

Operating Instructions

Setup and Calibration

YASKAWA - MotoEye LT



EN



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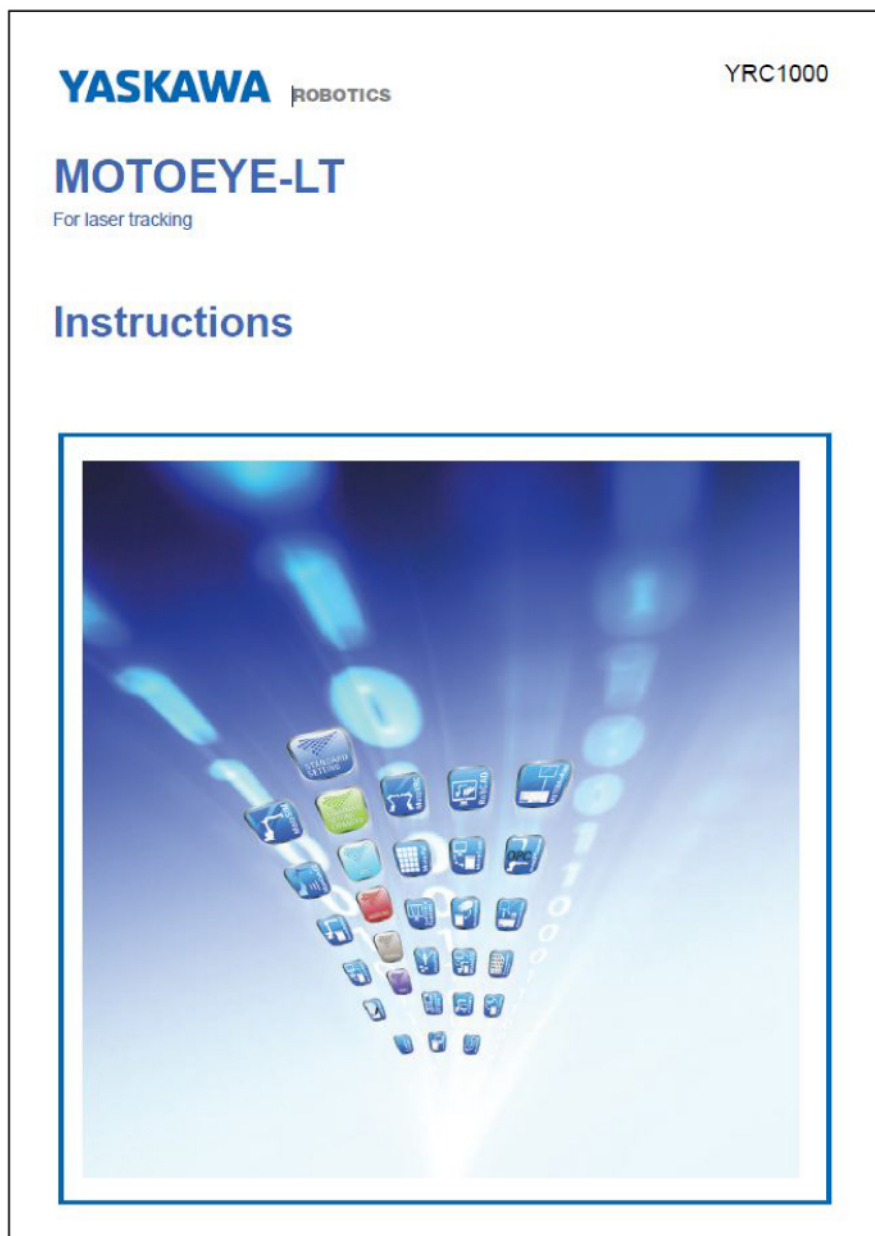
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1 Introduction

The content of this document is intended to assist in the calibration of the wenglor system and a YASKAWA robot with YRC1000.

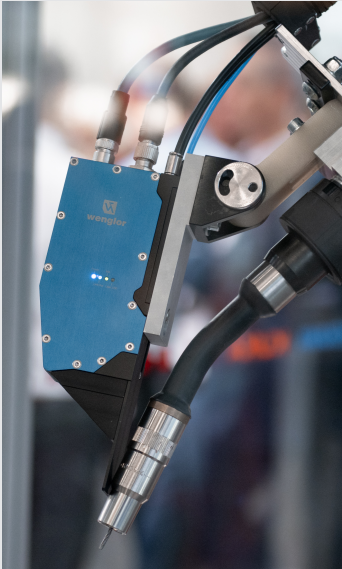
The document provides step-by-step instructions for quickly and easily performing the necessary steps for calibration using.

The wenglor “Setup and Calibration manual” also use content and images from the YASKAWA MOTOEYE-LT instructions: Document ID: E11020000314GB07



2 Calibration Equipment

For the wenglor “Setup and Calibration manual”, an AR 1440 and the YRC1000 were used.
 The following components were used to create the calibration document. Depending on the application, other components may also be used.

wenglor	YASKAWA	Calibration plate
MLZL141 MVCV001	AR1440 YRC1000 MotoEye LT software	Random lap-joint plate
 	 	

3 System Requirements YASKAWA

- Controller: DX200 or YRC 1000
- Software: MOTOEYE-LT
- Function specification D2-D2013-028
- DX 200 software version DN1.83.00A(–)-00 or newer version
- Macro Job's and MACRO.DAT fitting to the application
- Sensor-app / motoPlus-interface LTRACK-DX200.out, YRC1000MotoEyeLT_122_Yeu.out or MotoEyeLT_YEU_2.02_02 for Dual or newer versions

The MotoPlus application MotoEye LT is required for Seam Tracking.

In addition, the MotoPlus Runtime must also be active in the background.

- MotoPlus Runtime - is a license to be able to start MotoPlus applications
- MotoPlus - is an application with programmed functions that can be loaded onto the control unit, e.g. to communicate with external control units with MotoEye LT

There are two versions of MotoPlus application MotoEye LT - Standard MotoEye LT and European MotoEye LT.

The European MotoEye LT is required for the communication with wenglor.

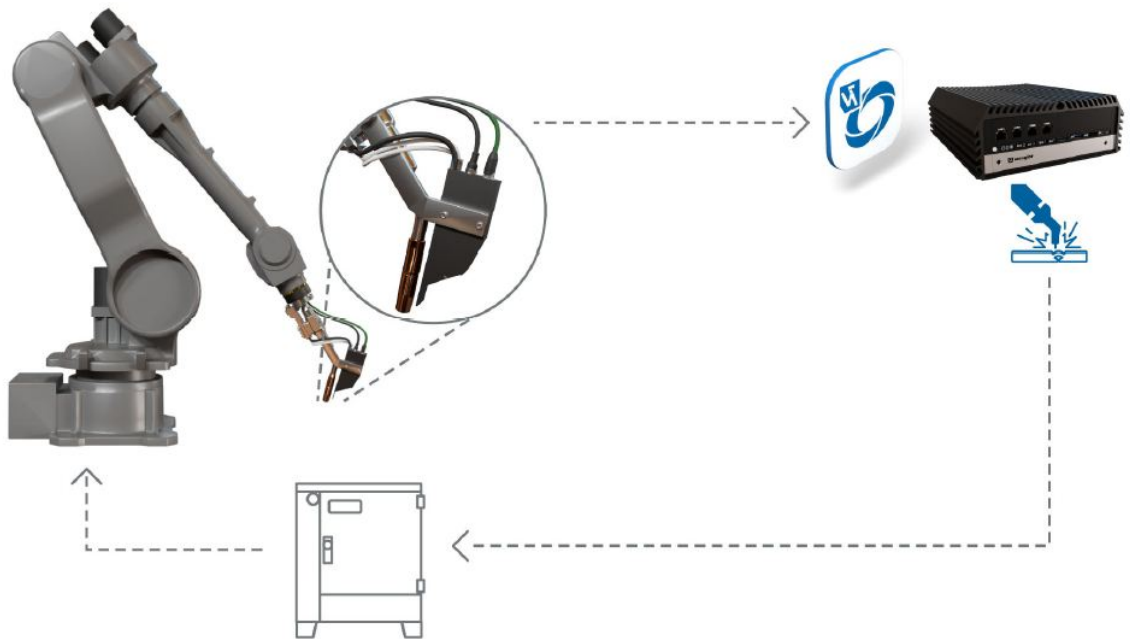
Default: "YRC1000MotoEyeLT_1.24_Yeu.out"

Important: In the European version, the name must always contain YEU.

4 Preparation of wenglor System

4.1 Connection Hardware

- wenglor Profile Sensor and the wenglor Machine Vision Controller must be connected to a power source (see notes in the operating instructions)
- The Ethernet cable of the Profile Sensor is connected to one of the four CAM ports on the front panel
- An additional connection cable is connected to one of the Ethernet Ports on the rear of the wenglor Machine Vision Controller and the LAN 2 or LAN 3 port in the robot controller
- To connect to the machine vision controller and a laptop, the second Ethernet port on the rear panel can be used

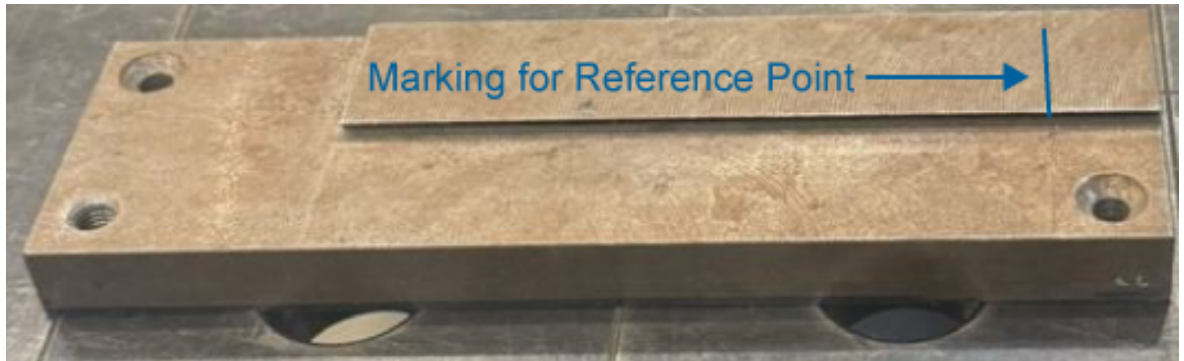


Additional note

The wenglor Machine Vision Controller requires its own power supply unit and can't be powered via the robot controller

4.2 Calibration Plate

- Make a small marking line at the top edge of the calibration tool to indicate the reference point
- The calibration tool must be a Lap-Joint



Additional note

The wenglor Machine Vision Controller requires its own power supply unit and can't be powered via the robot controller

4.3 Setting wenglor weHub

- Start wenglor weHub on the desktop



- Change the IP address of the wenglor Machine Vision Controller to be on the same network as the robot controller.

1.

2.

Running

weHub is not connected to device. weHub is not connected to AI Lab. Go to [Settings](#) and login.

