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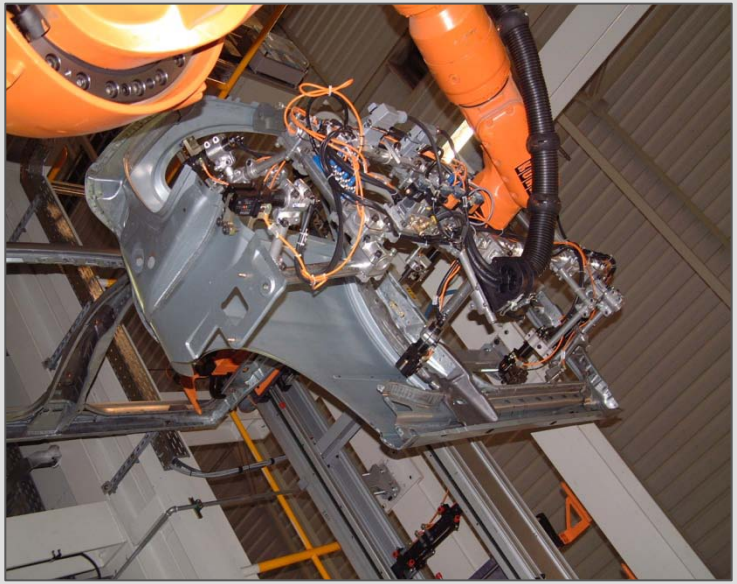
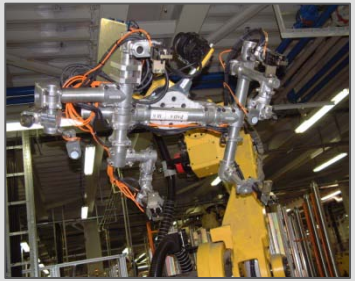
ULTRALIGHT ROBOT GRIPS

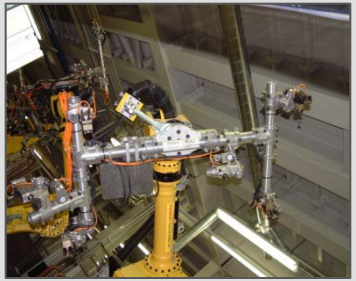
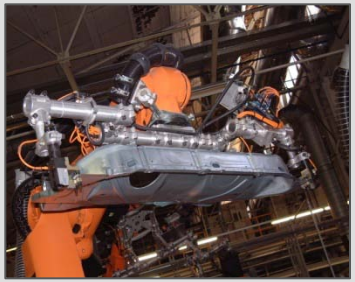
TECHNICAL PRESENTATION

www.misati.com

Specialist in Automation

Misati is a reference manufacturer in pneumatic fastening elements. Founded in 1977, Misati is nowadays a world-leader specialist in automating stamping processes with transfer presses and **robot grips.**

Technology

Misati has its own Research & Development Department, which designs and develops all Misati's fastening and structural elements. All Misati's technology is patented.

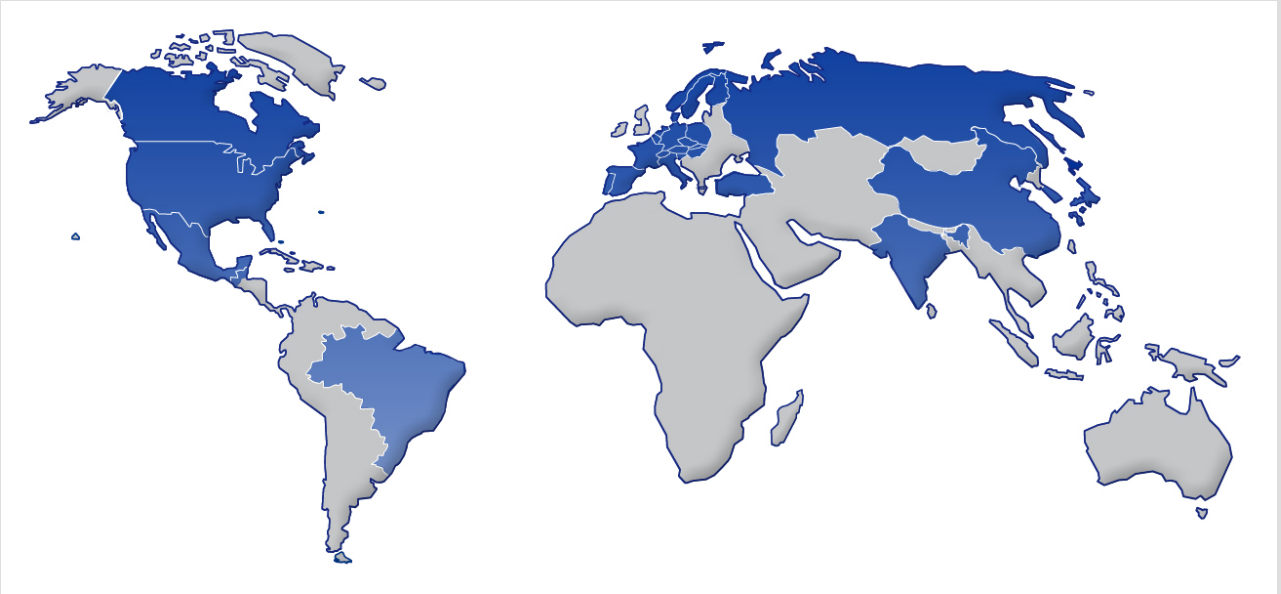
Misati also offers **engineering services** to its customers, either advising them on the use of its miniclamps (application engineering), revising their projects or developing projects of transfers or robot grips for them.

Production Process

Misati's **production process** is fully **automated** with the newest CNC machining centres, which enable us to manufacture miniclamps and structural elements with the maximum dimensional accuracy.

Distribution Network

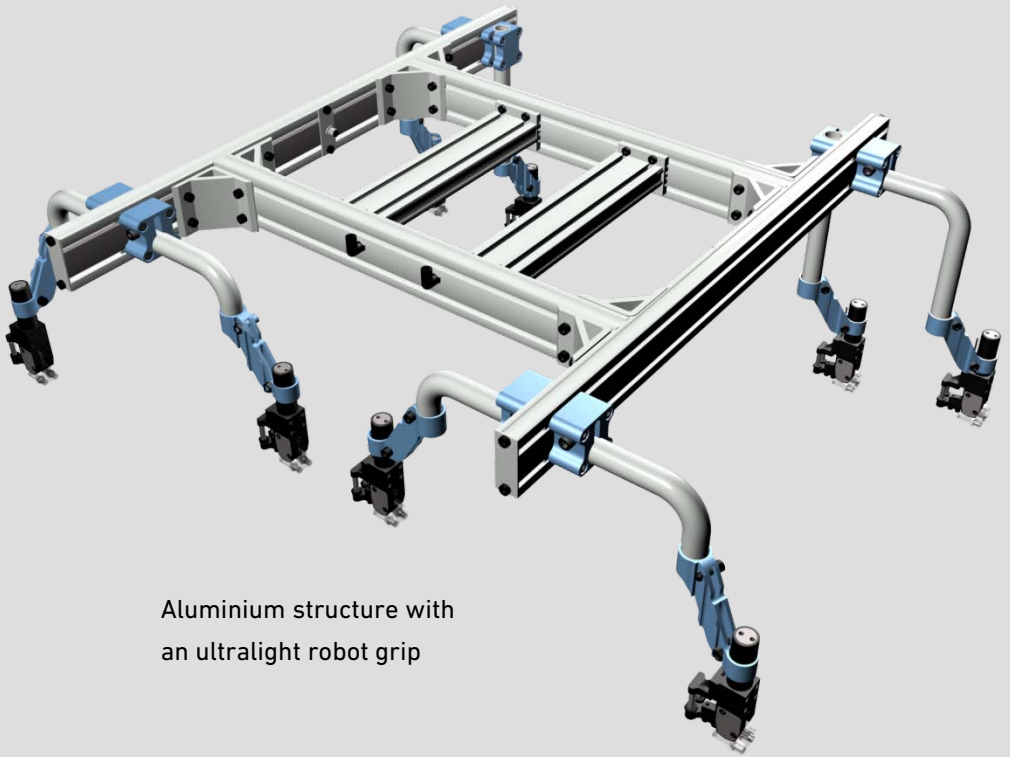
Misati has a **worldwide sales network** that gives support and personalized attention (sales engineers) to customers in Europe, America and Asia.



