



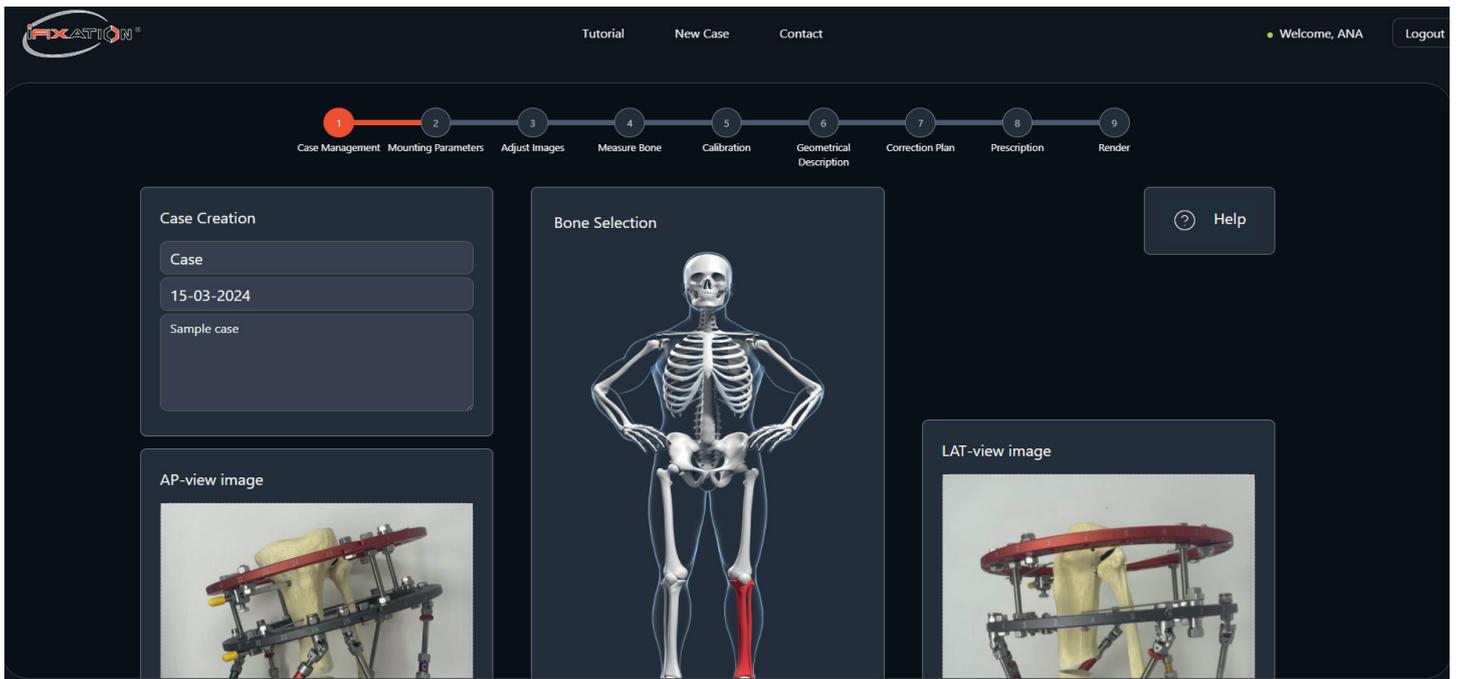
MILANO - ITALY



## User Manual iFix 2



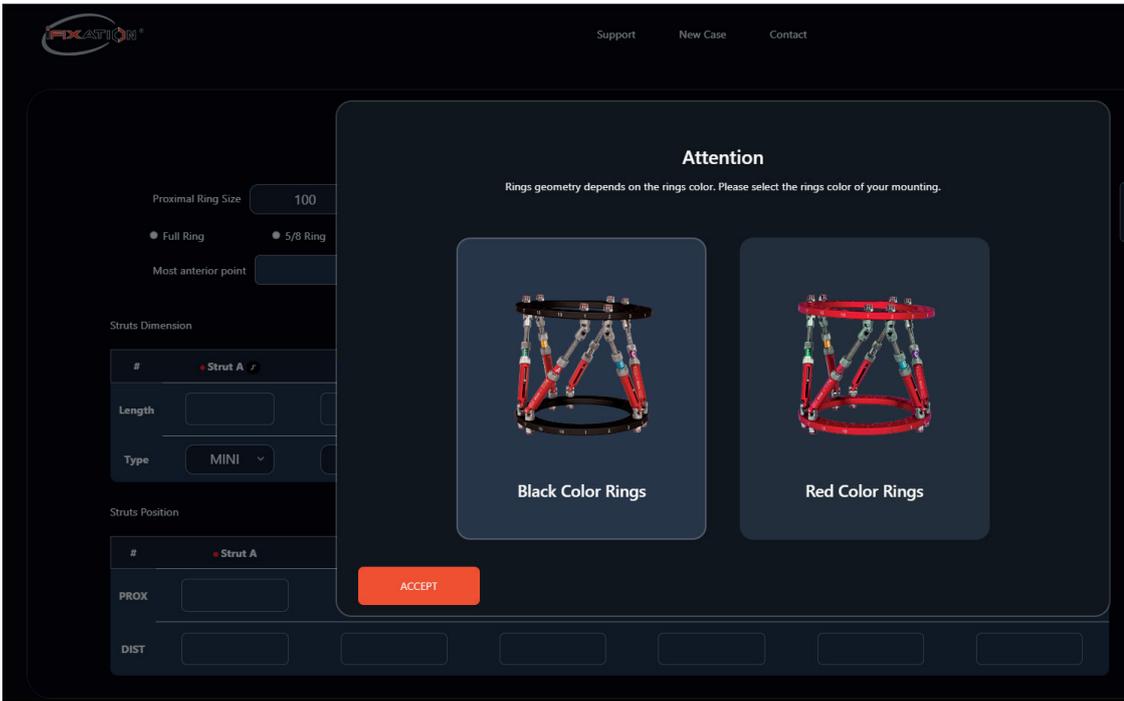
## STEP 1: CASE MANAGEMENT.



Name the case, define a date, put an optional note, choose a bone with its fracture or osteotomy level and upload the anterior and lateral X-ray.

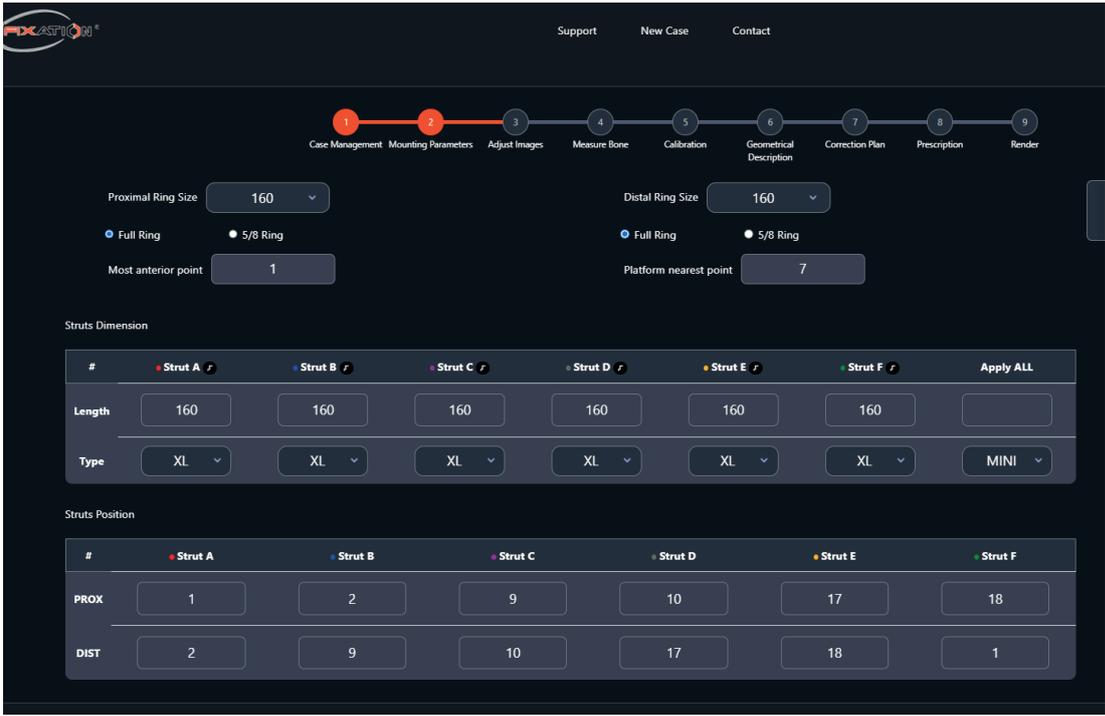
- X-rays can be cropped to avoid irrelevant information. Once images are ready, upload them by clicking on the upload button.
- By hovering the mouse over the skeleton, it is possible to choose the bone. Once clicked on the target bone, a window with the level of osteotomy or fracture will appear. Click on one of the four available levels.