Name: YASKAWA TechCenter

Type: Machine Vision Controller

Article Number: MVCV001

Serial Number: 10287

Manufacturer: wenglor sensoric GmbH

Hardware Version:

Firmware Version: 1.3.3

MAC Address: 2C:94:64:06:DA:E4

Subnet Mask: 255.255.255.0

Gateway: 0.0.0.0

IP Address: 192.168.2.3

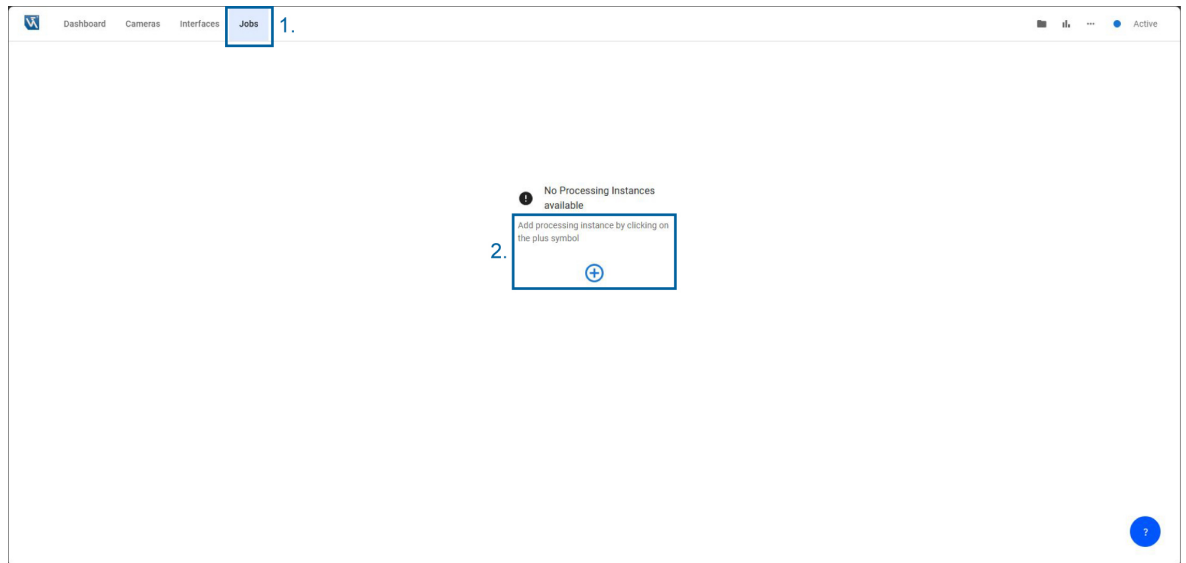
More info: <https://www.wenglor.com/product/MVCV001>

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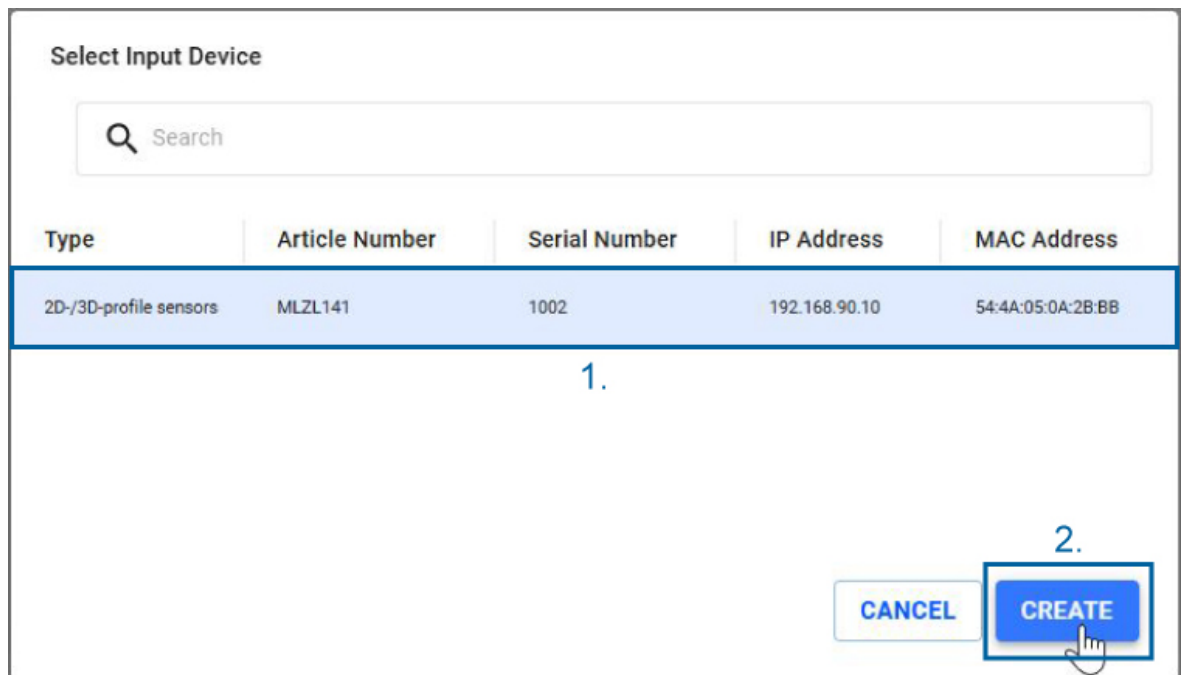
- Open the device by clicking on the corresponding icon.

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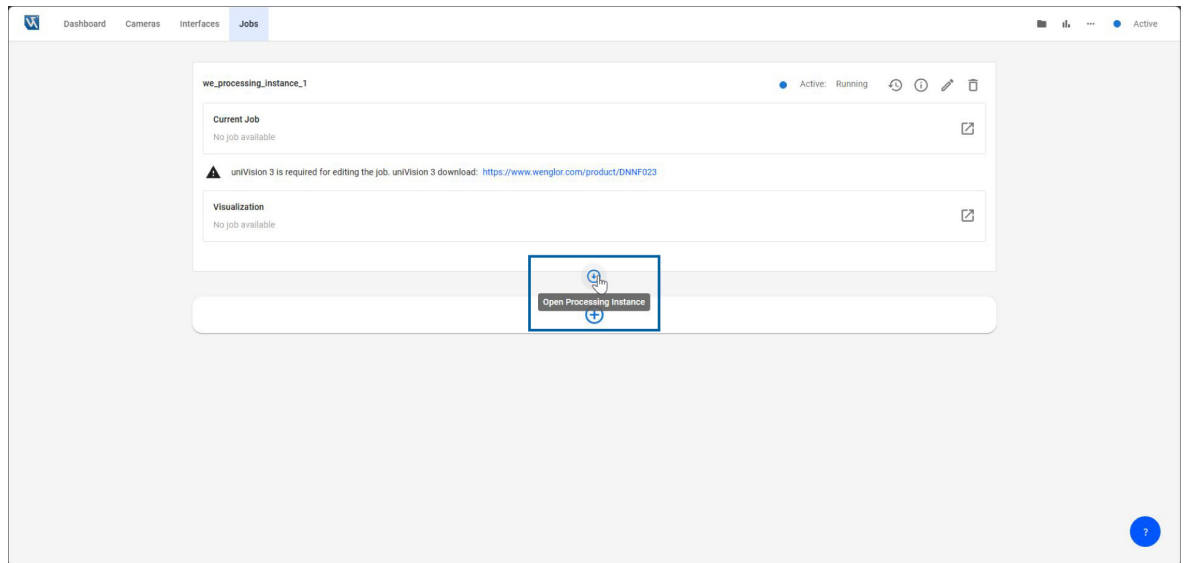
- Open “Jobs” and add a new processing instance by clicking on the “+” sign.



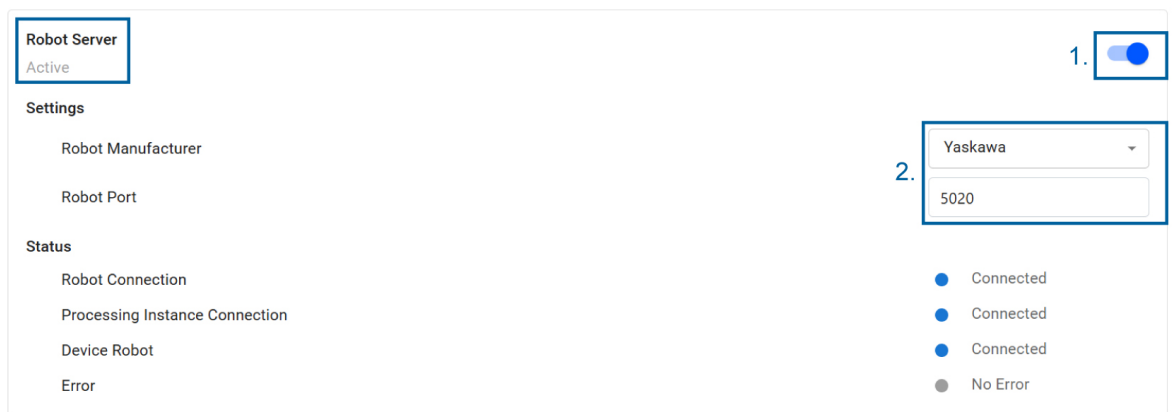
- Select the correct 2D/3D Profile Sensor in the device list and click on “CREATE”.



- Open the Processing Instance and scroll down to Robot Server



- Activate the Robot Server and select YASKAWA as Robot Manufacturer (Robot Port 5020 is default for YASKAWA)



Status notes

The robot connection is established when the status shows “Connected.”

If the connection cannot be established, please check the following:

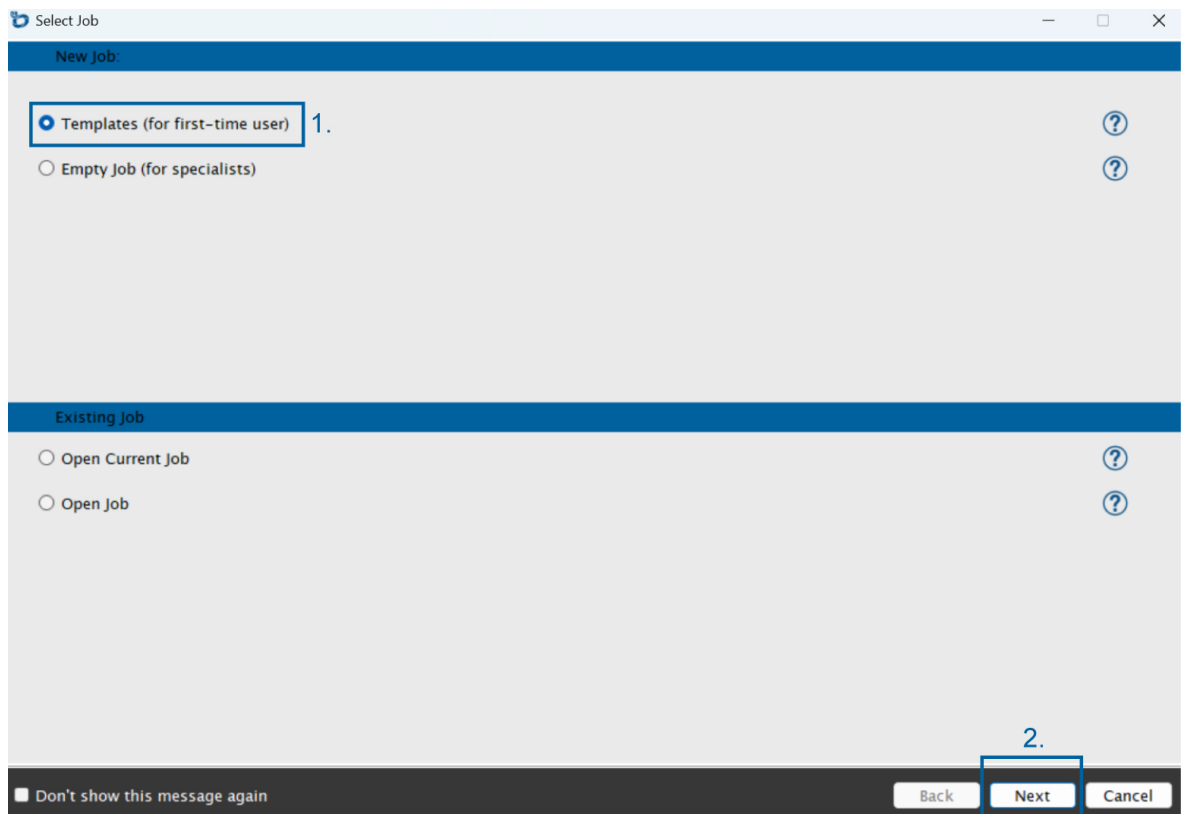
- Make sure the computer and the robot are connected to the same network.
- Verify that the IP address and robot port are correct.
- Restart the robot controller after entering the IP address of the wenglor controller in the teach pendant.
- Make sure the “Device robot weld seam tracking” license is valid and activated.

4.4 Parametrize Calibration Job

- Scroll up to top and start the uniVision Job parametrization by clicking on “Open Device”.