NEW ULTRALIGHT ROBOT GRIP

Ultralight Structure

The **new ultralight robot grips** are made up of Misati's high-quality standard pneumatic miniclamps and a **structure** –also designed and manufactured by Misati- with profiles, mountings, tubes and brackets made with a **special aluminium**.



Aluminium structure with an ultralight robot grip

Ultralight Robot Grip

As its name suggests, lightness is the most remarkable characteristic of the new robot grip, that is, a **reduced weight.**

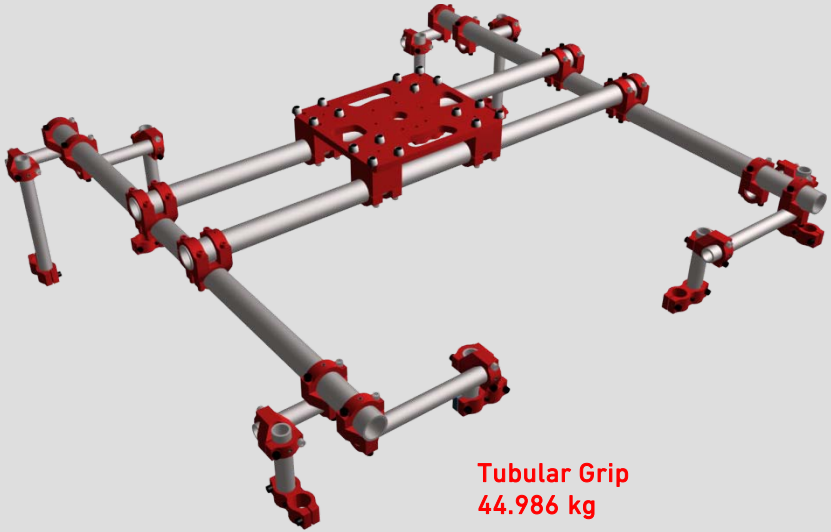
But, as we will see now, the new ultralight robot grip has other **unique technical advantages.**

Compared to the traditional tubular grips, ultralight grips become **more productive** and **cheaper** thanks to the benefits they product.

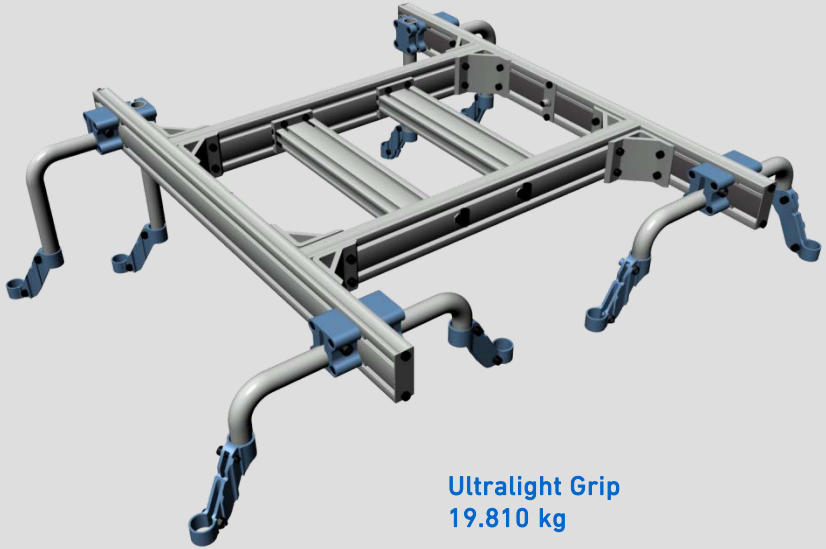
1. Reduction in Weight

While a tubular grip can weigh more than 40kg, the same ultralight grip can weigh less than a half.

– 55,96%



Tubular Grip
44.986 kg



Ultralight Grip
19.810 kg

1. Reduction in Weight

This drastic reduction in weight is possible because ultralight grip elements are manufactured with a **special machined aluminium alloy,** which, apart from a **low weight**, gives them a **high resistance**.

Likewise, the ultralight grip can be used under the **high mechanical overstressing** (deflection, angular moment, vibration, etc.) that robot grips usually suffer during handling processes.

1. Reduction in Weight

As there is less moving mass, **the robot can be smaller, cheaper** and so **quicker**.

2. Modular Structure

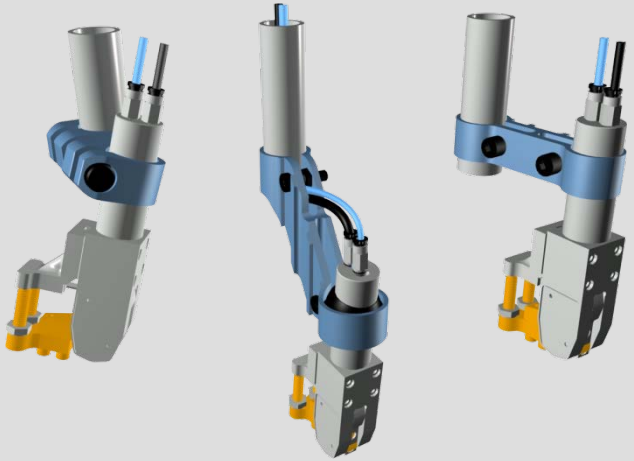
Misati grips are **modular,** or in other words, flexible and recoverable.

These grips are made up of different **standard components** (miniclamps, centring clamps, profiles, mountings, tubes and brackets) which are assembled together to form the structure that places the clamp at the desired point in the space.

2. Modular Structure

Modular structures have many advantages:

- They are **flexible**: components can be exchanged at any time simply by loosening nuts. It is not necessary to rebuild the whole grip in case you have to enlarge it or modify it.
- They are **recoverable & interchangeable**: as these components are standard, they can be used again in other grips.

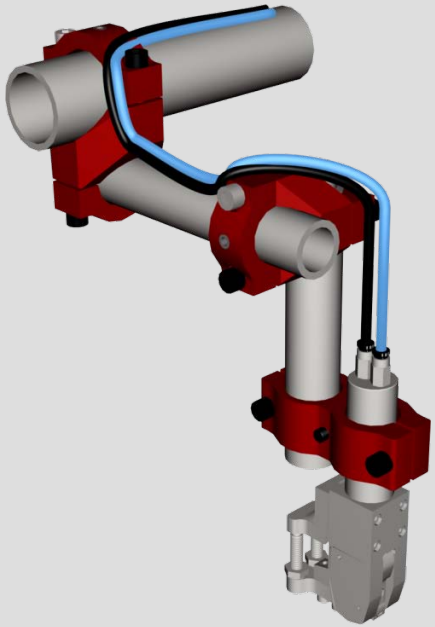


2. Modular Structure

- It is **not** required to **manufacture any special parts** since brackets are fastened directly to the miniclamp.