## STEP 2: MOUNTING PARAMETERS.

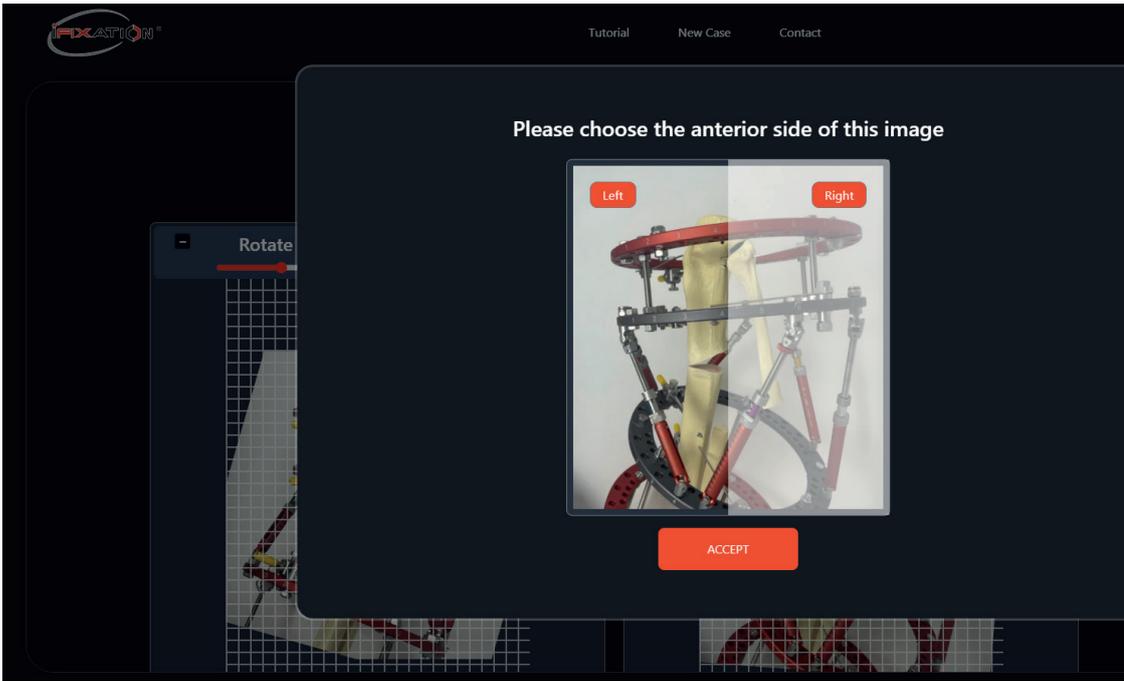


The software will ask you to choose the colour of your rings. The rings' colour defines the distribution of the holes along the ring. Once you have chosen the colour, iFixation will confirm your choice.

Select the diameter of the proximal and distal rings. Define the most anterior point, which is the hole located in the proximal ring on the most anterior side. If you draw a vertical line from the most anterior point to the distal ring, the point on this line and on the distal ring is the closest point to the platform (Platform nearest point). Enter the numbers of the holes where each strut connects to the proximal and distal rings.



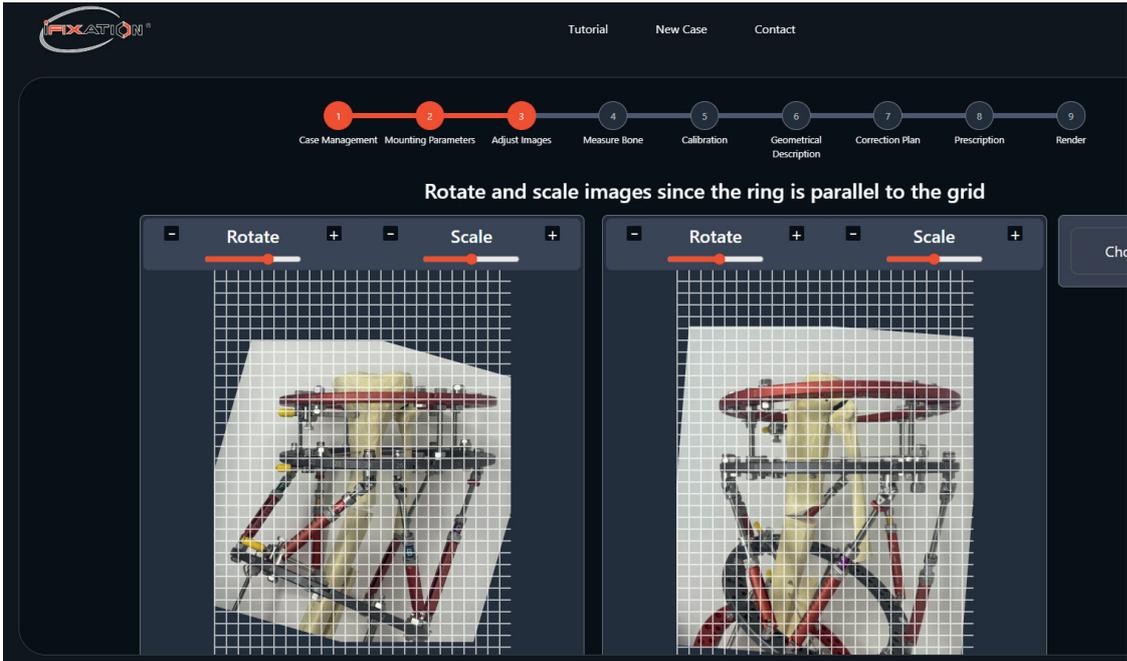
**STEP 3: ADJUST IMAGES.**



Click on the “Choose Anterior” button and select the anterior side of the X-ray.

Rotate and scale the Anterior and Lateral X-rays.

Rotate the images by clicking on the minus or plus buttons or by moving the slide bar. The proximal ring has to be horizontal. See the grid for guidance.