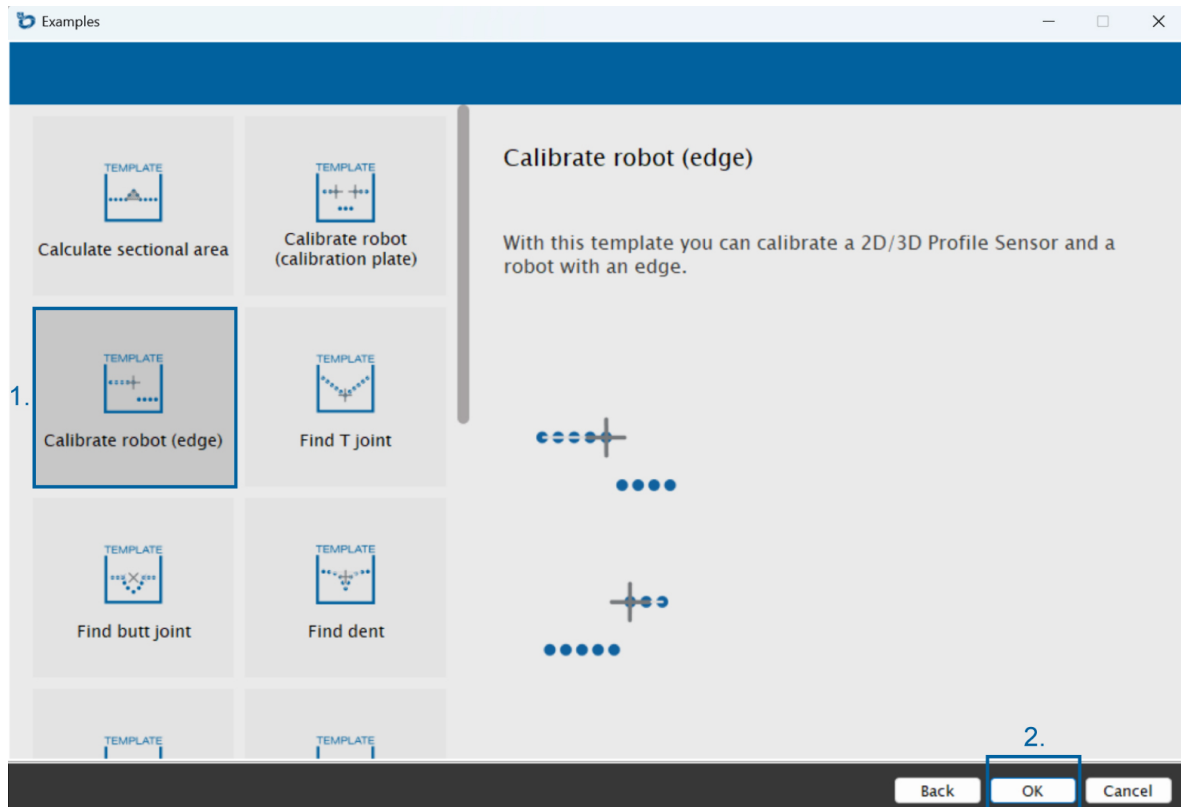
- Create the calibration Job by using templates (for first-time-user) and click “Next”.



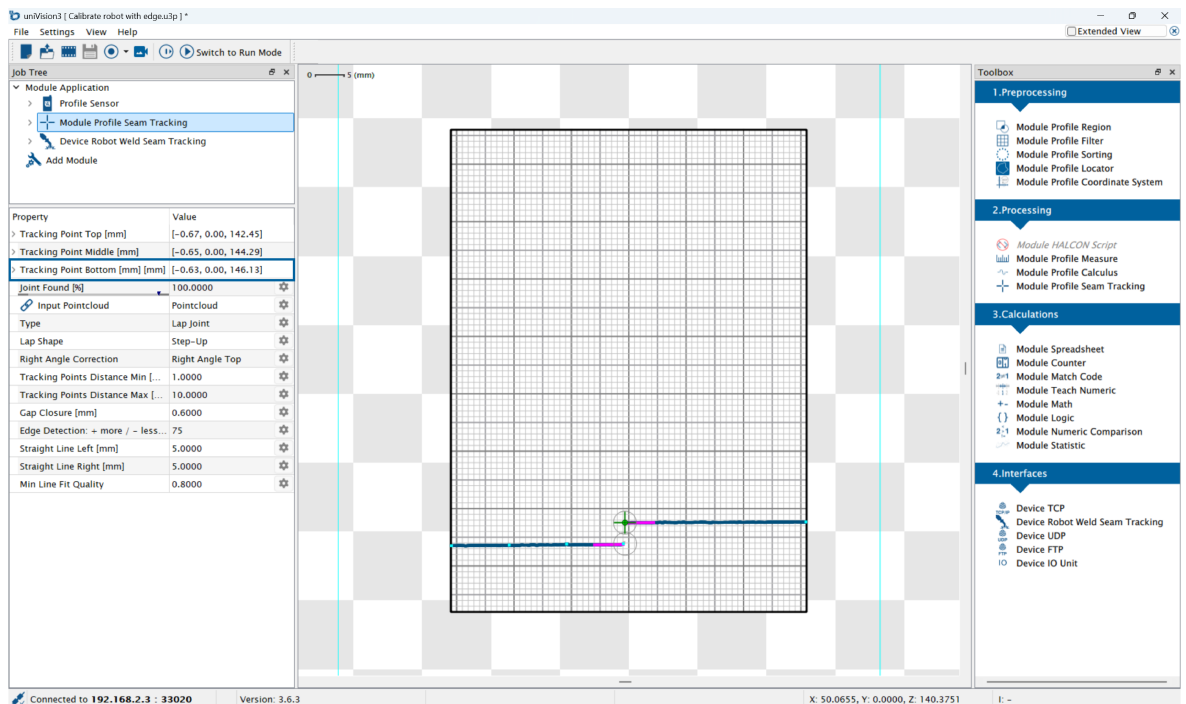
Template notes

If the template is used in job parameterization, the tracking point and validity are automatically linked in Device Robot and sent to the Robot Controller.

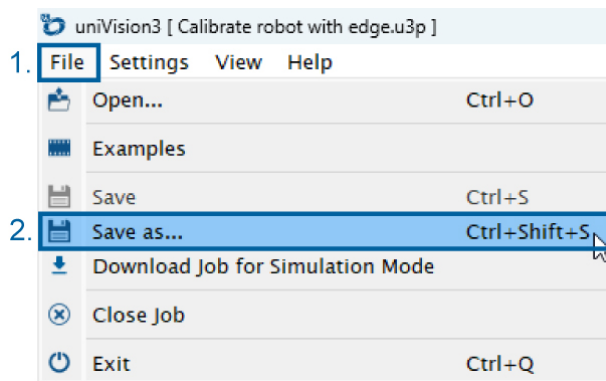
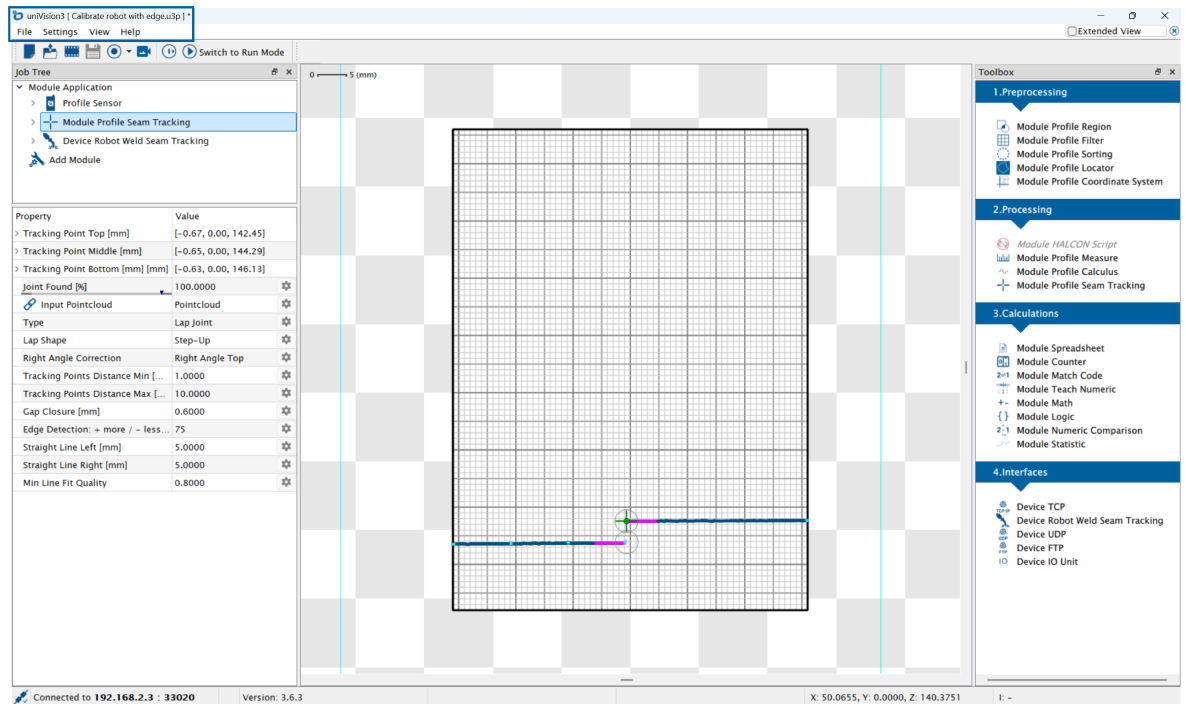
- For calibration with YASKAWA use the template “Calibrate robot (edge)” and click “OK”



- To find the “Tracking Point Top”, **consider** the edge direction of your lap joint and choose **Step-Up or Step-Down**

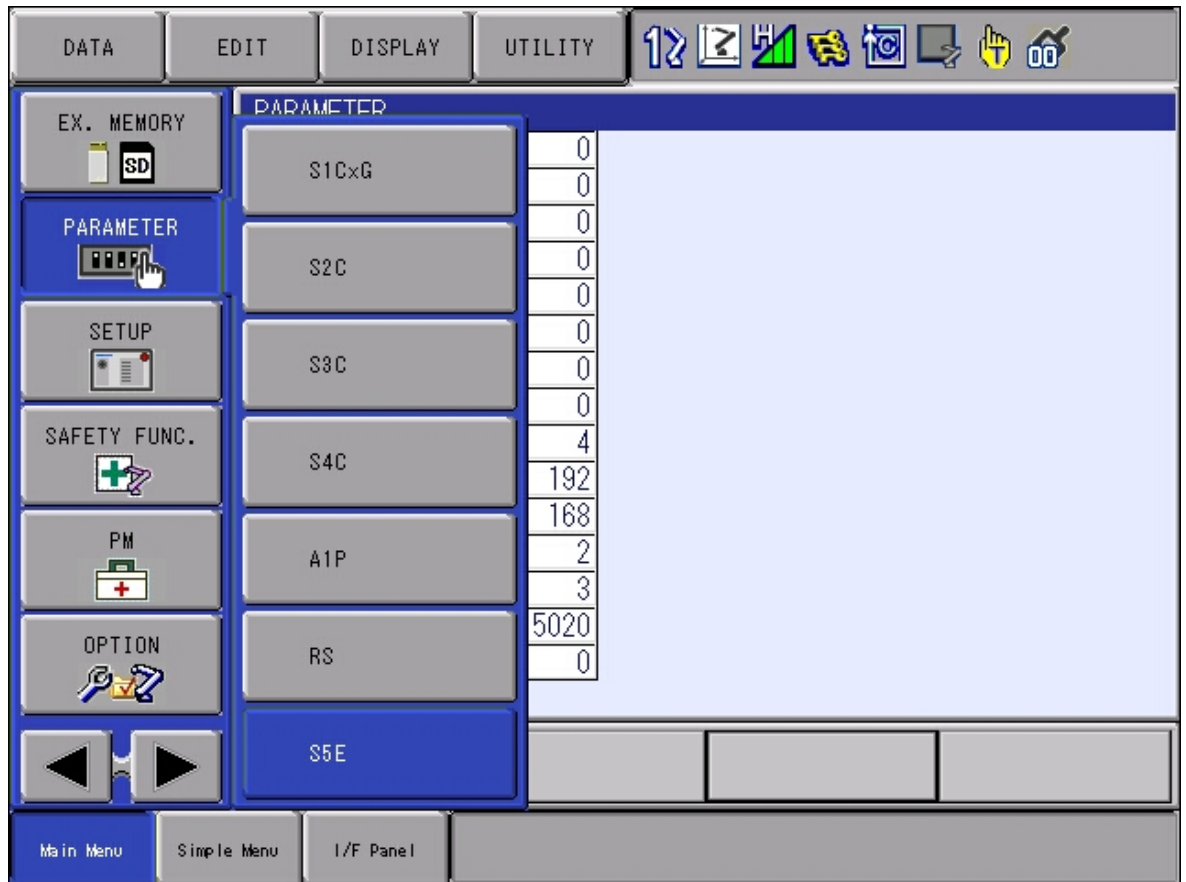


- Save the Job as a number (e.g. 40)