  This fastening is, moreover, made through the cylinder of the miniclamp, so it's possible to **change elements quickly**.

3. Protection of Cables



Tubular Grip

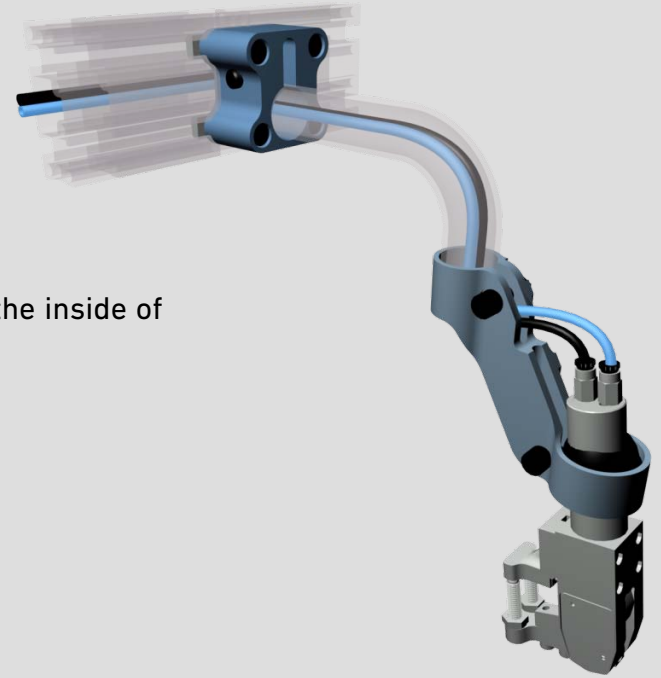
A grip has many wires and tubes: electrical cables for each sensor and pneumatic tubes to channel the compressed air to clamps and centring clamps.

These cables are tied externally to the **tubular grip** structure with plastic clamps or Velcro strips.

It is common that these cables get caught to any element of the system when it is in motion, so they easily get broken or disconnected and, therefore, there is a **production stoppage**.

3. Protection of Cables

The **ultralight grip** has been designed to house all cables through the inside of tubes and profiles, **avoiding any accidental breakage of cables**.



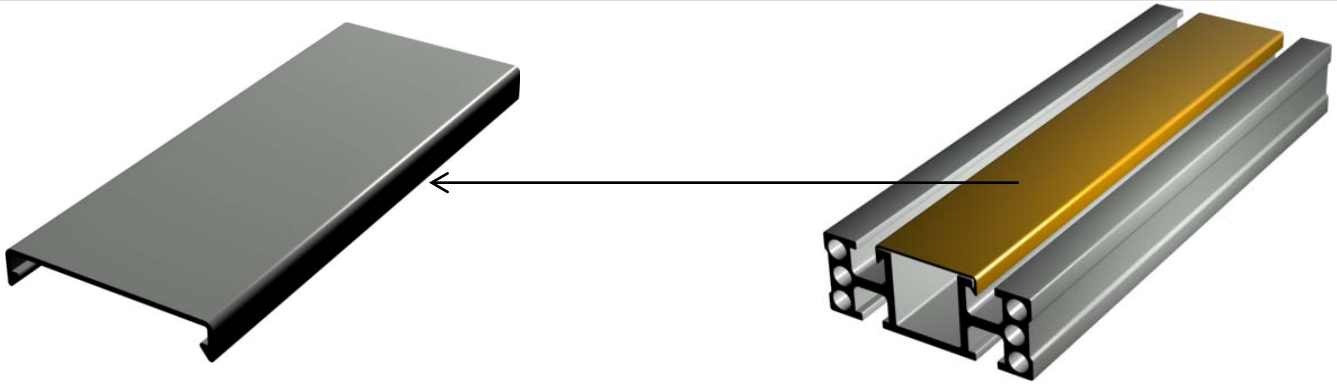
Ultralight Grip

3. Protection of Cables

Likewise, the **accessibility to cables** is guaranteed in case some changes need to be made on the grip. All you have to do is to take apart the rear cover from the profile to gain access to cables.

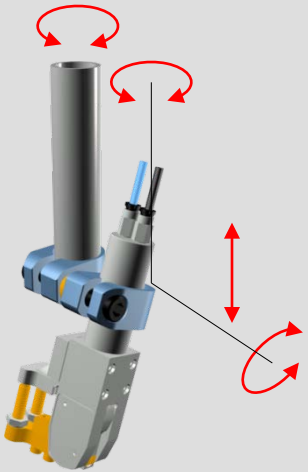
Rear Cover

Aluminium Profile + Rear Cover

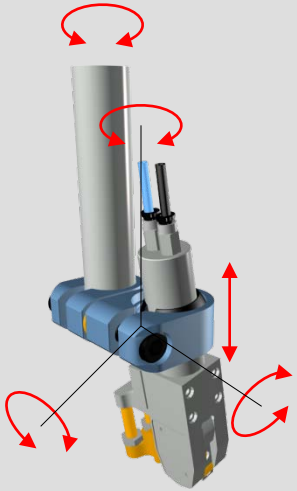


4. Degrees of Freedom

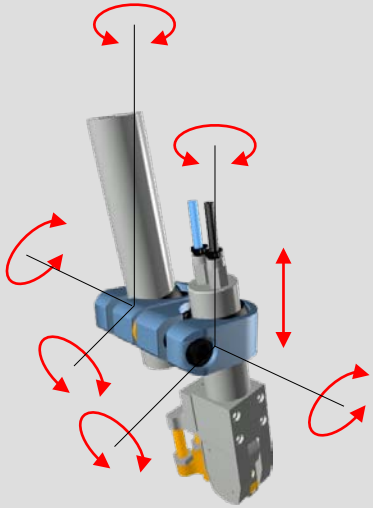
It is very important to provide miniclamps and the other terminal elements of the robot grip with the **6 degrees of freedom (3 displacements & 3 turns)** necessary to place the clamp at the desired point in space.