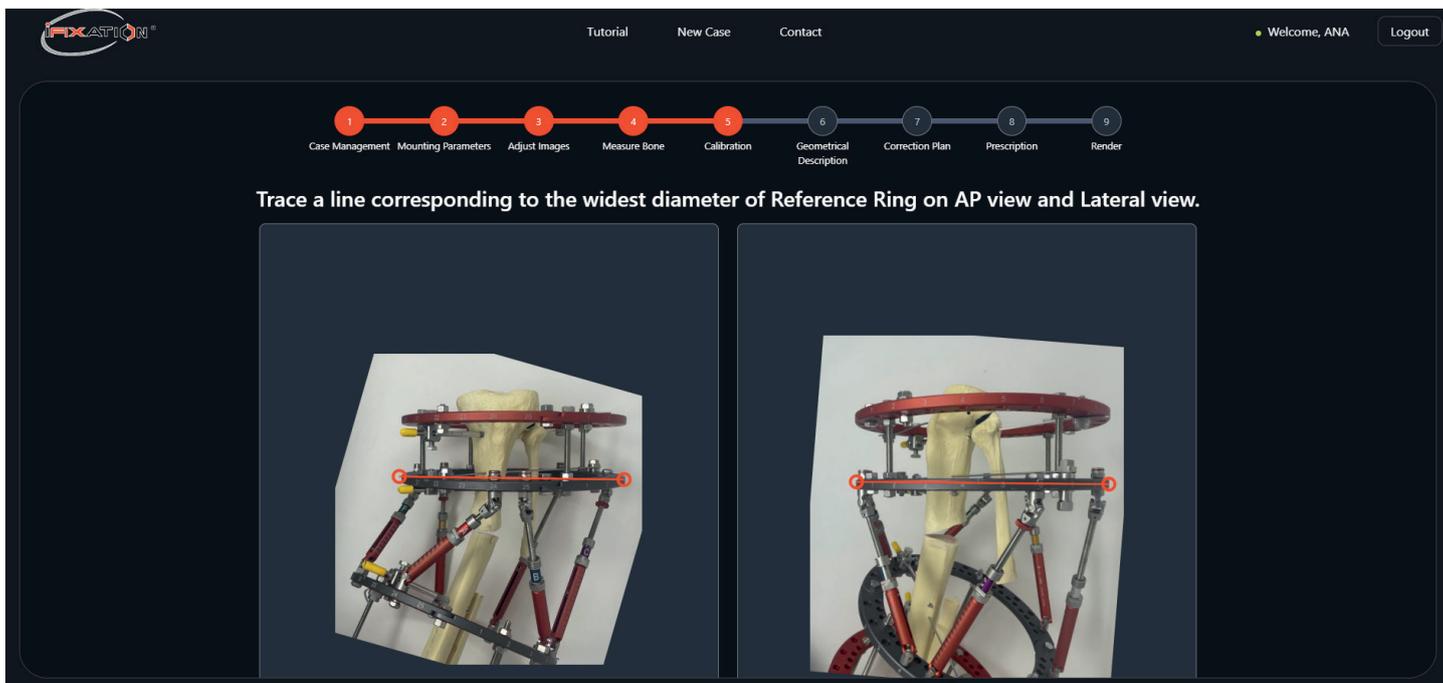
## STEP 4: MEASURE BONE.

The screenshot shows the iFIXATION software interface. At the top, there is a navigation menu with 'Tutorial', 'New Case', and 'Contact'. On the right, it says 'Welcome, ANA' and 'Logout'. Below the menu is a progress bar with 9 steps: 1. Case Management, 2. Mounting Parameters, 3. Adjust Images, 4. Measure Bone (highlighted in red), 5. Calibration, 6. Geometrical Description, 7. Correction Plan, 8. Prescription, and 9. Render. Below the progress bar, the instruction reads: 'Trace a line corresponding to the bone area on AP view and Lateral view.' Two X-ray images of a knee joint are shown side-by-side. The left image is the AP view and the right is the Lateral view. Both images show a red line tracing the bone area, with red circles at the proximal and distal ends of the line.

It is necessary to indicate to the software two known and identical points on the X-ray. These points could be the ends of the bone, the location of a visible pin or even the center of the rings.

- For this example the line goes from the most proximal pin to the most distal pin.

## STEP 5: CALIBRATION.

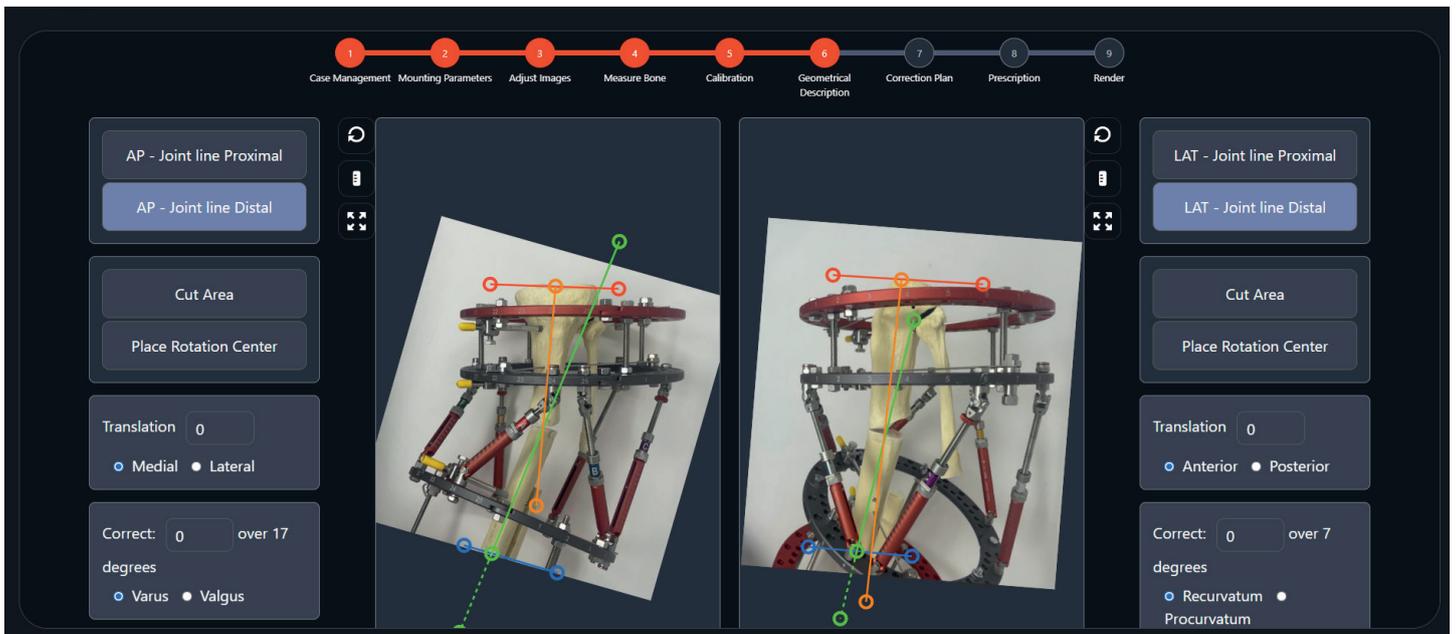


The screenshot shows the software interface with a navigation menu at the top: Tutorial, New Case, Contact, Welcome, ANA, and Logout. A progress bar below the menu indicates the current step is 5, Calibration. The steps are: 1 Case Management, 2 Mounting Parameters, 3 Adjust Images, 4 Measure Bone, 5 Calibration, 6 Geometrical Description, 7 Correction Plan, 8 Prescription, and 9 Render. The main instruction reads: "Trace a line corresponding to the widest diameter of Reference Ring on AP view and Lateral view." Below this instruction are two side-by-side images of a knee joint model with a reference ring. Red lines with circular endpoints are drawn across the ring in both views to indicate the measurement.

Indicate the diameter of the proximal ring on both X-rays.

- Draw a line from the lateral part to the medial part of the reference ring.

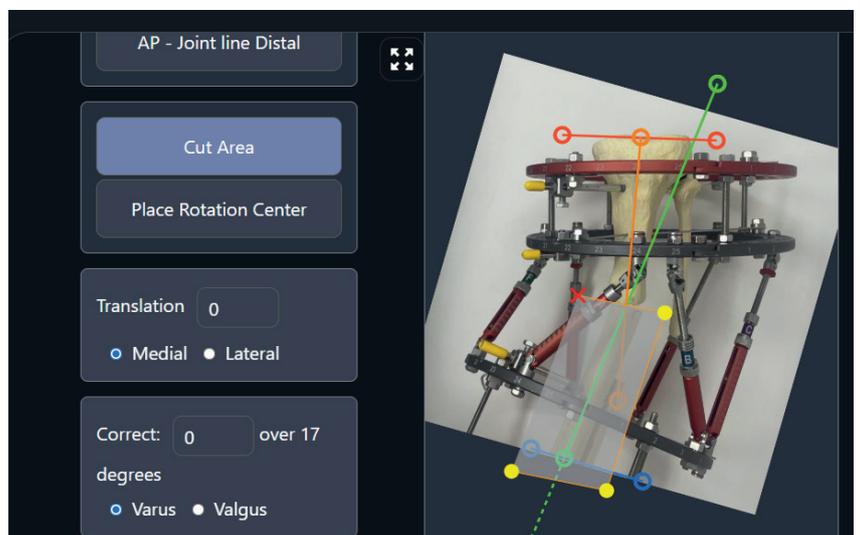
## STEP 6: GEOMETRICAL DESCRIPTION.