5 Preparation wenglor System in the Teach Pendant

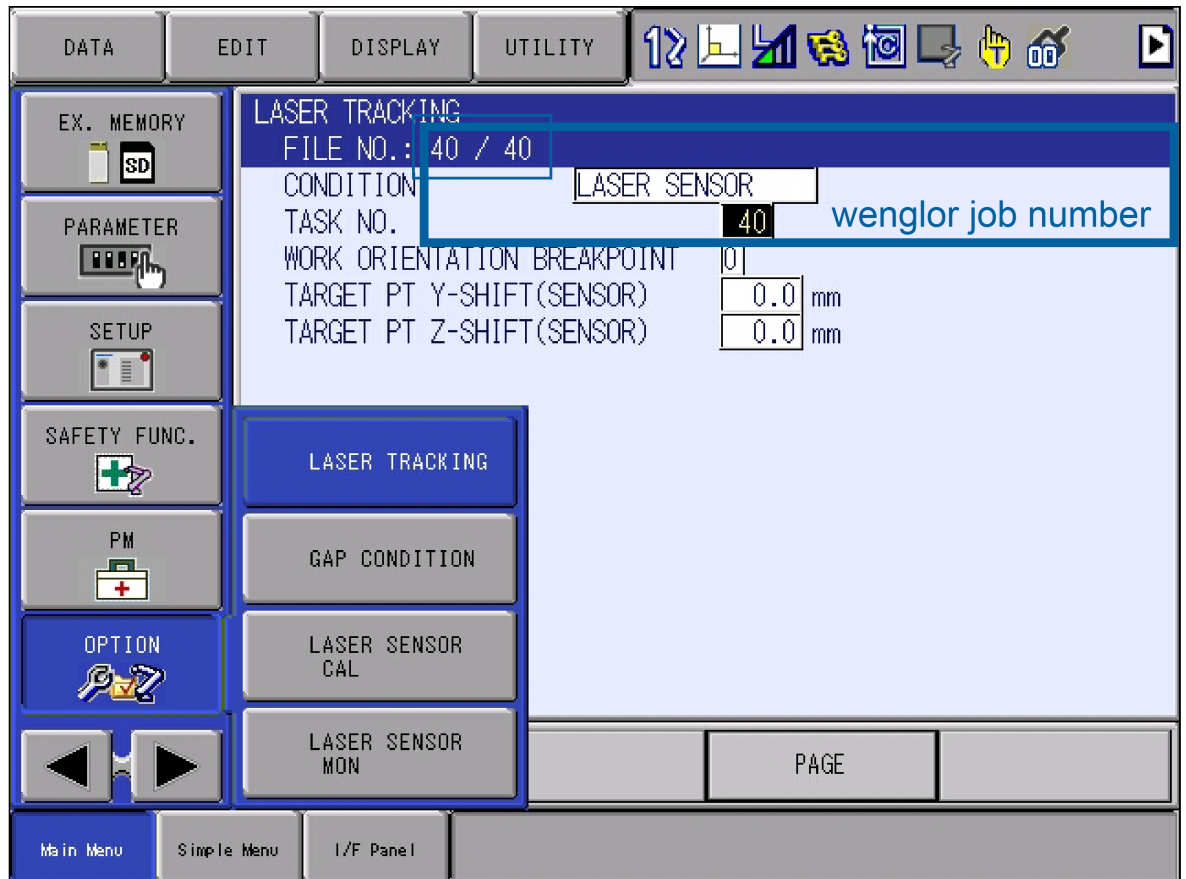
- Open the parameter protocol in the Teach Pendant.



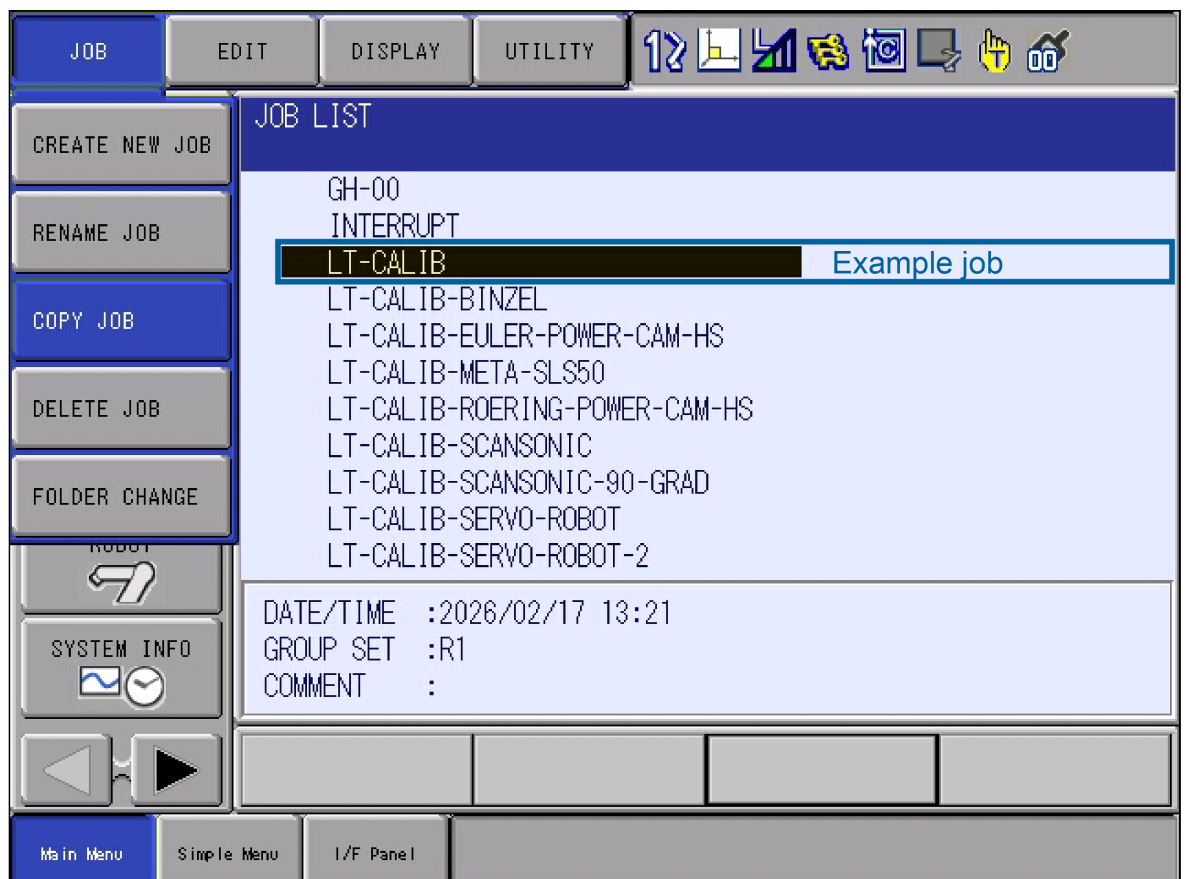
- Enter the IP address of the wenglor Machine Vision Controller and the Robot Port.

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EX. MEMORY		<table border="1"> <thead> <tr> <th colspan="3">PARAMETER</th> </tr> </thead> <tbody> <tr><td>S5E151</td><td></td><td>0</td></tr> <tr><td>S5E152</td><td></td><td>0</td></tr> <tr><td>S5E153</td><td></td><td>0</td></tr> <tr><td>S5E154</td><td></td><td>0</td></tr> <tr><td>S5E155</td><td></td><td>0</td></tr> <tr><td>S5E156</td><td></td><td>0</td></tr> <tr><td>S5E157</td><td></td><td>0</td></tr> <tr><td>S5E158</td><td></td><td>0</td></tr> <tr><td>S5E159</td><td></td><td>4</td></tr> <tr><td>S5E160</td><td></td><td>192</td></tr> <tr><td>S5E161</td><td></td><td>168</td></tr> <tr><td>S5E162</td><td></td><td>2</td></tr> <tr><td>S5E163</td><td></td><td>3</td></tr> <tr><td>S5E164</td><td></td><td>5020</td></tr> <tr><td>S5E165</td><td></td><td>0</td></tr> </tbody> </table>						PARAMETER			S5E151		0	S5E152		0	S5E153		0	S5E154		0	S5E155		0	S5E156		0	S5E157		0	S5E158		0	S5E159		4	S5E160		192	S5E161		168	S5E162		2	S5E163		3	S5E164		5020	S5E165		0
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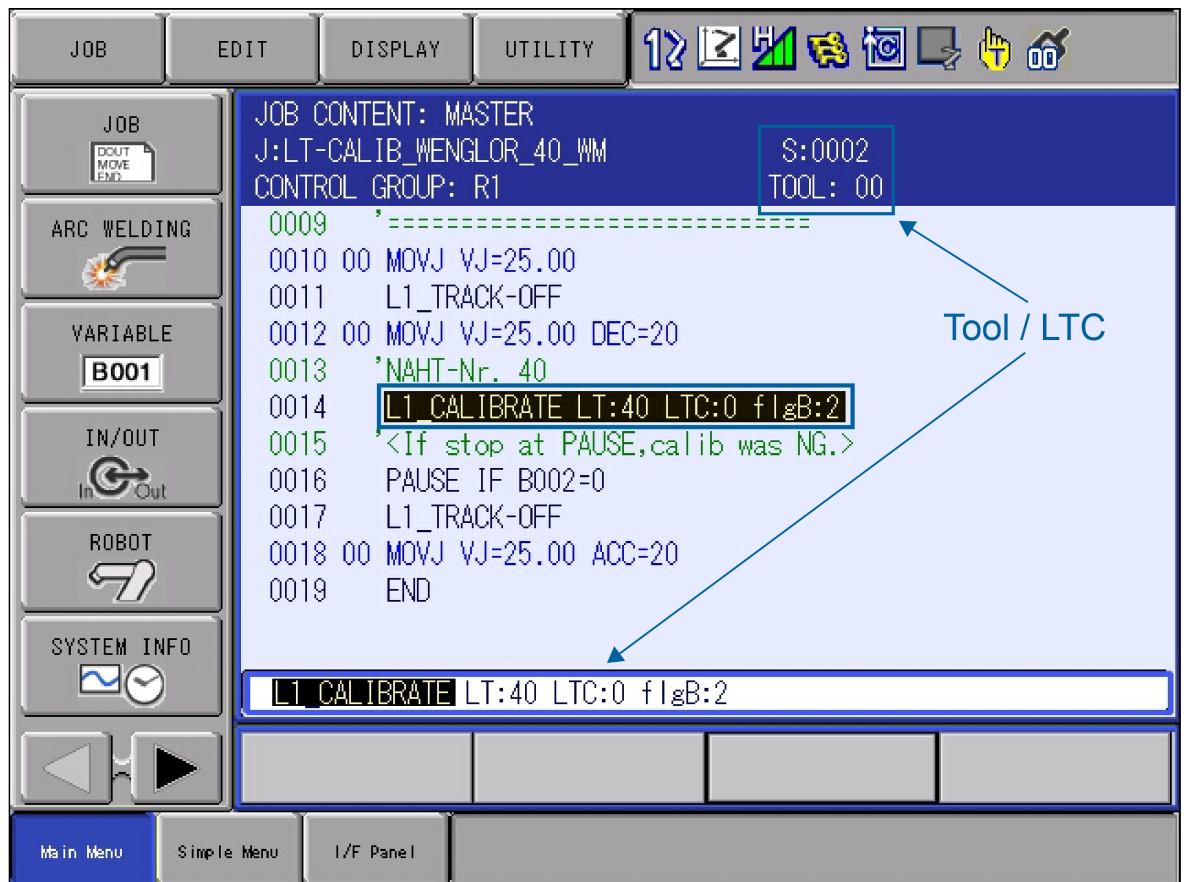
- Define the Laser Tracking File (e.g. 40).



- Copy the Calibration Job LT-CALIB.