Without Ball Joint



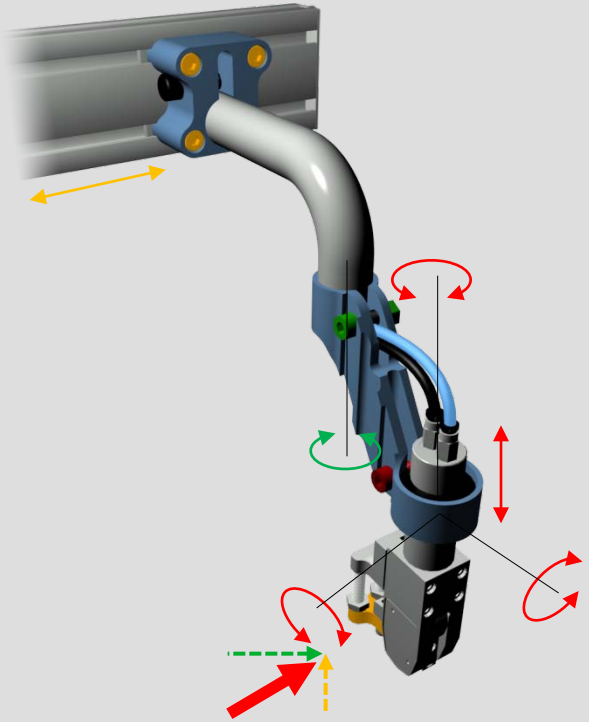
1 Ball Joint



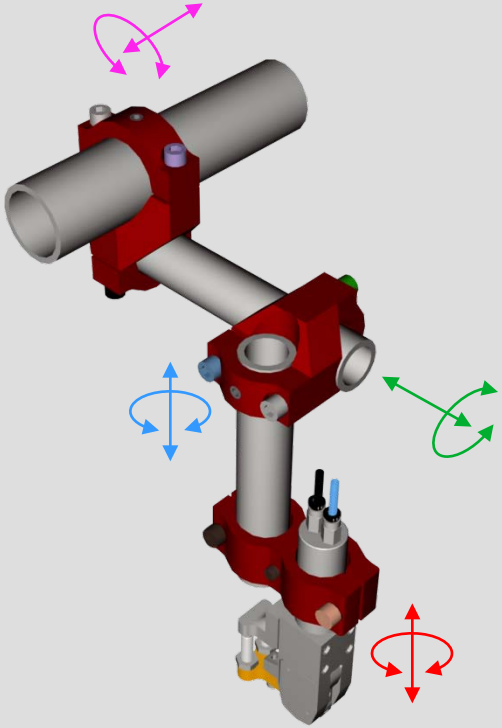
2 Ball Joints

4. Degrees of Freedom

These 6 degrees of freedom of the terminal elements will convert **any external force or impact on the grip into a breakdown of the sliding of joints**. Any breakages of the elements of the grip or permanent deformation of the structure are then avoided.



4. Degrees of Freedom

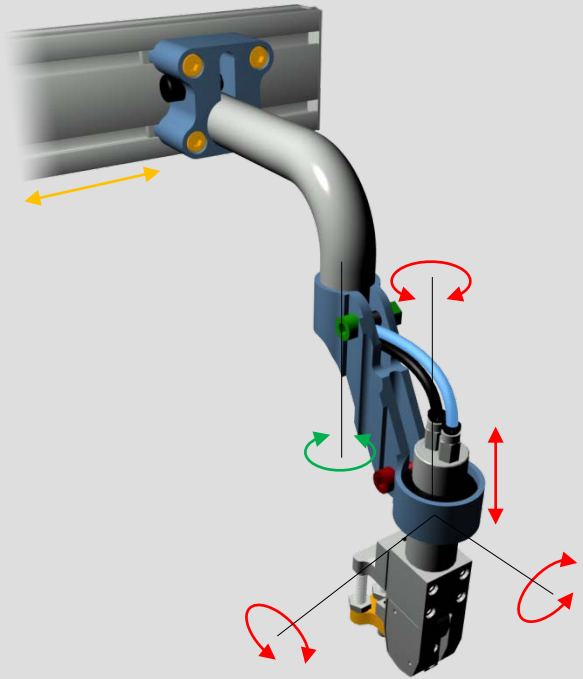


Tubular Grip

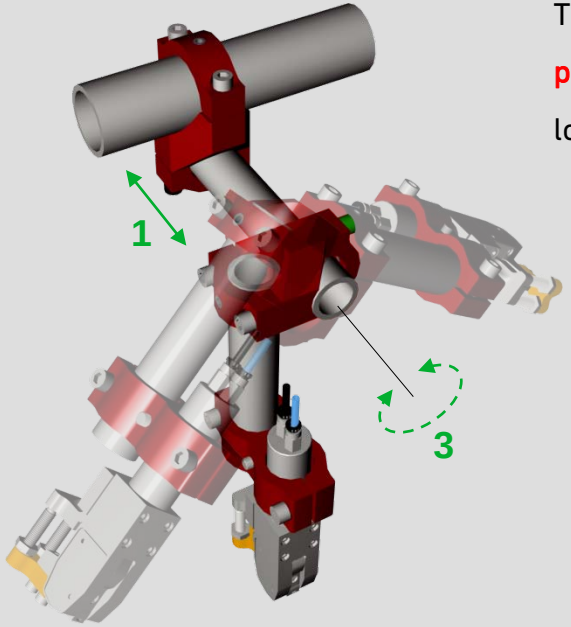
The closer the degree of freedom is to the terminal element, **the clearer and easier will be the adjustment** of the grip.

Degrees of freedom in traditional tubular grips are away from terminal elements, so adjustment becomes more complex. In ultralight grips, however, they are very close to miniclamps.

Ultralight Grip



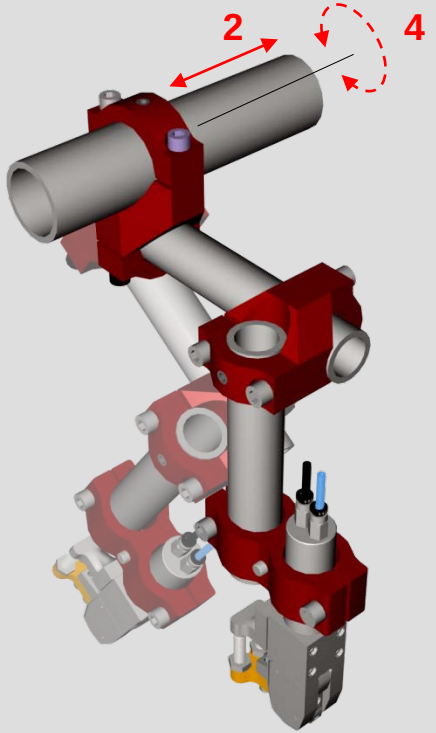
5. Adjustment of the Fastening Element without Losing Position



Tubular Grip

Traditional tubular grips **lose their position** in points 3 & 4 when screws are loosened to adjust positions 1 or 2.

The arm of the grip being assembed will fall swinging like a pendulum.



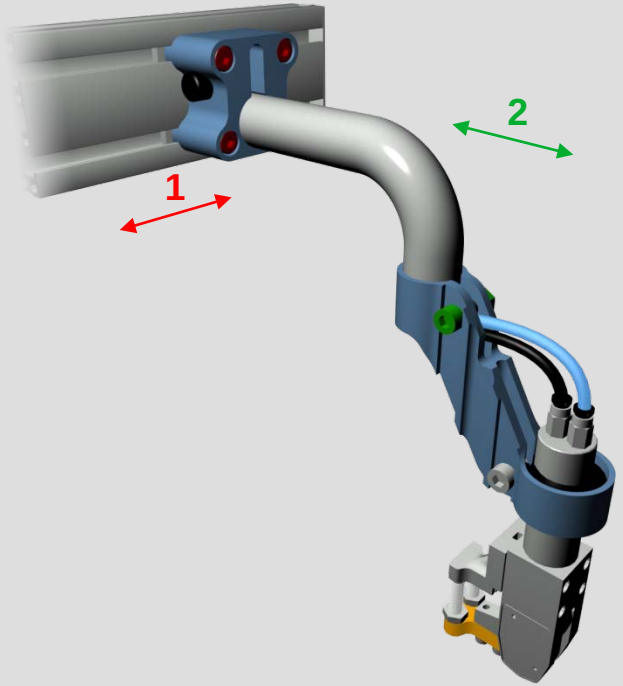
Tubular Grip

5. Adjustment of the Fastening Element without Losing Position

Nevertheless, position can be adjusted in Misati's ultralight robot grip **without the rest of the grip losing its orientation**.

