin is stopped close enough from the station
- It should be possible to unlock the door from inside the cabin, and not dangerous to get out

- TPH Brest, Capucins and Jean Moulin stations



Fire risk management

- Need for a specific risk analysis for each installation (real risk under the line / in the stations, cycle time, …)
- Early detection of the fire can't be done by the operator, especially in/near stations…
- ...hence importance of the communication system with the passengers, particularly in case of operator in a remote control center and/or in cities
- Questions raised in link with « fire emergency mode » without staff in the station :
  - In case of fire, should it be triggered straight away, or would ending the current cycle and blocking next departure be enough first ?
  - Where are the triggers for the « fire emergency mode » ?
    - On-site → more time to reach them,
    - Remote → complicated to secure the link, including fire-proof it

STRMTG feedback on aerial ropeway operation without present staff

- No serious incident so far, but few such installations in service
- Few occurrences of an operator having to access on-site to solve a problem
- The safety analysis demonstrates that safety level is at least as good as an installation with present staff
- (Cost efficiency : more complicated systems, so more expensive to conceive / build)
- A ropeway without present staff is a complex system, it should not be handled as an elevator or an escalator !
- Usual staffed ropeway reflexes must be kept, in particular to reset alarms / automats and manage weather conditions
- The operation without staff should remain an operation mode the operator can give up at any moment