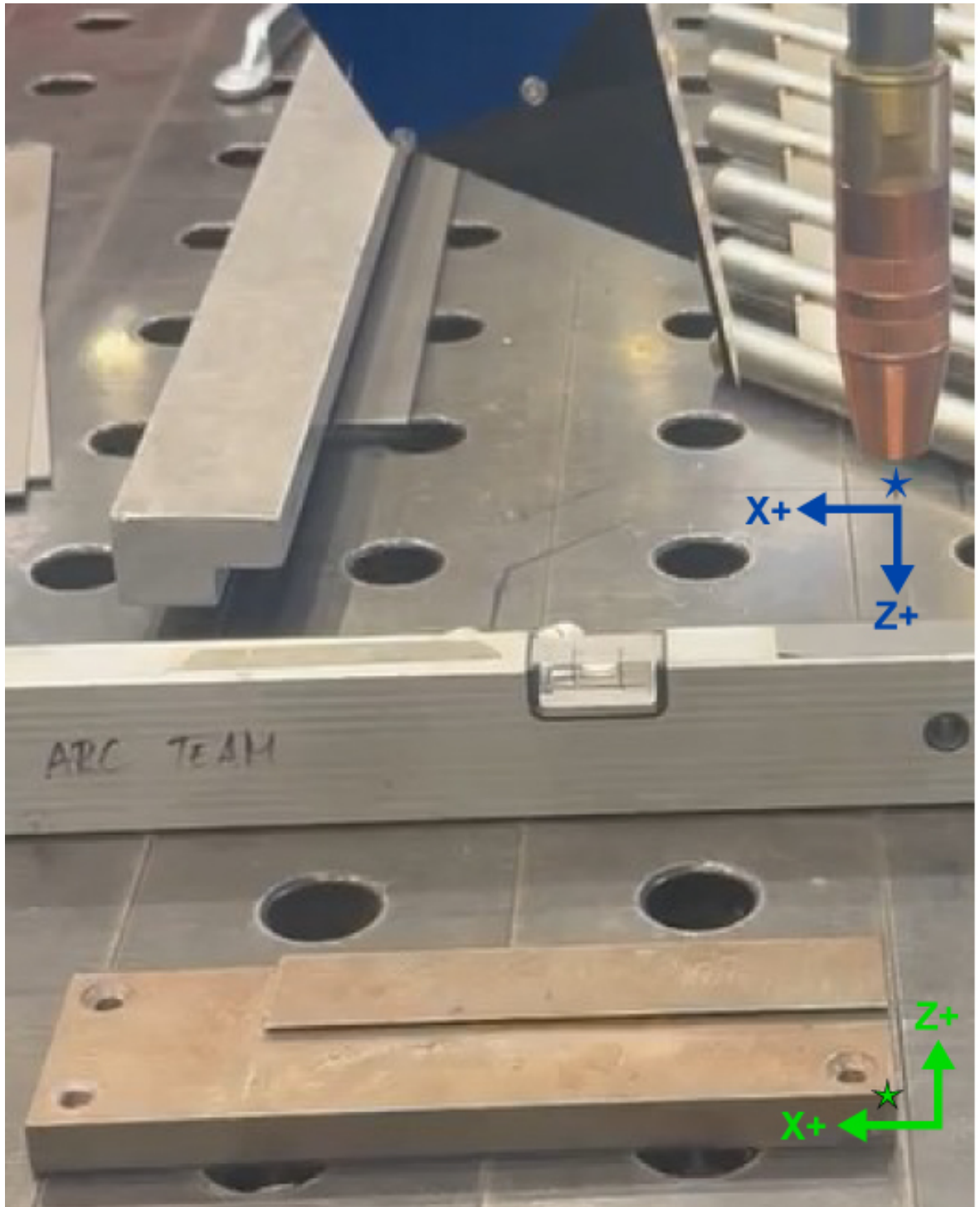
- Open the Macro
- Set LTC to the same number as the used TOOL number (in this case, LTC = 0 for tool 0)



6 Calibration

6.1 Base/Tool Coordinate System

- Coordinate system is based on the right-hand coordinate system
- Tool: **X+** in the welding direction and **Z+** is downwards
- Base: **X+** in the welding direction and **Z+** is upwards
- The base coordinate system can be positioned at the corner of the calibration plate

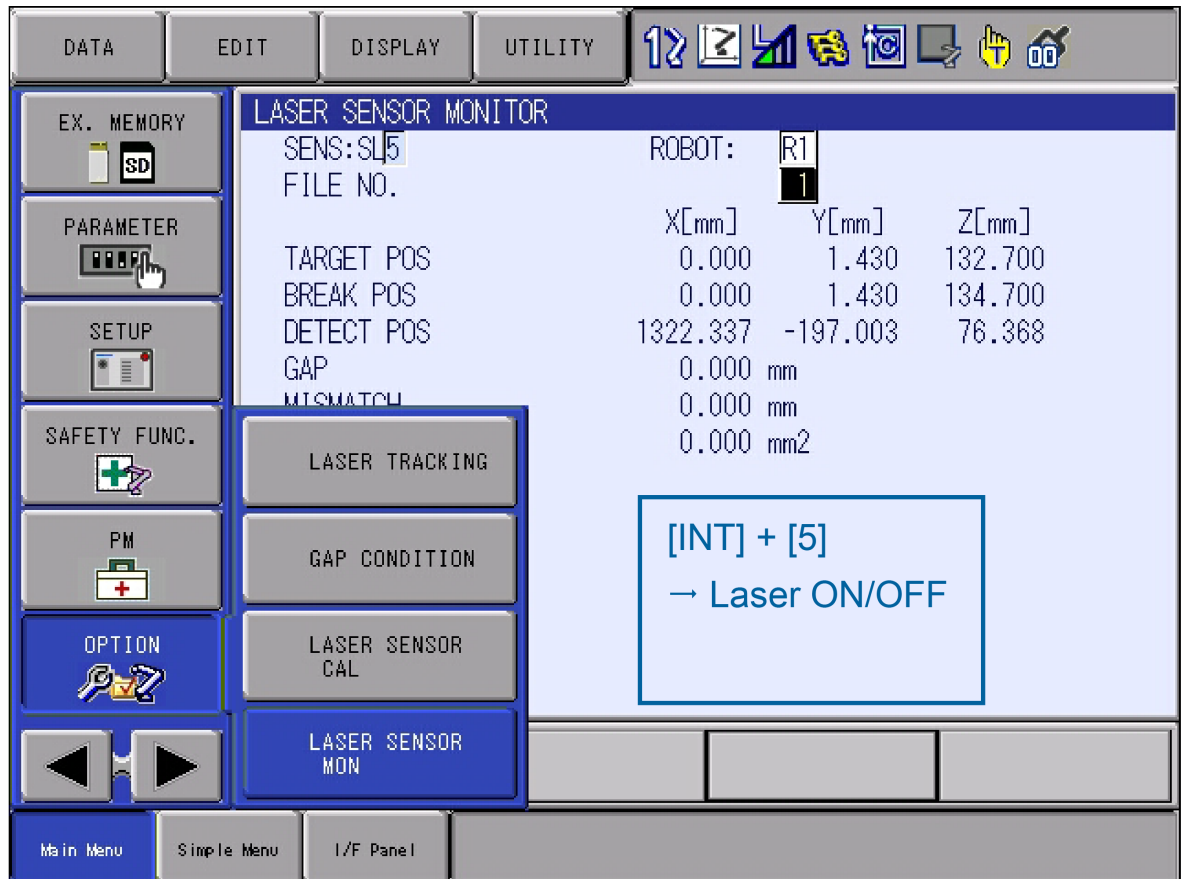


6.2 Sensor Calibration with LT-CALIB

- Register the Teach-Position for each calibration step (TOOL REFP., sensing#1 -4, ESCAPE REFP.).
- YASKAWA user manual for MotoEye LT, Chapter 6.

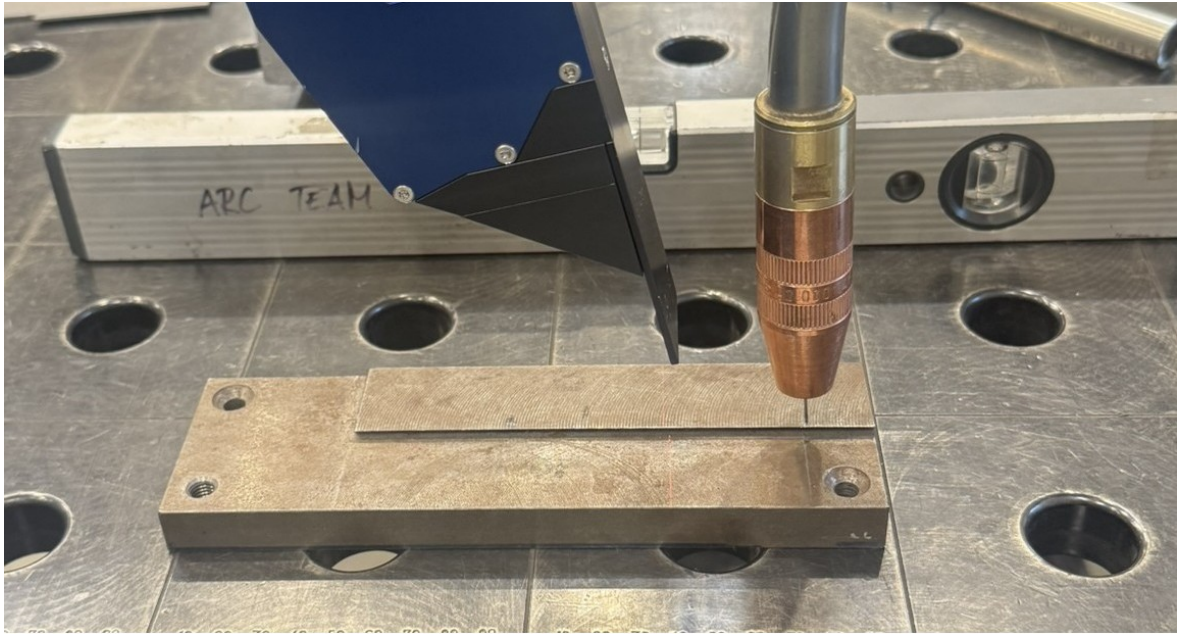
JOB	EDIT	DISPLAY	UTILITY															
JOB ARC WELDING VARIABLE B001 IN/OUT ROBOT SYSTEM INFO 	ARGUMENT SETTING																	
	JOB NAME : L1_CALIBRATE																	
	<table><thead><tr><th>NAME</th><th>TYPE</th><th></th><th>UNIT</th></tr></thead><tbody><tr><td>LT FUNC. FILE#</td><td>40</td><td>☒</td><td>1-20</td></tr><tr><td>CALIB. FILE</td><td>0</td><td>☒</td><td>0-63</td></tr></tbody></table>					NAME	TYPE		UNIT	LT FUNC. FILE#	40	☒	1-20	CALIB. FILE	0	☒	0-63	
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	LT FUNC. FILE#	40	☒	1-20														
	CALIB. FILE	0	☒	0-63														
	TOOL REFP.					REGIST												
	sensing#1 REFP.					REGIST												
	sensing#2 REFP.					REGIST												
	sensing#3 REFP.					REGIST												
sensing#4 REFP.					REGIST													
ESCAPE REFP.					REGIST													
RESULT FLAG					99	☒												
L1_CALIBRATE LT:40 LTC:0 flgB:99																		
Main MenuSimple MenuI/F Panel																		

- To activate the Laser ON/OFF press both the key inter lock and key 5.



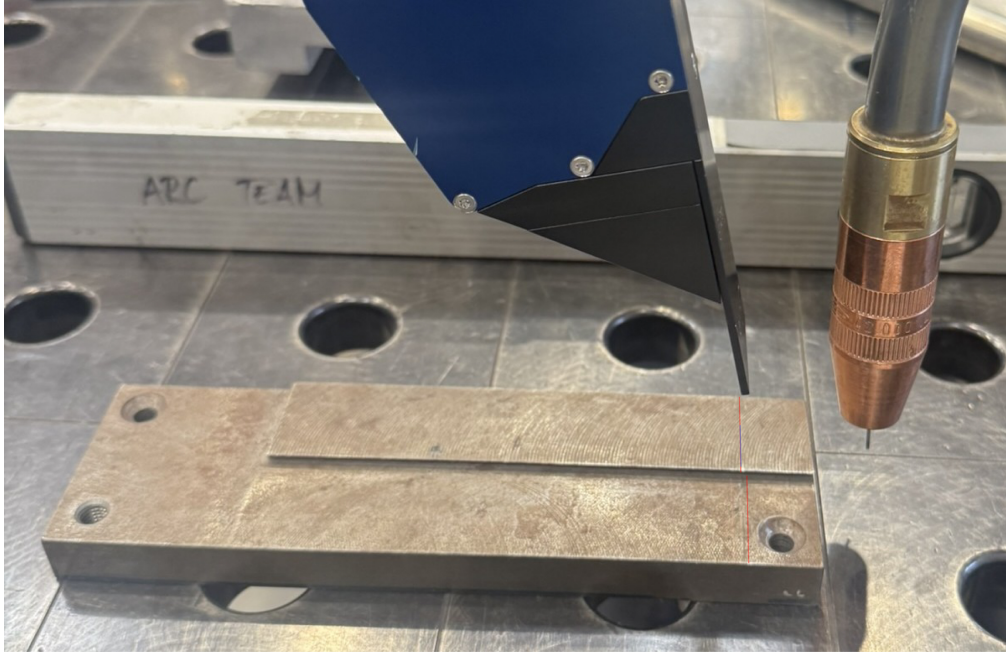
6.3 Tool REFP.

- The tool REFP. is the first position for the TCP.
- Move the TCP (wire or calibration tip) to the Reference Point and make sure that the wire is exactly at the edge of the lap joint and the marking line.
- Register this position in the Teach Pendant as Tool REFP. (Press [MODIFY] and [ENTER]).
- It is displayed as {REGIST} if registered – not flashing.