The arm of the grip slides along the **profile slots,** which act as a guide and prevent the arm of the grip from falling down and losing its position.

This is a very useful feature during assembly and adjustment, as it saves time.



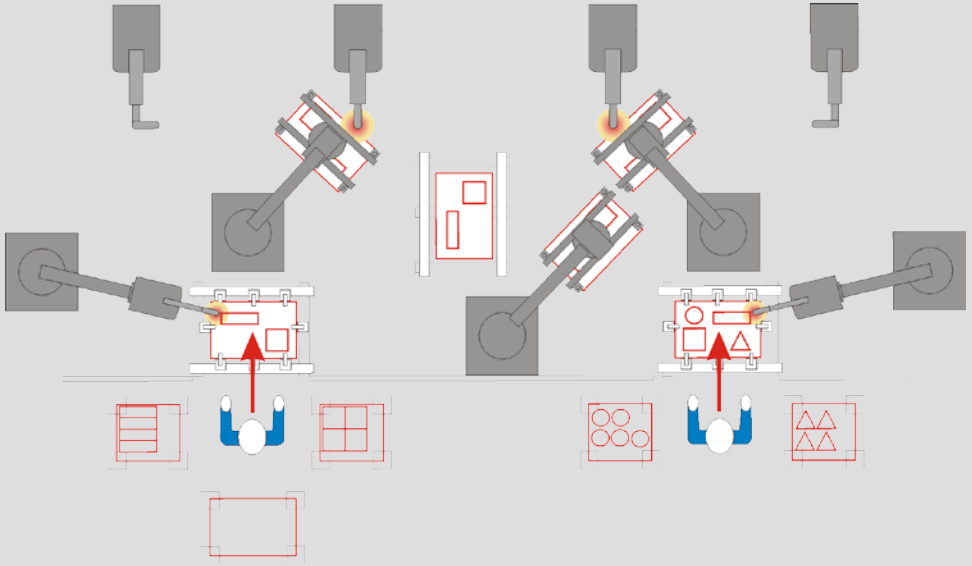
Ultralight Grip

6. Less Occupied Space

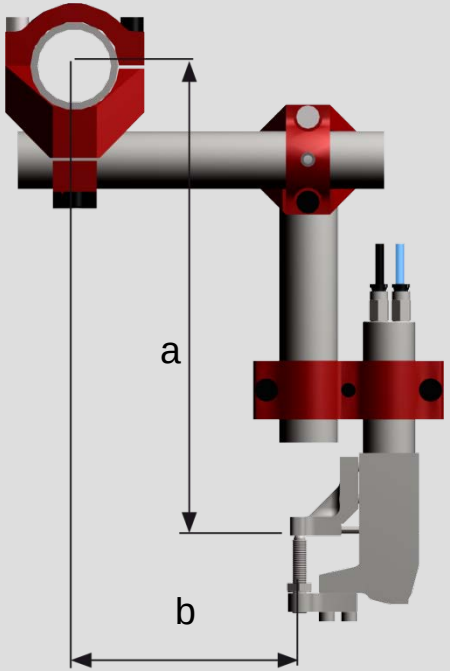
A robot grip needs to go in the tool, take the part and place it in another tool, with no friction or collision of any kind.

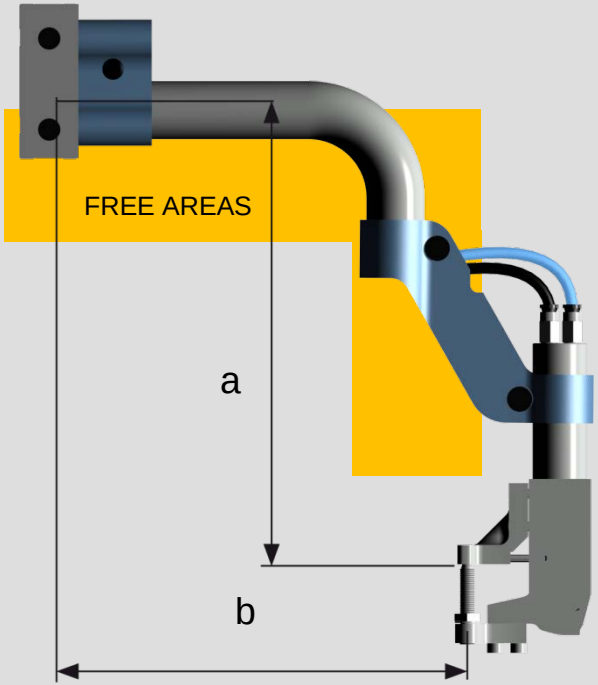
There are many elements that can complicate and even block the access of the grip to the part to handle, such as centring pins, fastening elements, and so on.

Hence the importance of having **grips that occupy a little space**.



6. Less Occupied Space





Compared to traditional tubular grips, the new Ultralight Grip leaves critical areas free (in yellow colour), so **the design the grip** and **its entry and exit from the tool becomes easier**.

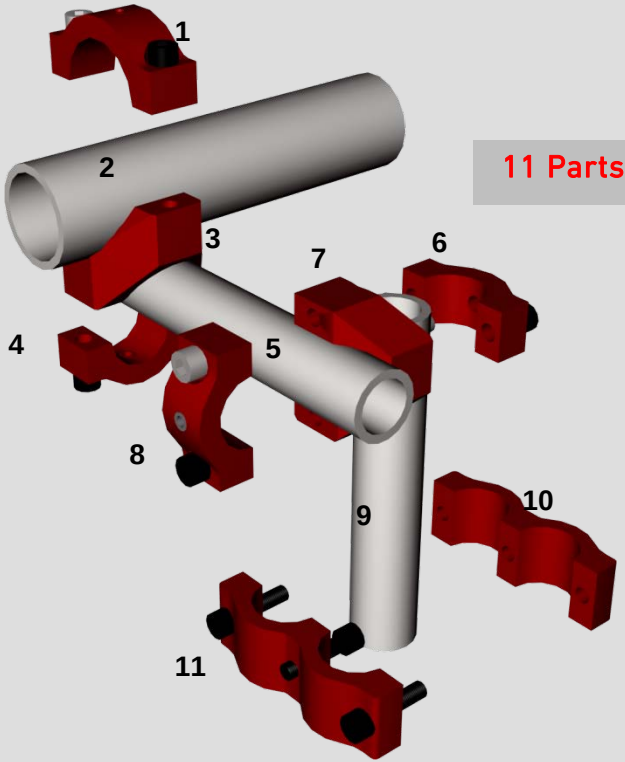
7. Sheet Detection

In order to avoid stoppages or impacts, it is absolutely necessary to have the sheet controlled at all times.