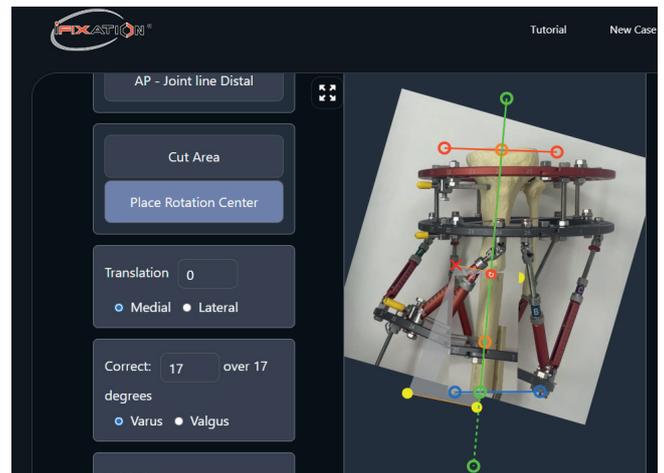
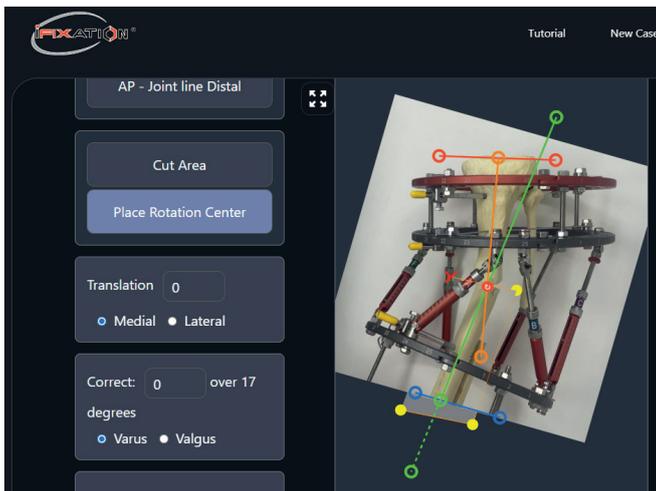


This step will help the user to define the position of the CORA and to understand the behavior of the moving bone component.

- Trace the joint line and the axis of the proximal component. The buttons on the left govern the AP view while those on the right govern the lateral view. The red line represents the joint line, while the orange line represents the bone axis.
- Repeat this process for the distal component.
- The green box shows the value of the angle formed between the bone axis and the joint line.

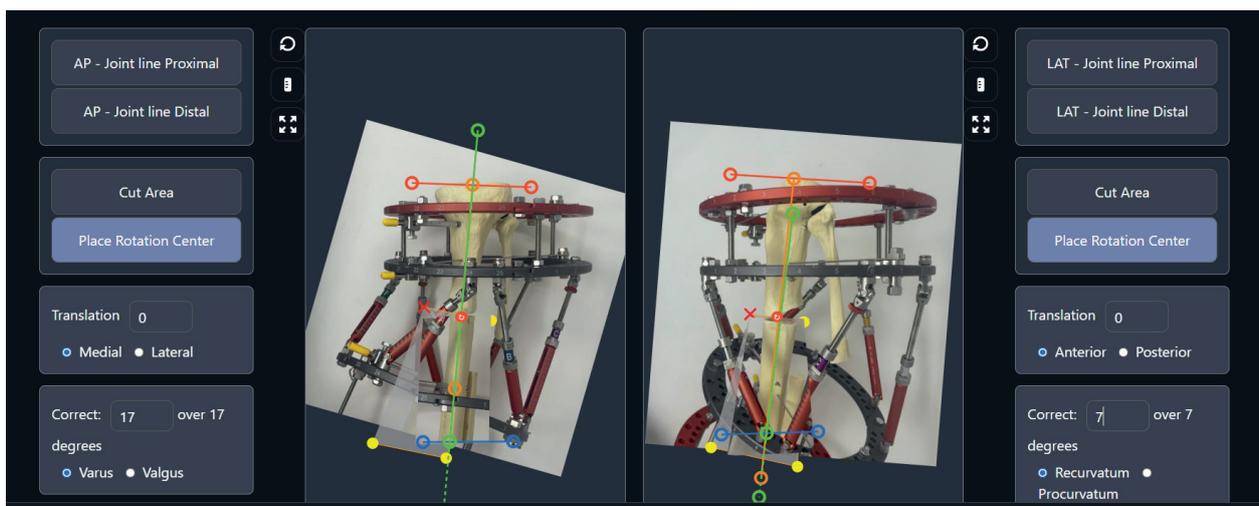
Draw the area where the moving component is located. Click in the “Cut Area” button and draw the area by clicking around the bone component. Once the area is generated, if you want to redo it, you can click on the red “X” and repeat the process.



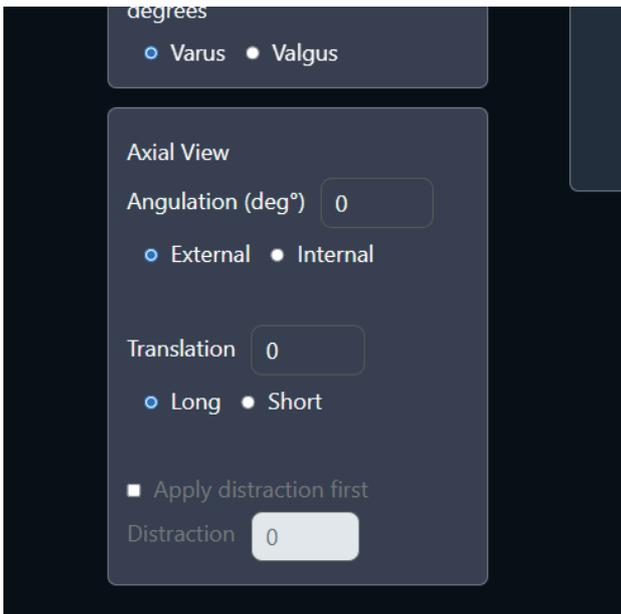


The theory related to deformity correction of deformities explains that the CORA should be located at the intersection of the axes of the component.

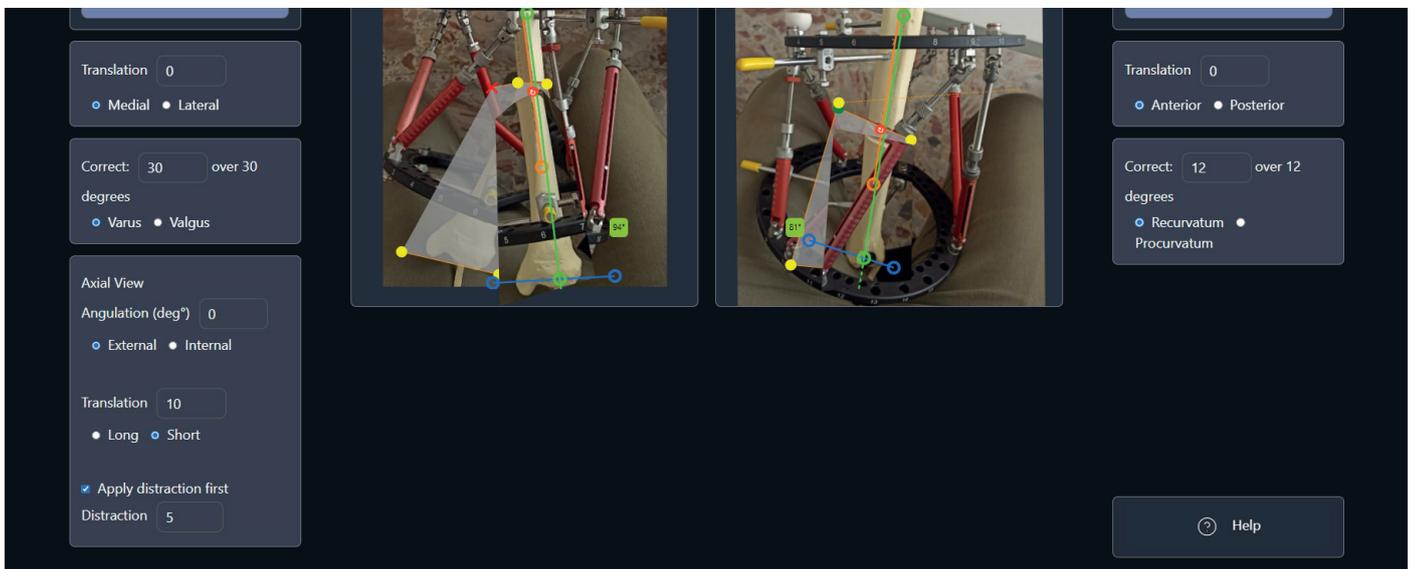
- Click in the “Place Rotation Center” button, the CORA will appear automatically.
- At this point, the software measures the angle between the two axes and suggests a correction value. If you agree with this value, enter it in the box shown. You will see that the selected bone element will rotate according to the value entered. When the CORA is not located at the intersection point of the axes, translations are generated after rotation.