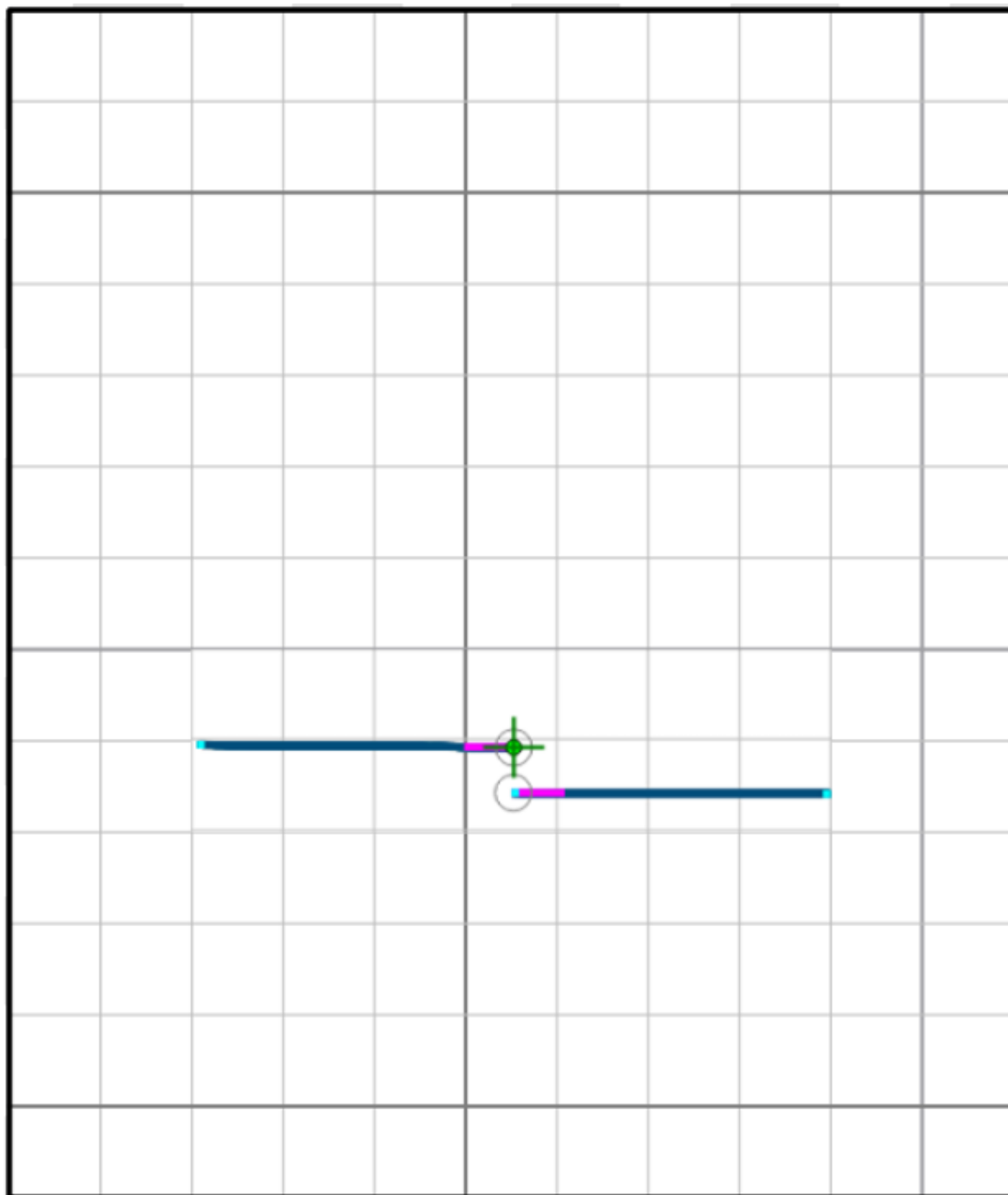


6.4 sensing#1 REFP.

- The sensing#1 REFP. defines the distance between TCP and Sensor (laser line).
- Move the laser line to Reference Point (taught Tool REFP.) and make sure that the laser line overlaps exactly at the reference point and the “Tracking Point Top” in the uniVision software is stable in the middle of the Field of View.
- Save this position in the Teach Pendant as sensing#1 REFP.

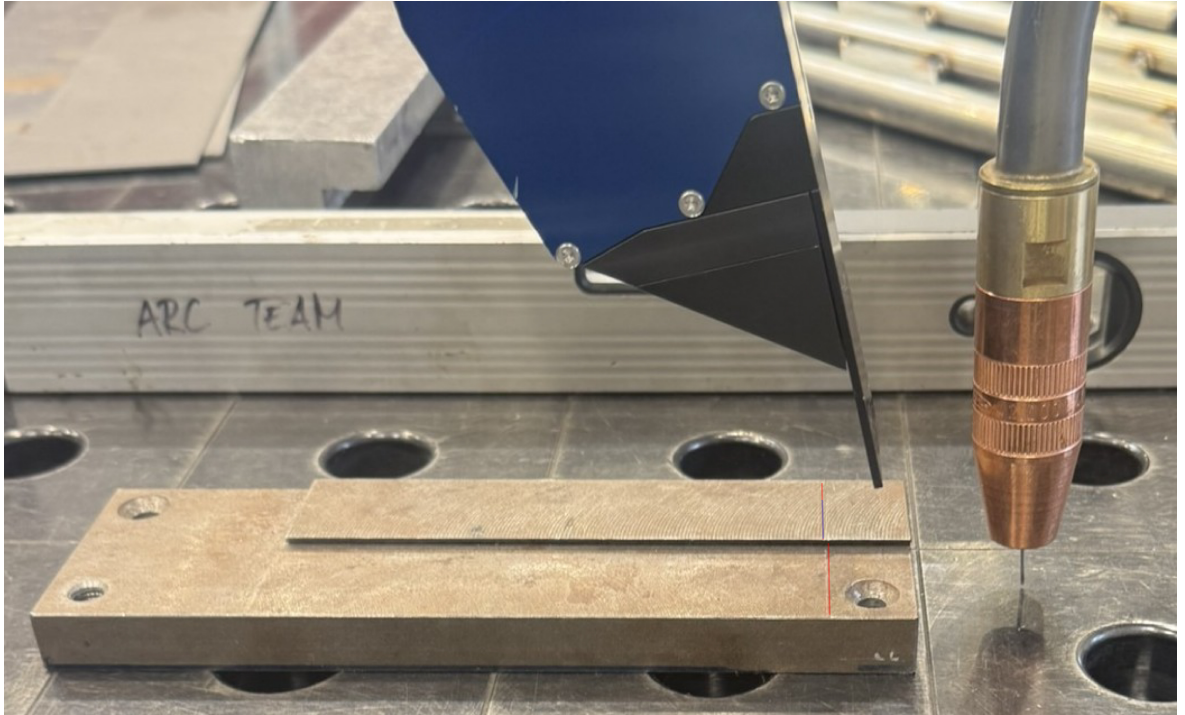


- Tracking Point Top roughly in the middle of the FOV.

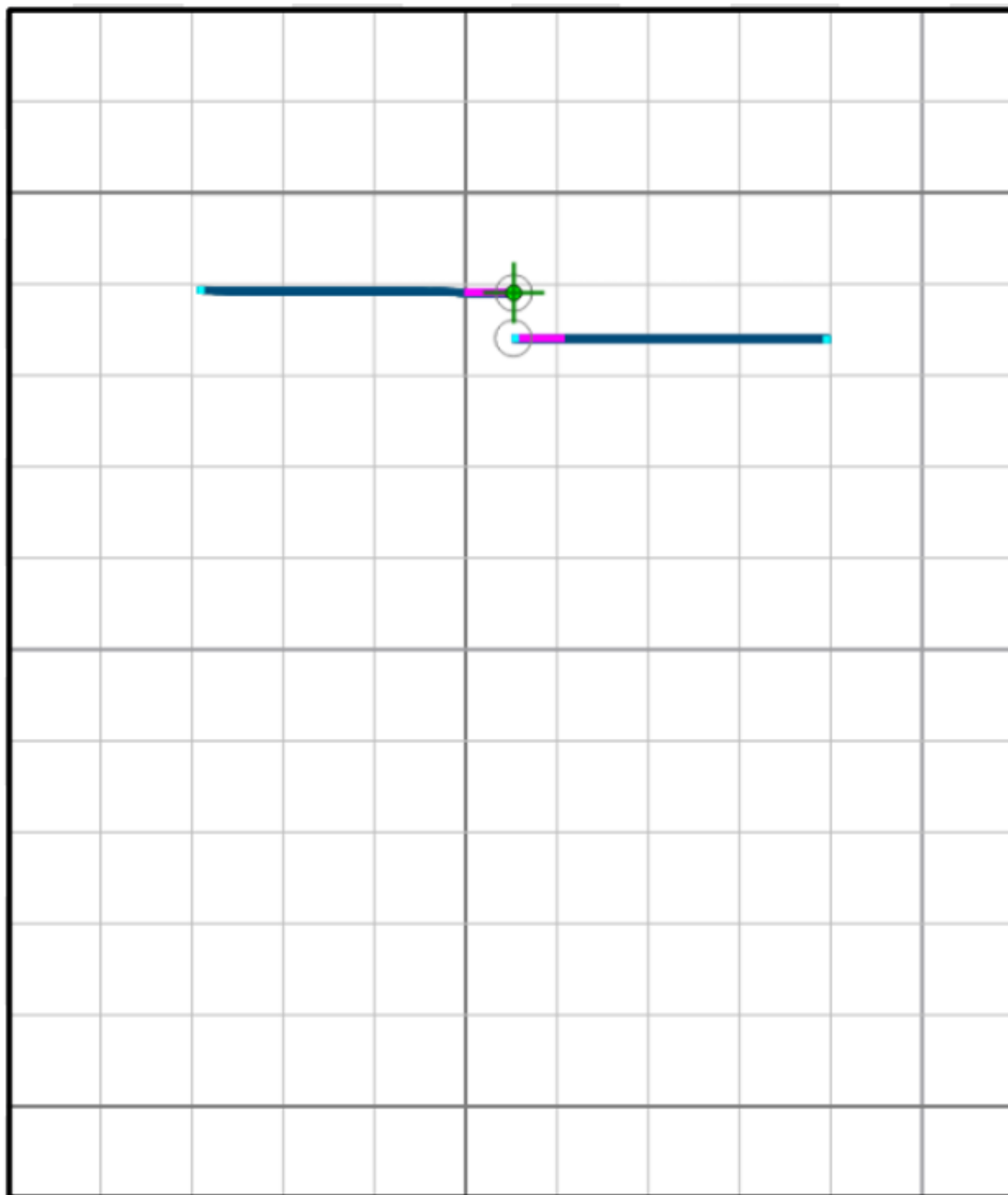


6.5 sensing#2 REFP.

- Move the robot downwards and make sure that the laser line overlaps exactly at the reference point and that the “Tracking Point Top” in the uniVision software is stable in the middle of the Field of View.
- Save this position in the Teach Pendant as sensing#1 REFP.