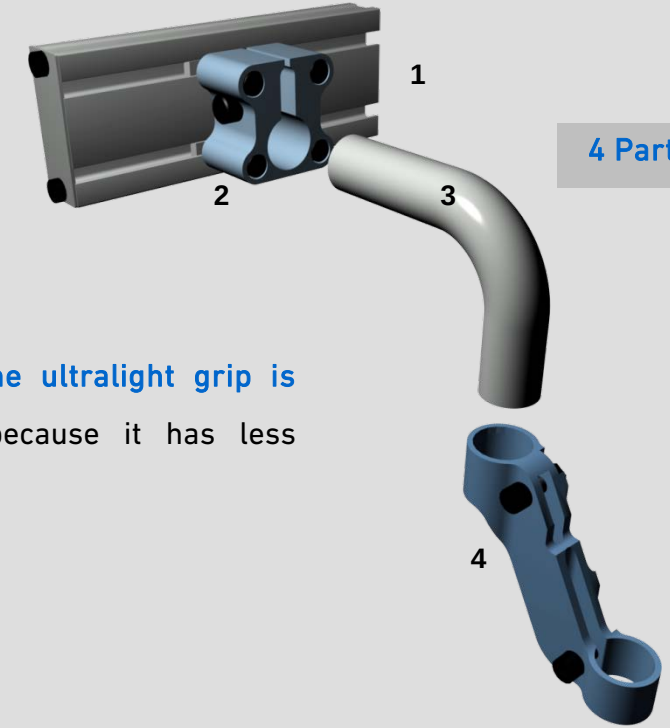
This is why the ultralight grip controls the presence of the part with the miniclamp sensors, which **detect whether the sheet is present or not** and whether the sheet is well located.

Signal:
- Presence of the sheet
- Closing of the Clamp

8. Less Number of Parts



11 Parts



4 Parts

The **design of the ultralight grip is much simpler** because it has less parts.

9. Lower Cost

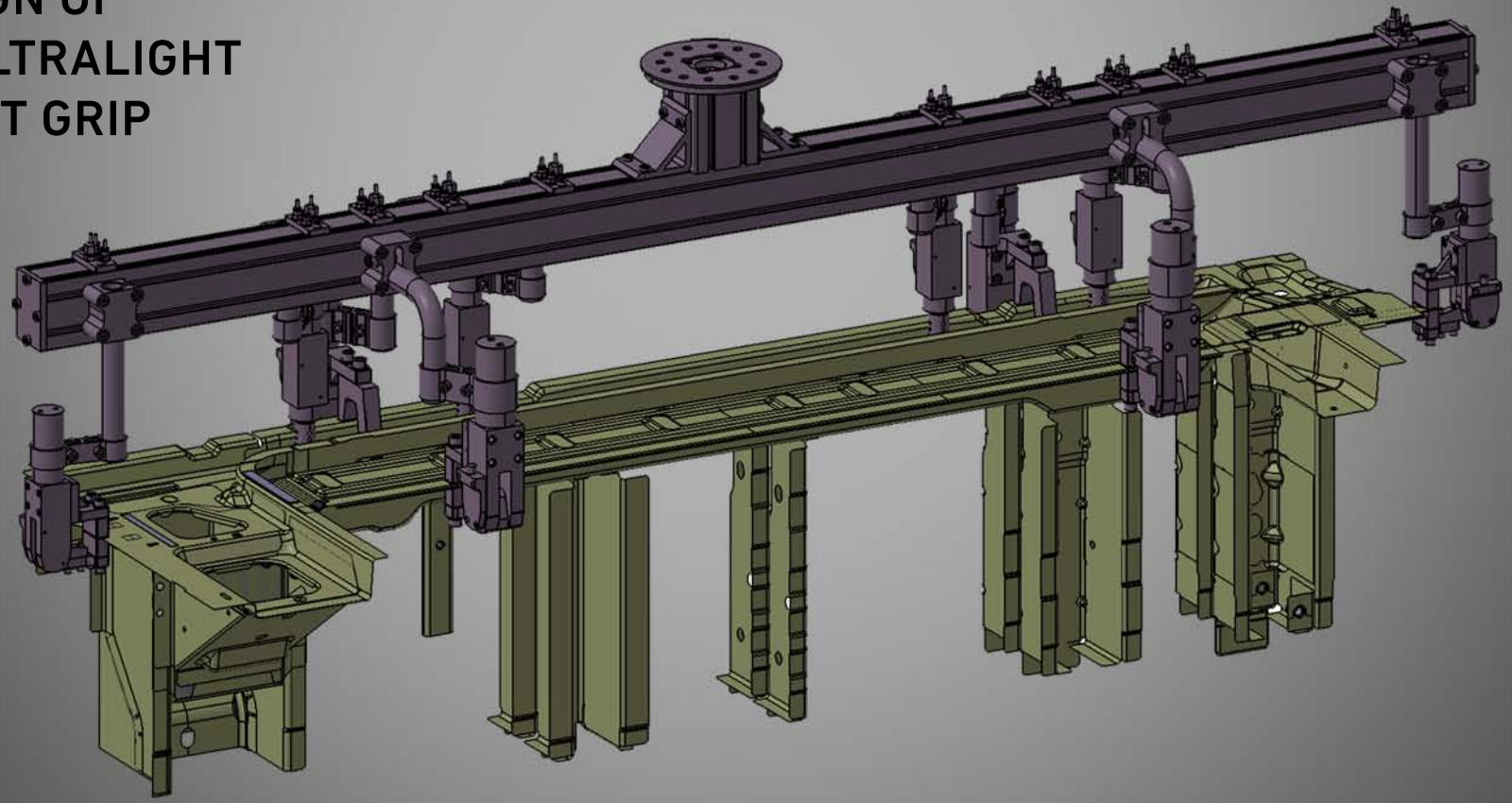
Misati's new ultralight robot grips are cheaper because:

- They facilitate the design, assembly and adjustment of the grip, so there is a saving in the number of working hours.

- Their elements are cheaper and a the delivery time is short.

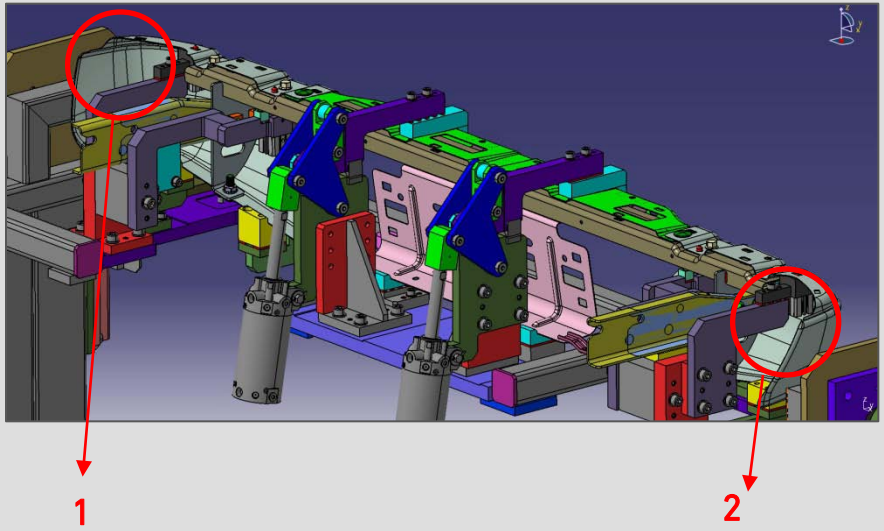
- Advice from the manufacturer, who will give the simplest and cheapest solution to the customer.