Repeat in the Lateral view the process done in the AP view. Place the joint line and the bone axis of both bone components. Select the area of rotation and position the CORA. Then enter the rotation value.

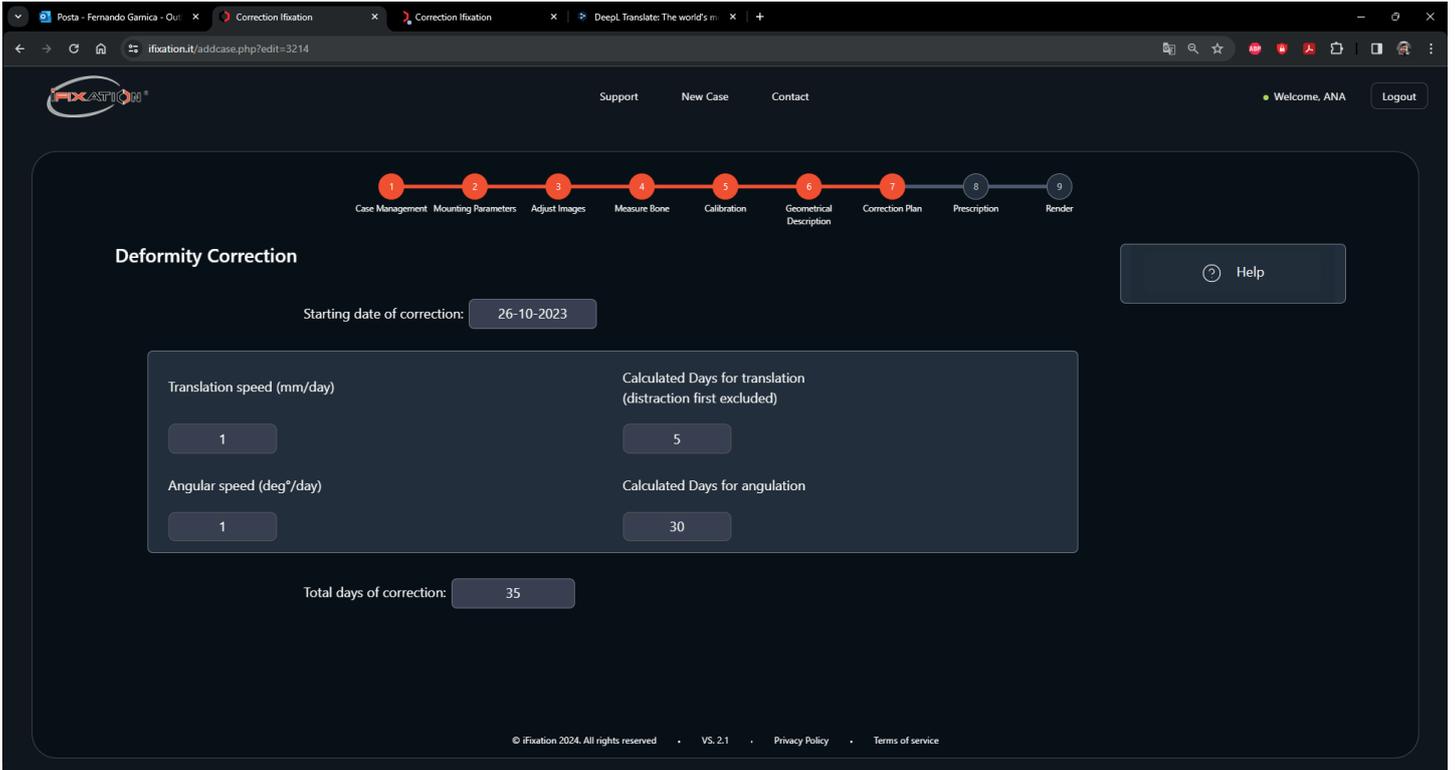


The box at the bottom left governs the Axial view. Here, the angle (if any) of internal or external rotation will be indicated. Also, it will describe whether the fracture or deformation is shortened or lengthened by a few millimeters. Usually, Translation input is used for lengthening to avoid impingement between the rotating bone element and the immobile one.



- Take as an example 10 millimeters of lengthening. Since we are describing the deformity, in order to make a lengthening we must select that the leg is 10 mm short. In this case, the software will understand that a lengthening must be performed.
- Assume also, that 5 of the 10mm will be performed before the angular correction starts. For this, we activate the Apply Distraction First option with a value of 5mm.

## STEP 7: CORRECTION PLAN.



The screenshot shows the 'Correction Plan' step in the iFixation software. The interface includes a progress bar at the top with 9 steps: Case Management, Mounting Parameters, Adjust Images, Measure Bone, Calibration, Geometrical Description, Correction Plan (current step), Prescription, and Render. The 'Deformity Correction' section contains the following fields:

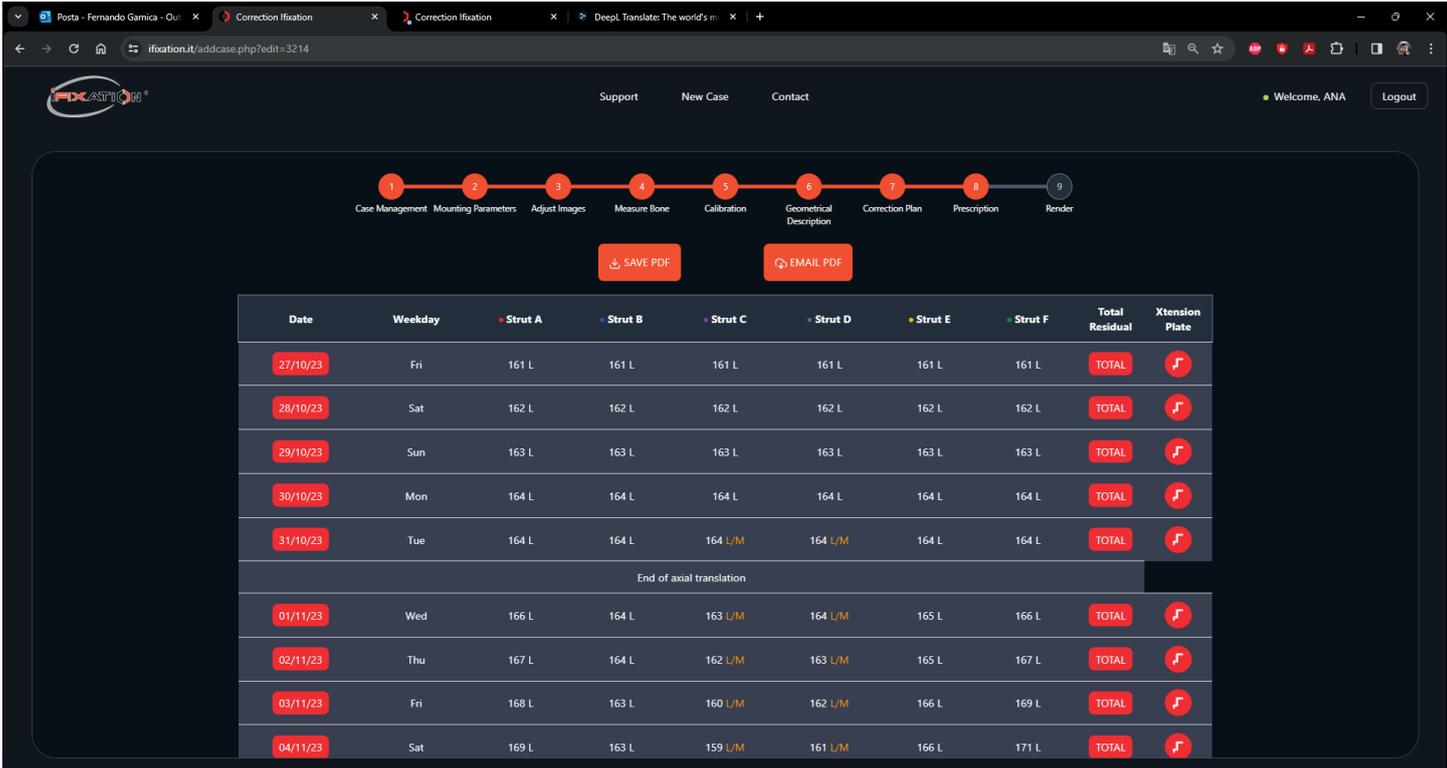
- Starting date of correction: 26-10-2023
- Translation speed (mm/day): 1
- Angular speed (deg/day): 1
- Calculated Days for translation (distraction first excluded): 5
- Calculated Days for angulation: 30
- Total days of correction: 35