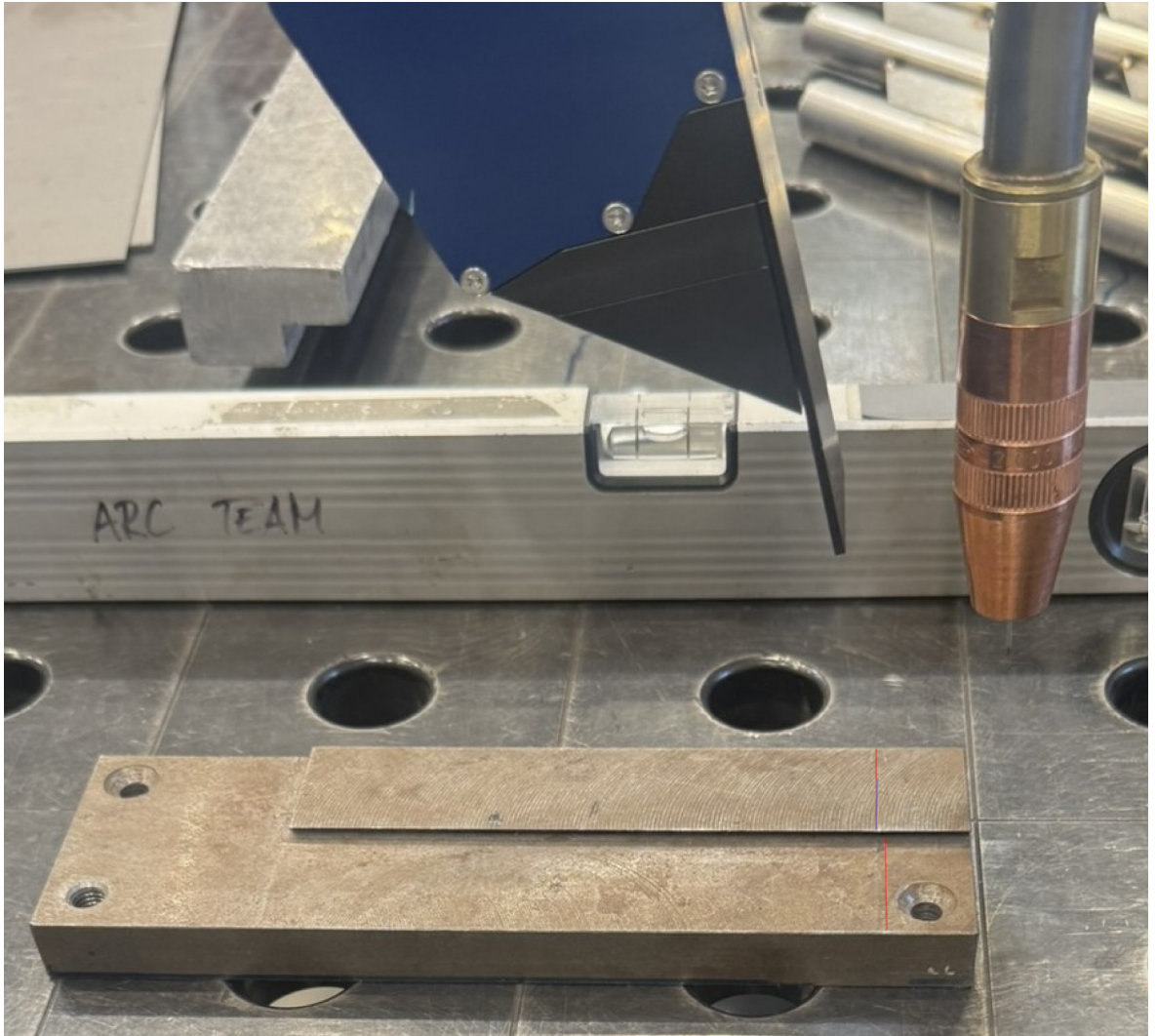


- Tracking Point Top roughly in the middle and at the top in the FOV.

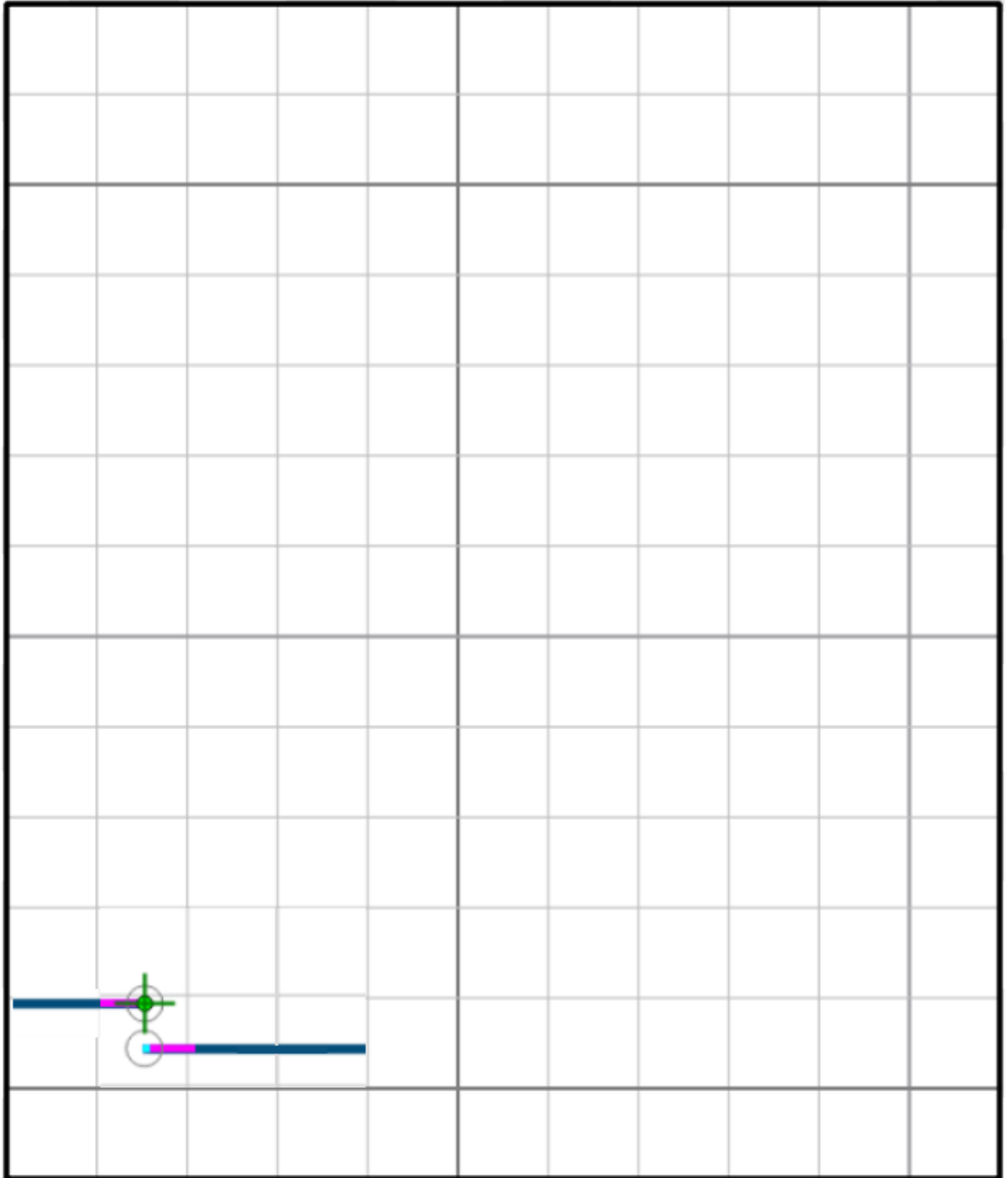


6.6 sensing#3 REFP.

- Move the robot upwards and left and make sure that the laser line overlaps exactly at the reference point and that the “Tracking Point Top” in the uniVision software is stable in the left lower corner of the Field of View.
- Save this position in the Teach Pendant as sensing#3 REFP.

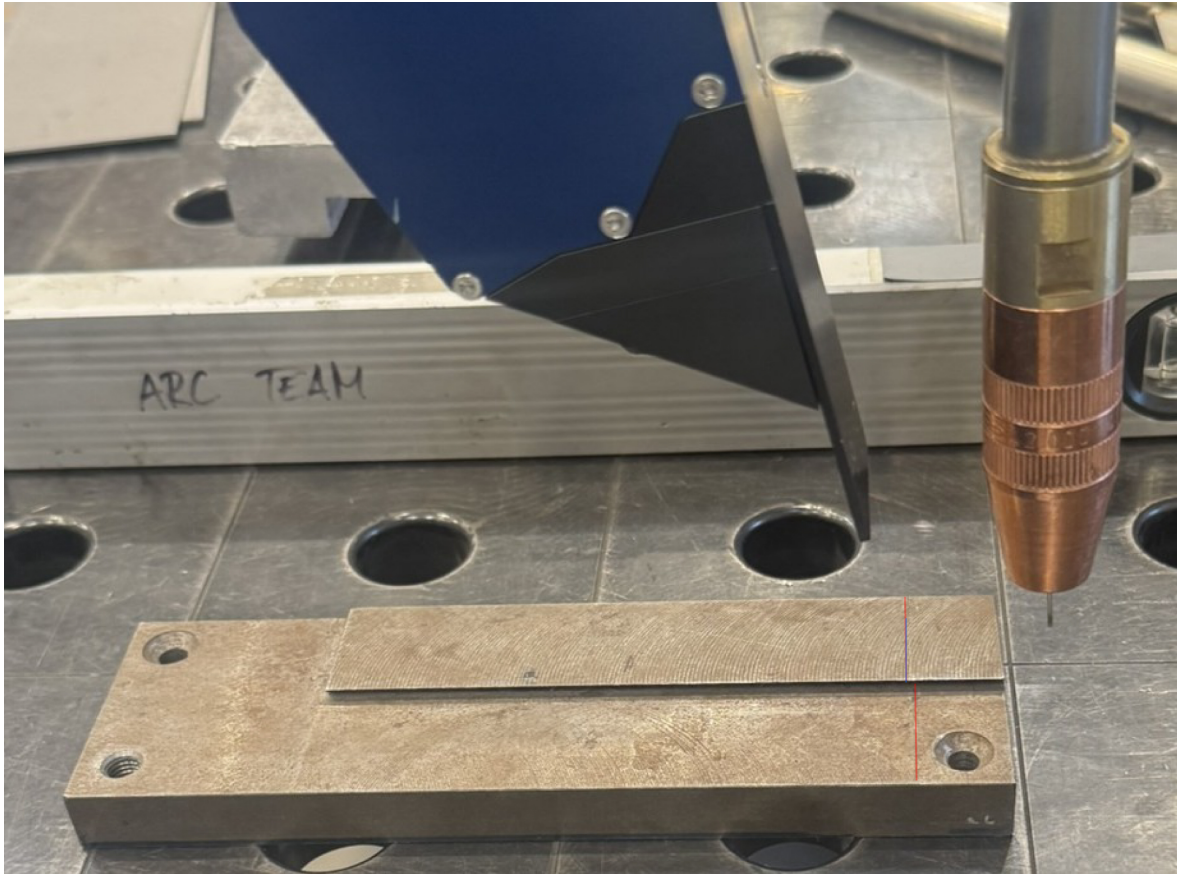


- Tracking Point Top in the lower left corner in the FOV.

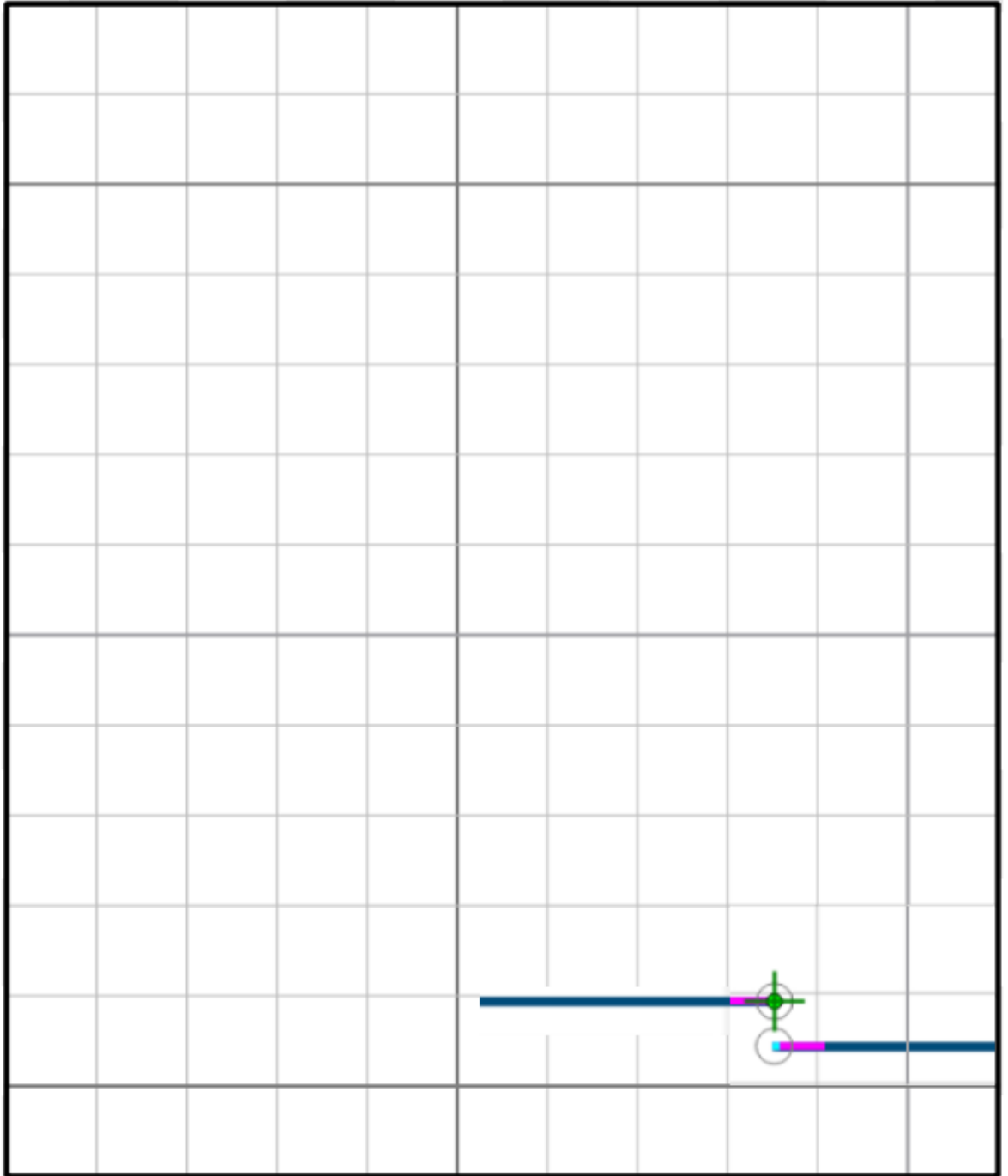


6.7 sensing#4 REFP.