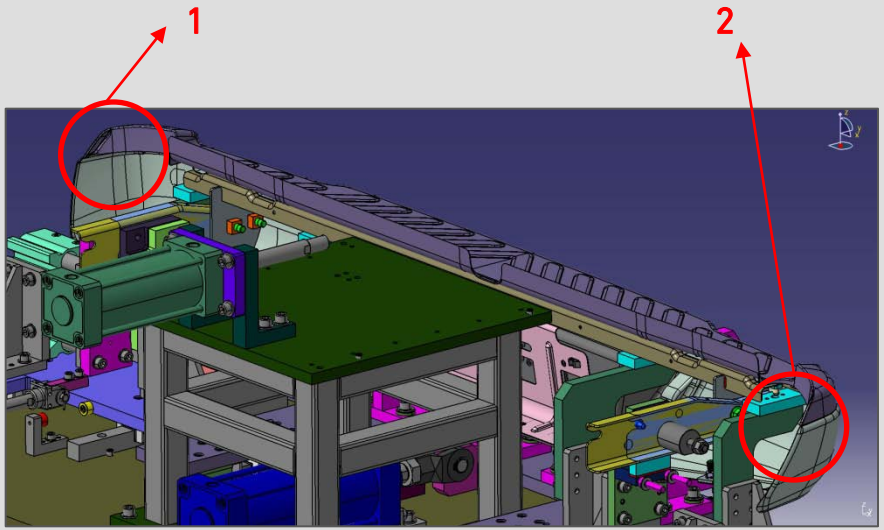
DESIGN OF AN ULTRALIGHT ROBOT GRIP



1. From where should the sheet be fastened?

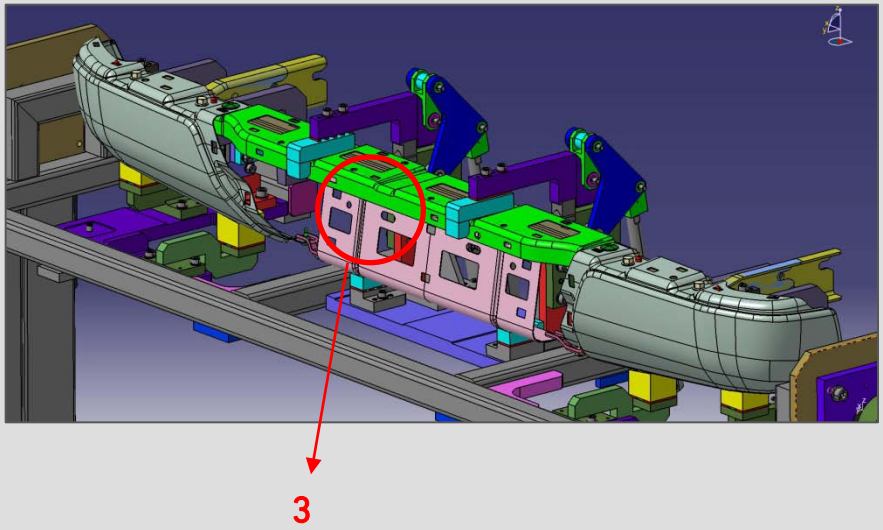
Unfortunately, the robot grip cannot always be designed to fasten the part from the most advisable or easiest point, but from the spare space available both in the entry and exit tools.

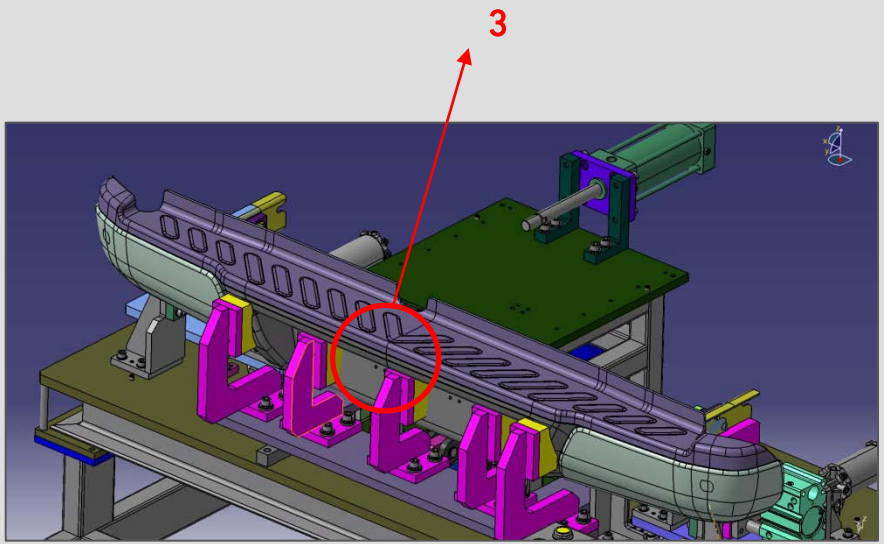




1. From where should the sheet be fastened?

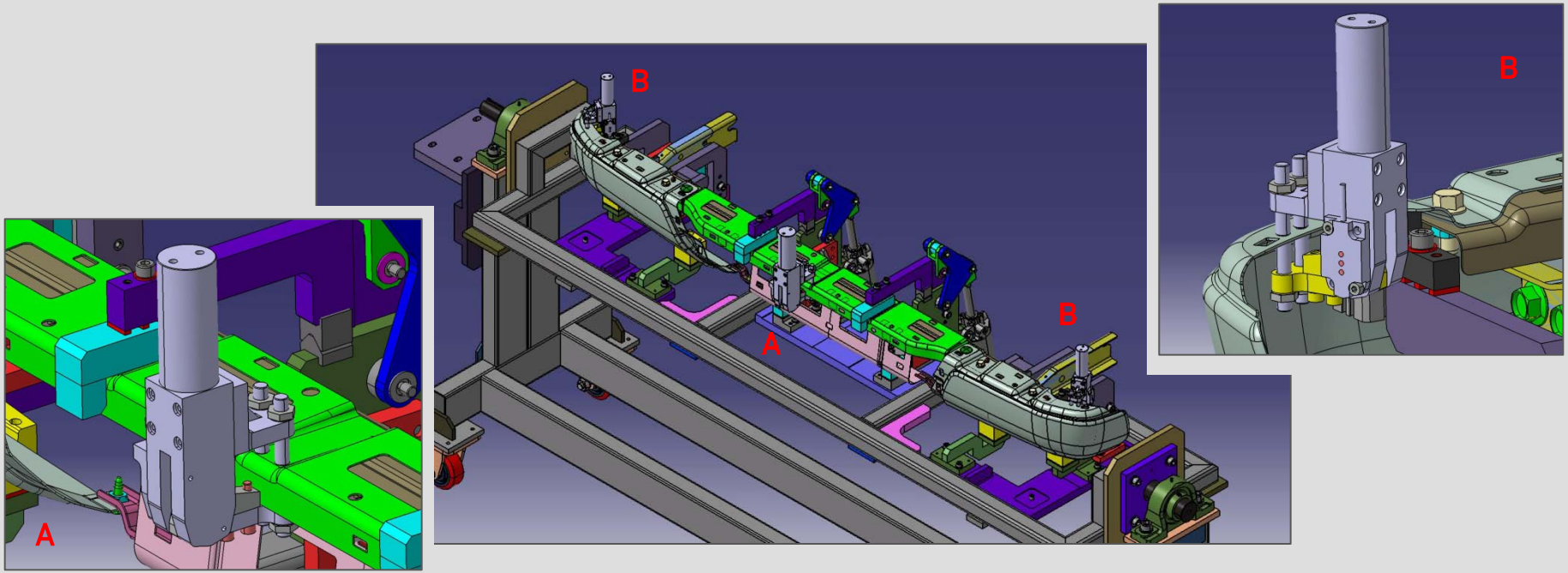
So, we will first look for these **spare points in both tools to fasten the sheet**.