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Define the date from which treatment will start.

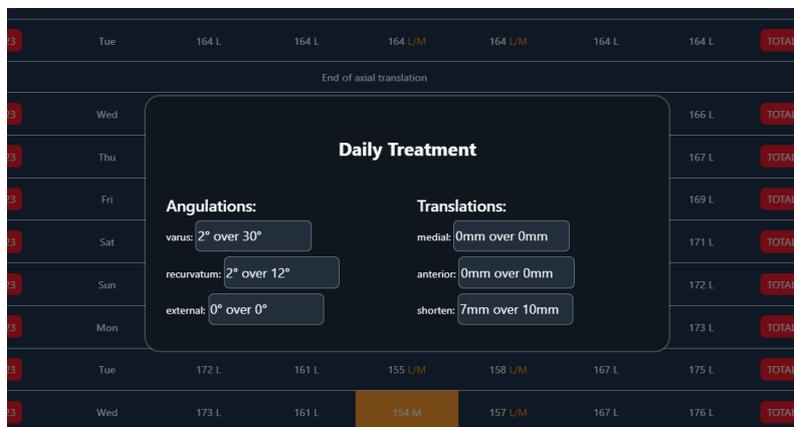
You can also modify the speed of the treatment by modifying Translation Speed and Angular Speed components or even by modifying the number of days directly.

## STEP 8: PRESCRIPTION.



Date	Weekday	Strut A	Strut B	Strut C	Strut D	Strut E	Strut F	Total Residual	Xtension Plate
27/10/23	Fri	161 L	TOTAL	🎵					
28/10/23	Sat	162 L	TOTAL	🎵					
29/10/23	Sun	163 L	TOTAL	🎵					
30/10/23	Mon	164 L	TOTAL	🎵					
31/10/23	Tue	164 L	164 L	164 L/M	164 L/M	164 L	164 L	TOTAL	🎵
End of axial translation									
01/11/23	Wed	166 L	164 L	163 L/M	164 L/M	165 L	166 L	TOTAL	🎵
02/11/23	Thu	167 L	164 L	162 L/M	163 L/M	165 L	167 L	TOTAL	🎵
03/11/23	Fri	168 L	163 L	160 L/M	162 L/M	166 L	169 L	TOTAL	🎵
04/11/23	Sat	169 L	163 L	159 L/M	161 L/M	166 L	171 L	TOTAL	🎵

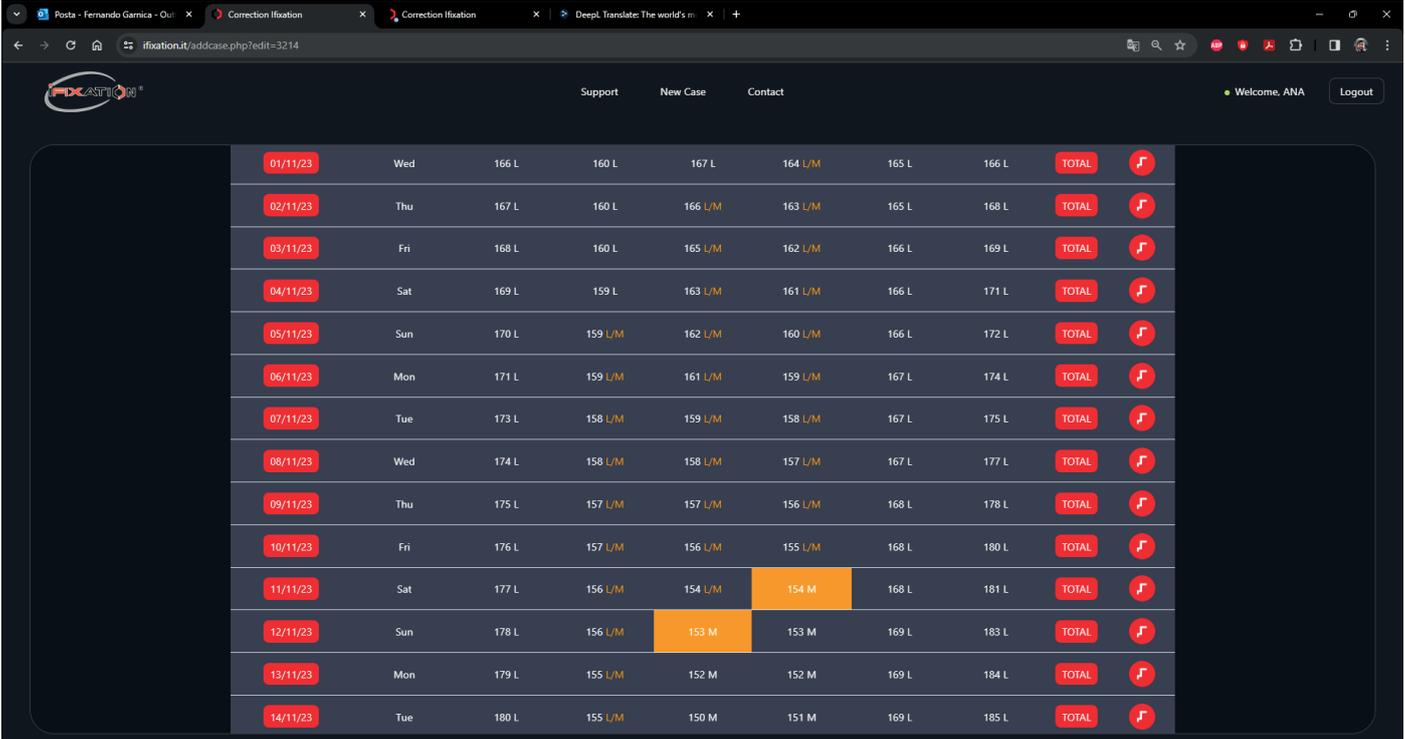
The table represents the prescription. The numbers in each row contain the lengths at which we must modify our struts on a daily basis. The prescription can be downloaded in PDF format or sent via e-mail by clicking on one of the two buttons above.



**Daily Treatment**

<p><b>Angulations:</b></p> <p>varus: <input type="text" value="2° over 30°"/></p> <p>recurvatum: <input type="text" value="2° over 12°"/></p> <p>external: <input type="text" value="0° over 0°"/></p>	<p><b>Translations:</b></p> <p>medial: <input type="text" value="0mm over 0mm"/></p> <p>anterior: <input type="text" value="0mm over 0mm"/></p> <p>shorten: <input type="text" value="7mm over 10mm"/></p>
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If you click on the buttons in the first column, you will see a window with Daily treatment, i.e. the correction made up to that specific day.