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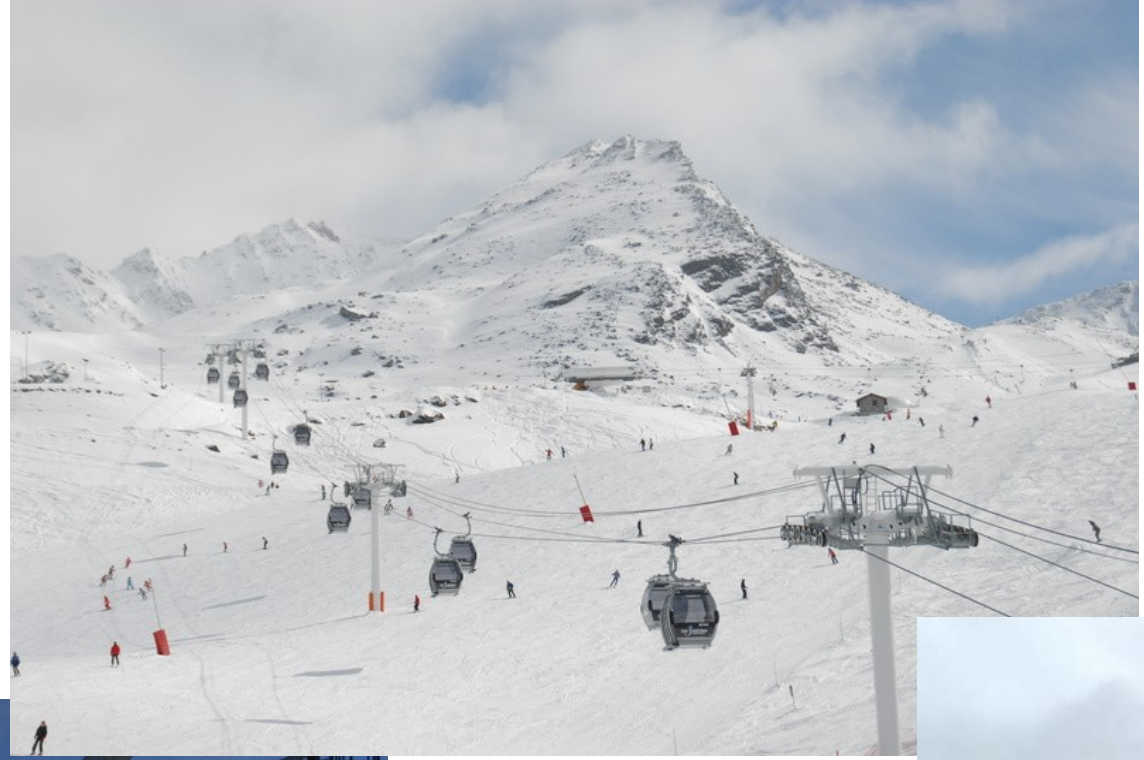
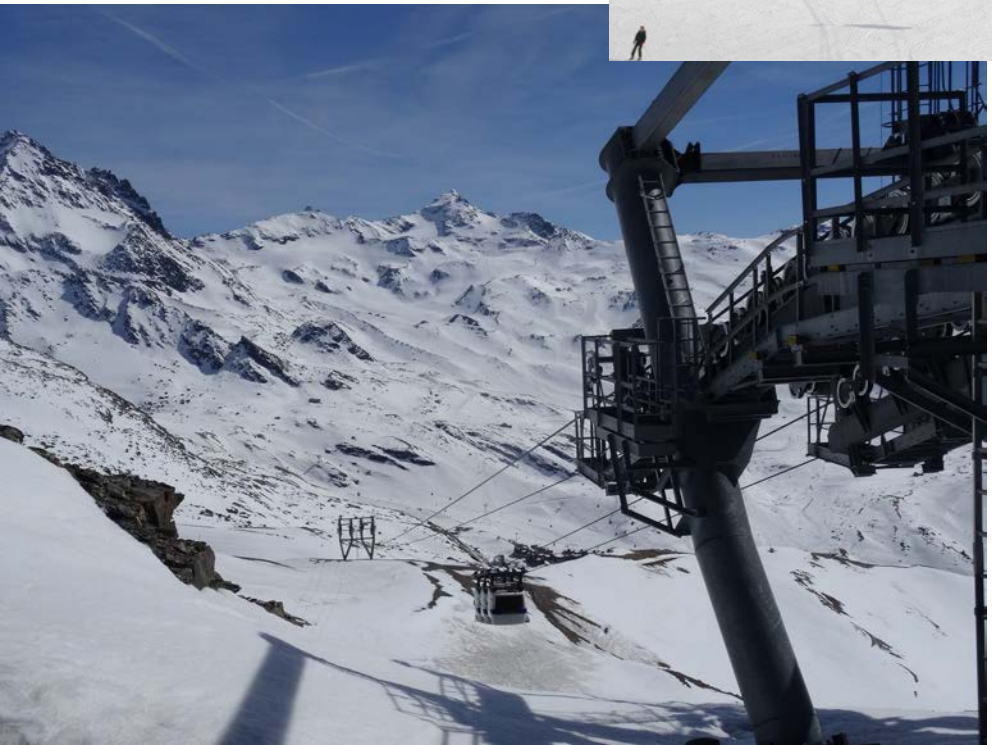
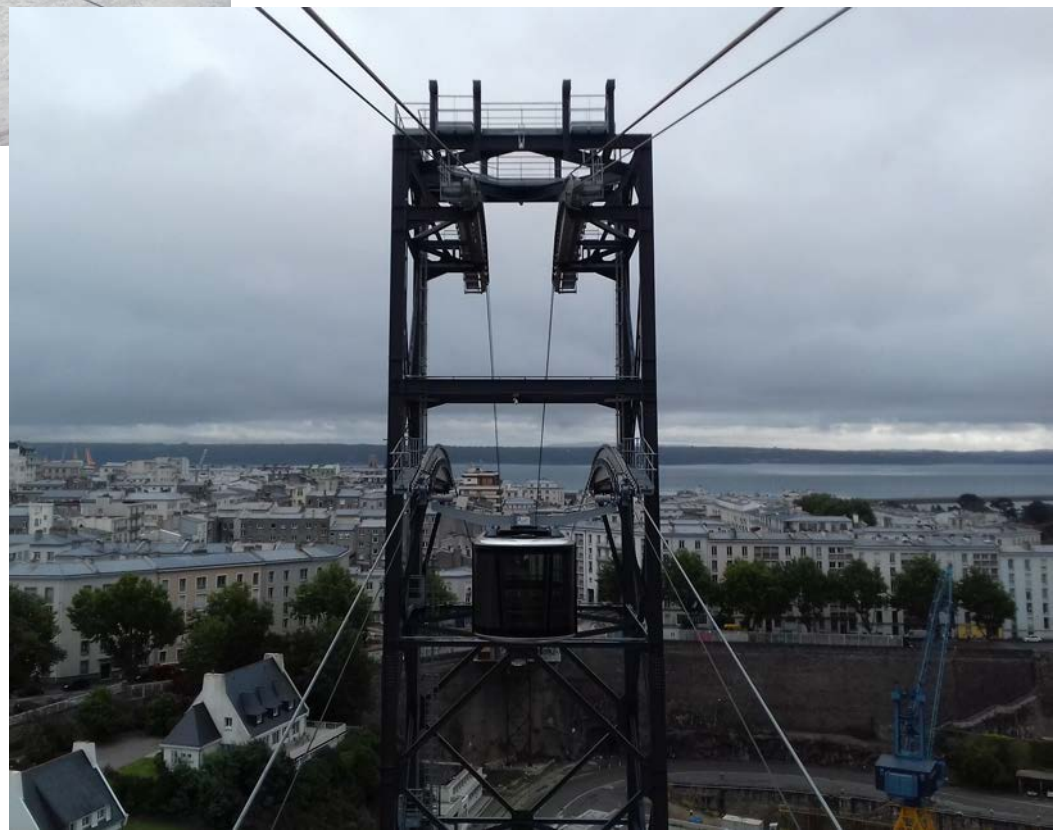




Thanks for your attention



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