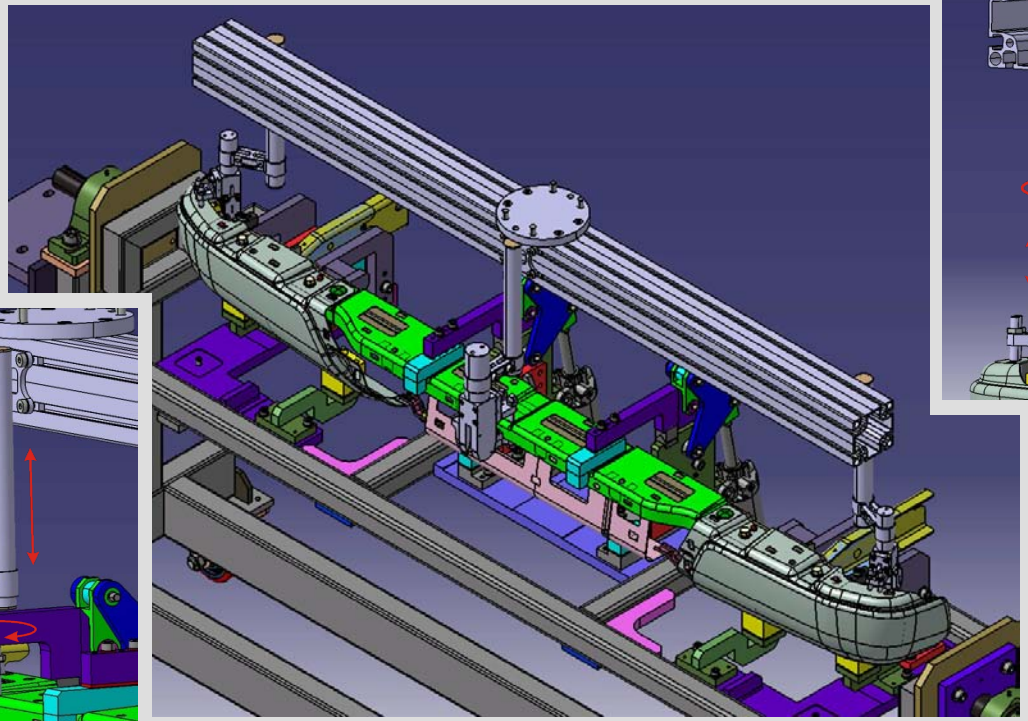


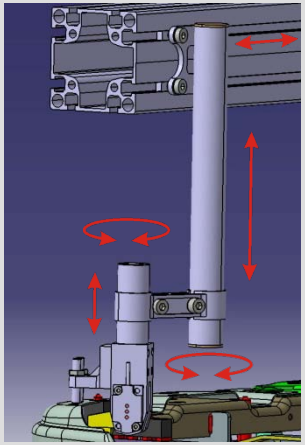


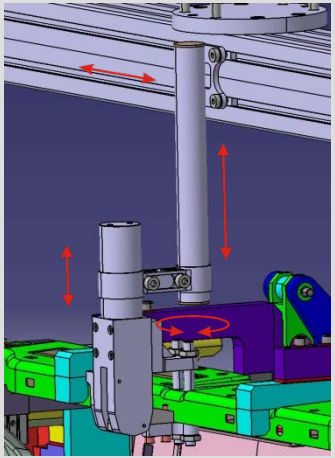
2. Choice of Miniclamps

Secondly, we need to choose the miniclamps according to the necessary force and to the fastening area on the sheet.



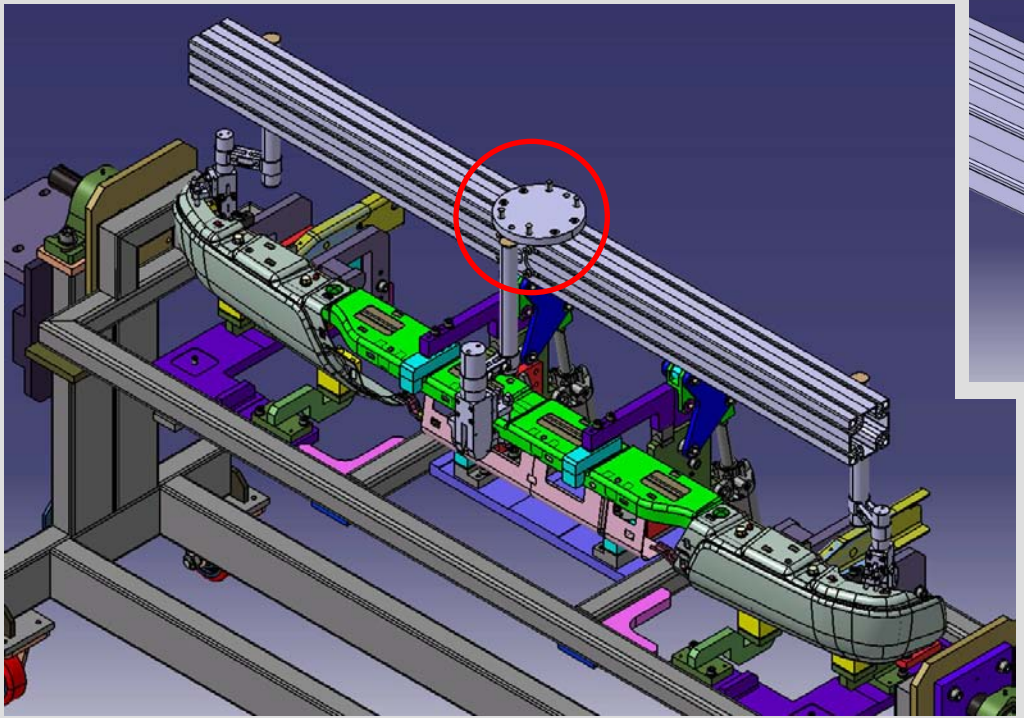


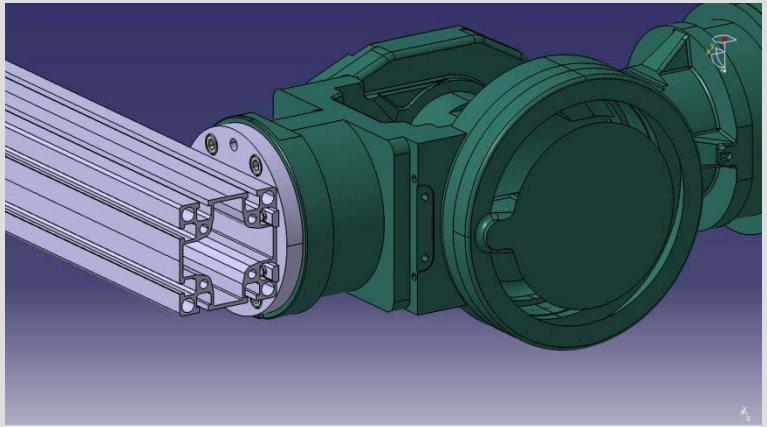




When designing the structure from the profile to the miniclamps, it is advisable to provide it with as many degrees of freedom as possible to make the adjustment of the grip easier.

4. Connection between Robot & Profile





Finally, the connection between the robot and the profile has to be decided.