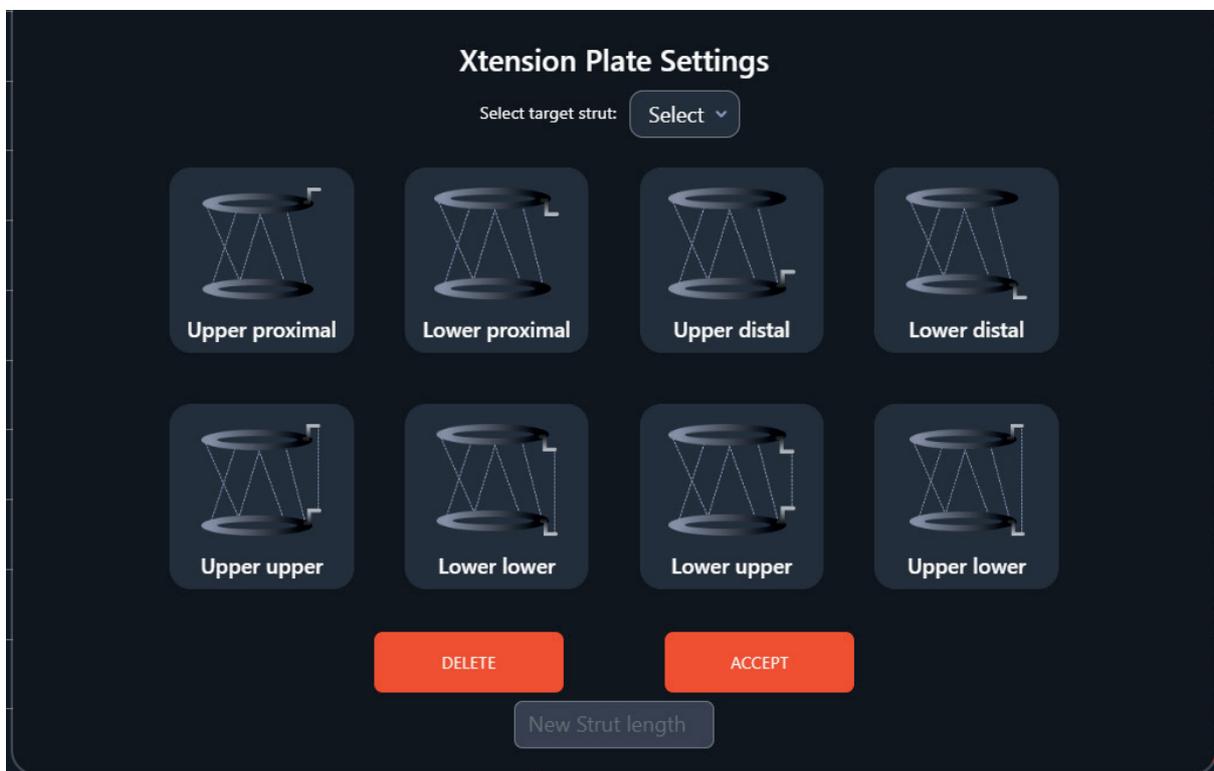
Date	Day	L	L/M	M	M	L	L	TOTAL	Icon
01/11/23	Wed	166 L	160 L	167 L	164 L/M	165 L	166 L	TOTAL	🔊
02/11/23	Thu	167 L	160 L	166 L/M	163 L/M	165 L	168 L	TOTAL	🔊
03/11/23	Fri	168 L	160 L	165 L/M	162 L/M	166 L	169 L	TOTAL	🔊
04/11/23	Sat	169 L	159 L	163 L/M	161 L/M	166 L	171 L	TOTAL	🔊
05/11/23	Sun	170 L	159 L/M	162 L/M	160 L/M	166 L	172 L	TOTAL	🔊
06/11/23	Mon	171 L	159 L/M	161 L/M	159 L/M	167 L	174 L	TOTAL	🔊
07/11/23	Tue	173 L	158 L/M	159 L/M	158 L/M	167 L	175 L	TOTAL	🔊
08/11/23	Wed	174 L	158 L/M	158 L/M	157 L/M	167 L	177 L	TOTAL	🔊
09/11/23	Thu	175 L	157 L/M	157 L/M	156 L/M	168 L	178 L	TOTAL	🔊
10/11/23	Fri	176 L	157 L/M	156 L/M	155 L/M	168 L	180 L	TOTAL	🔊
11/11/23	Sat	177 L	156 L/M	154 L/M	154 M	168 L	181 L	TOTAL	🔊
12/11/23	Sun	178 L	156 L/M	153 M	153 M	169 L	183 L	TOTAL	🔊
13/11/23	Mon	179 L	155 L/M	152 M	152 M	169 L	184 L	TOTAL	🔊
14/11/23	Tue	180 L	155 L/M	150 M	151 M	169 L	185 L	TOTAL	🔊

Clicking on one of the buttons in the Total Residual column will create a new case with all the information of the current case but with the length of the struts updated with the information of the target day.

The table can also warn that to continue the treatment it is necessary to change some strut. To see this, the colour of the Strut type letter changes and shows you the days on which the Strut change can be made. The last available day will be the one where the cell is completely coloured. Sometimes, there will be more than one Strut to change, it is suggested to choose a single day on which all struts can be changed, as in this case the 11th of November.

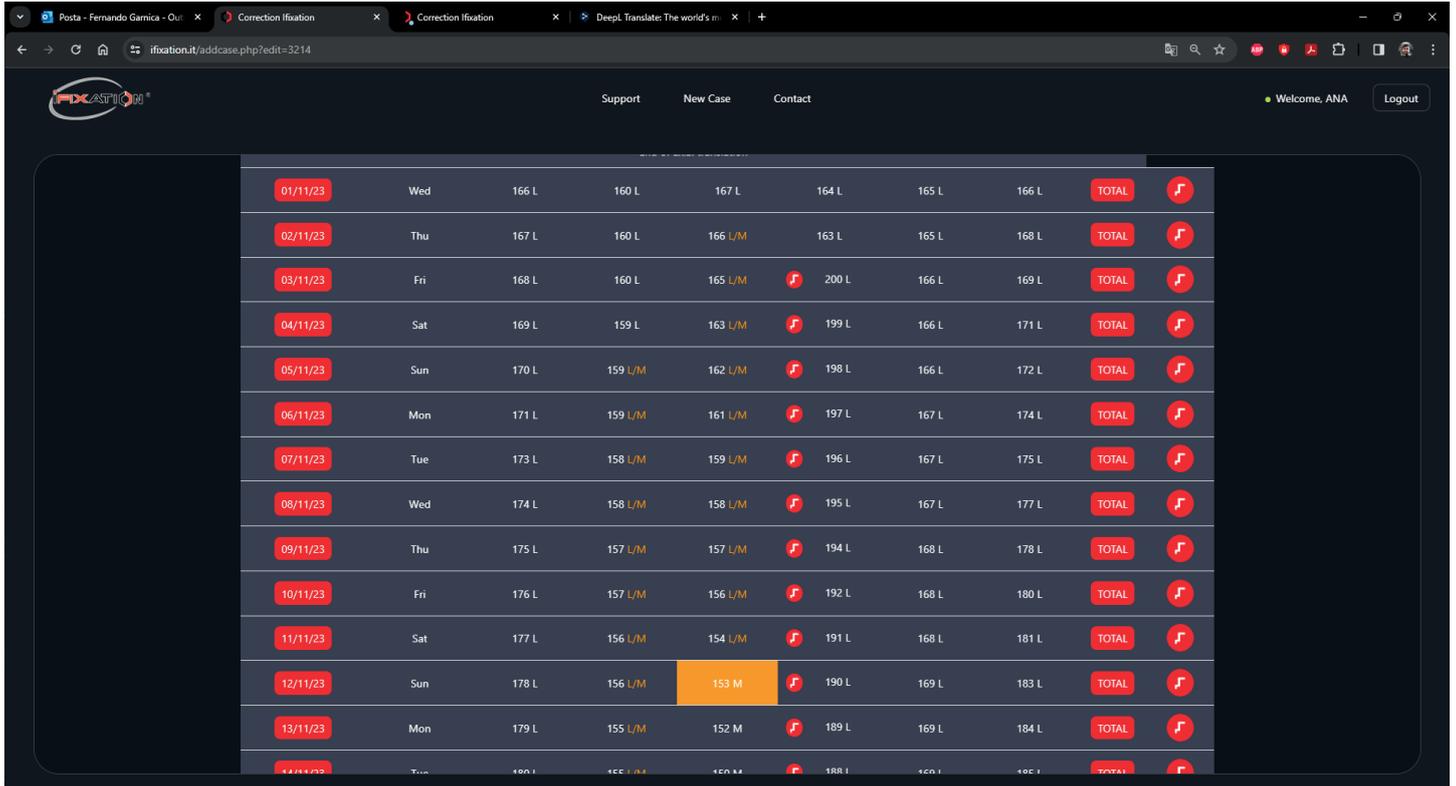
## XTENSION PLATE:

With the objective to make the iFixation 2 a more versatile device we have implemented an element called the Xtension Plate. This will be connected to a strut in order to increase its working space. The Xtension Plate will be used in assemblies where the rings are positioned too close together that the smallest strut is not able to connect the rings. Or, when a pin is touching a strut.



The Xtension Plate has 8 different configurations depending on whether one or two are placed on a Strut and their position on the ring. It can be placed above or below the ring. Depending on the orientation of the ring, the Strut will increase the working space by 30 mm with one Xtension Plate and by 60 mm with two Xtension Plates.

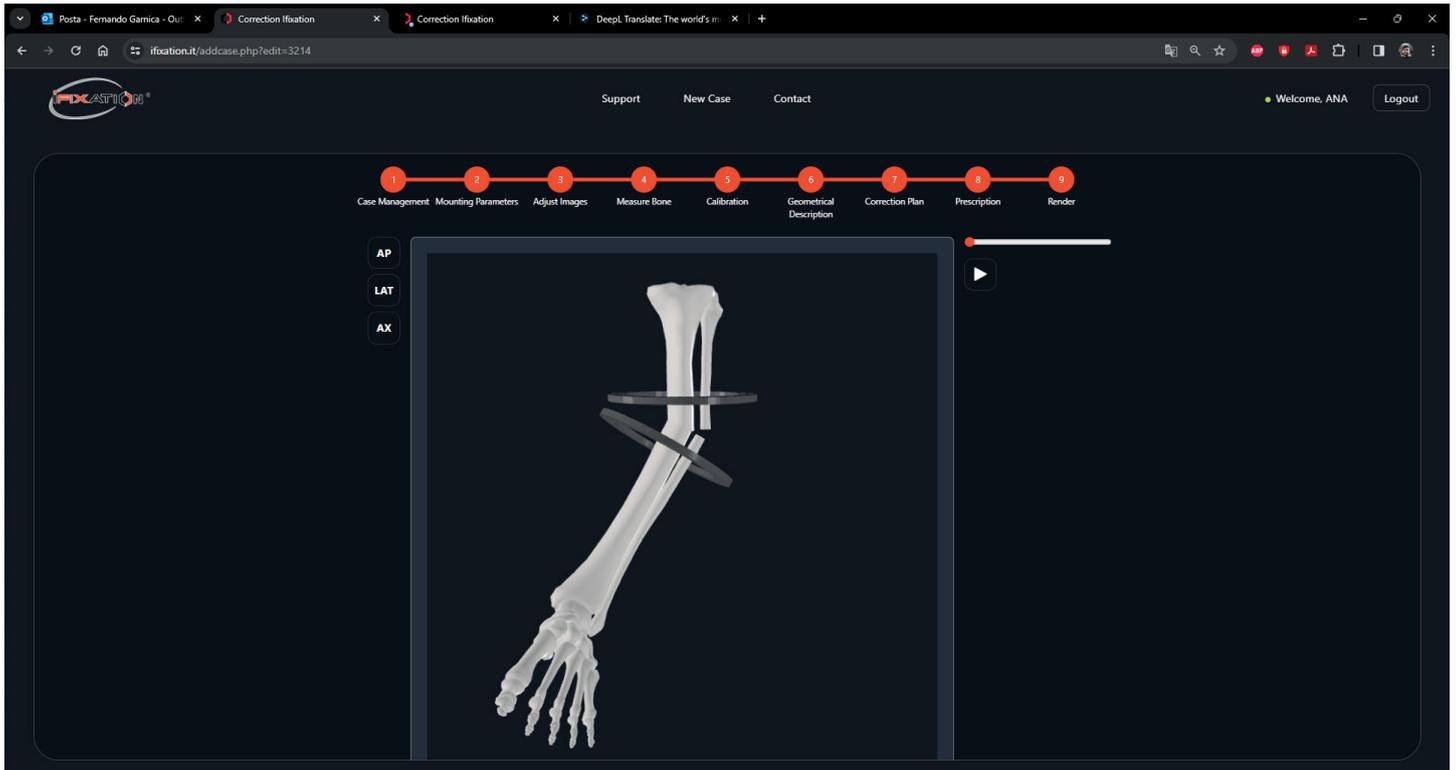
- There are two ways to insert the Xtension Plate into a case. The first is from Step 2: Mounting parameters. Inserting it here means that it was implanted during surgery. For this we click on the circular button with the Xtension Plate icon and select the type of mounting we performed.
- The second way is to insert it from step 8: Prescription.
- Inserting it from here means that the Xtension Plate was inserted during the treatment. To do this, click on the button in the last column corresponding to the day from which you want to insert it. Select the target strut and then select the configuration you want. Then click on accept.



Date	Day	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	TOTAL	Icon
01/11/23	Wed	166 L	160 L	167 L	164 L	165 L	166 L	166 L	TOTAL	🎵
02/11/23	Thu	167 L	160 L	166 L/M	163 L	165 L	168 L	168 L	TOTAL	🎵
03/11/23	Fri	168 L	160 L	165 L/M	200 L	166 L	169 L	169 L	TOTAL	🎵
04/11/23	Sat	169 L	159 L	163 L/M	199 L	166 L	171 L	171 L	TOTAL	🎵
05/11/23	Sun	170 L	159 L/M	162 L/M	198 L	166 L	172 L	172 L	TOTAL	🎵
06/11/23	Mon	171 L	159 L/M	161 L/M	197 L	167 L	174 L	174 L	TOTAL	🎵
07/11/23	Tue	173 L	158 L/M	159 L/M	196 L	167 L	175 L	175 L	TOTAL	🎵
08/11/23	Wed	174 L	158 L/M	158 L/M	195 L	167 L	177 L	177 L	TOTAL	🎵
09/11/23	Thu	175 L	157 L/M	157 L/M	194 L	168 L	178 L	178 L	TOTAL	🎵
10/11/23	Fri	176 L	157 L/M	156 L/M	192 L	168 L	180 L	180 L	TOTAL	🎵
11/11/23	Sat	177 L	156 L/M	154 L/M	191 L	168 L	181 L	181 L	TOTAL	🎵
12/11/23	Sun	178 L	156 L/M	153 M	190 L	169 L	183 L	183 L	TOTAL	🎵
13/11/23	Mon	179 L	155 L/M	152 M	189 L	169 L	184 L	184 L	TOTAL	🎵
14/11/23	Tue	180 L	155 L/M	150 M	188 L	169 L	185 L	185 L	TOTAL	🎵

You will see that the Xtension Plate logo appears on the column of the strut that we selected.

## STEP 9: RENDER.



In this step you will see a 3D animation that represents the deformity or fracture in its initial state, final state and during the treatment.

- On the left are the view buttons, by clicking on them we will see the bone from the Anterior, Lateral and Axial view.
- Clicking on the play button, we will see the animation of the treatment.
- Dragging the slider bar we will see the partial treatment.

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