- Move the robot at the same Z-height to the right and make sure that the laser line overlaps exactly at that the reference point and the “Tracking Point Top” in the uniVision software is stable in the right lower corner of the Field of View
- Save this position in the Teach Pendant as sensing#4 REFP

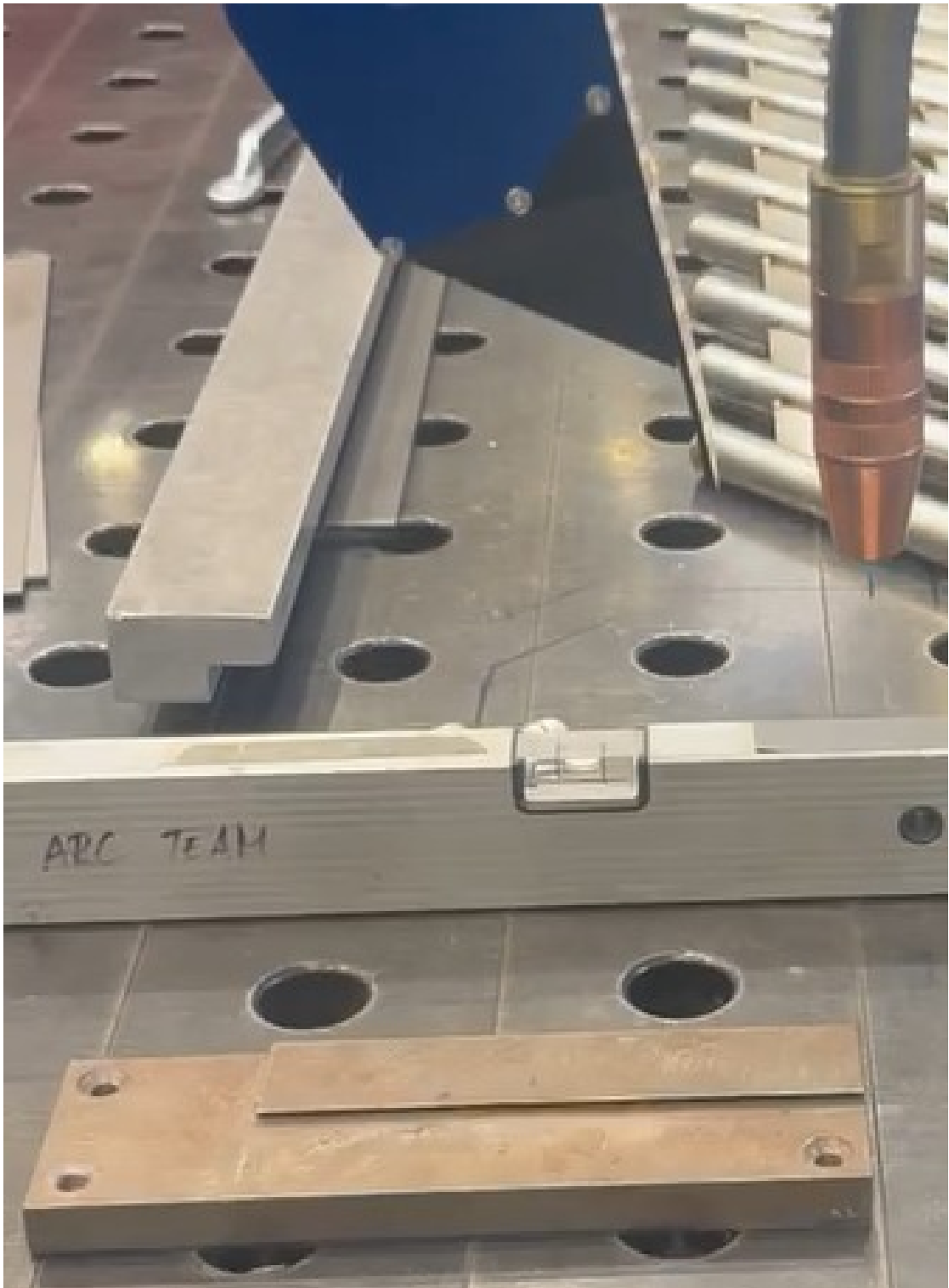


- Tracking Point Top in the lower left corner in the FOV



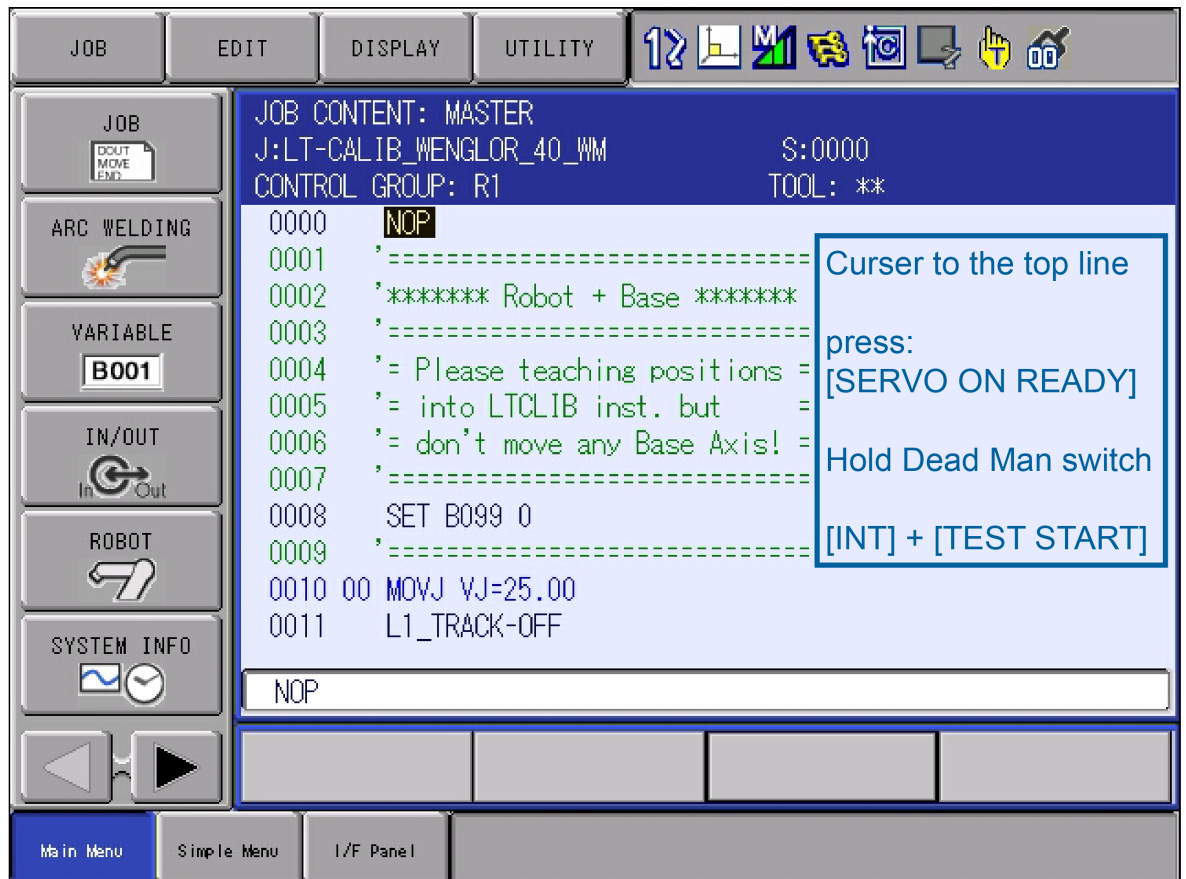
6.8 ESCAPE REFP.

- ESCAPE REFP. position is required to avoid interference between the end of the tool and the work-piece when moving from the tool reference point to calibration reference point



6.9 Execution of Calibration

- Once all positions are registered, start the calibration and the robot will automatically perform the calibration process
- Move the cursor to the beginning of the calibration JOB and set the robot controller to the PLAY mode
- Press [START] to execute the calibration job



6.10 Confirmation of the Calibration Results

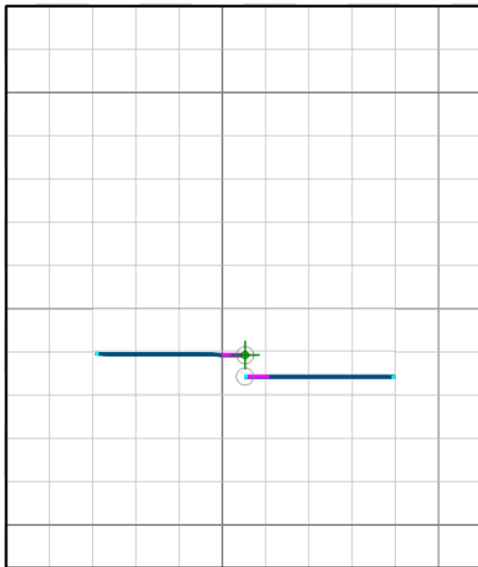
- Confirm that the [START] lamp is unlit and that the execution of the JOB has stopped.
- Check the position of the cursor.

If the cursor is on {END}, the calibration has been successfully completed.

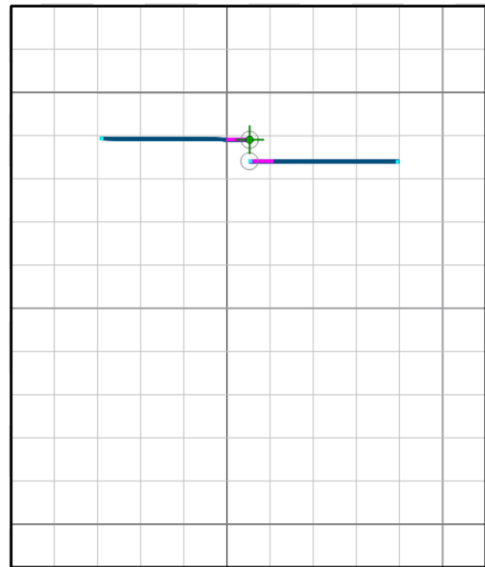
If the JOB is paused, the calibration has failed.

Additional note:

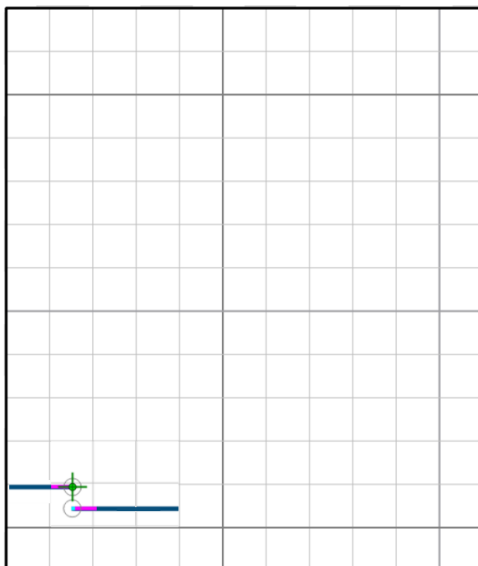
It is important that the “Tracking Point Top” is always displayed stable in the uniVision software during the calibration process.



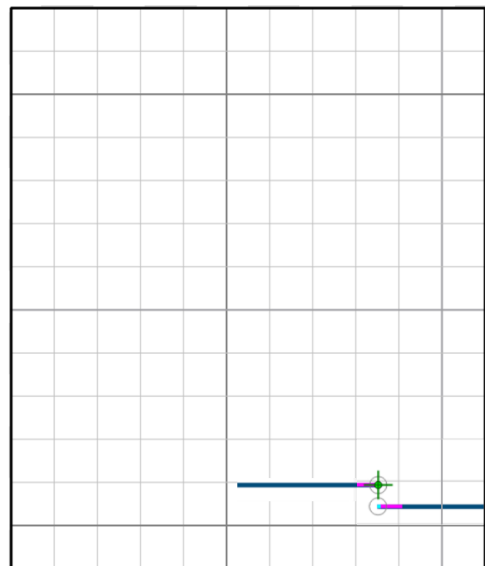
sensing#1 REFP.



sensing#2 REFP.



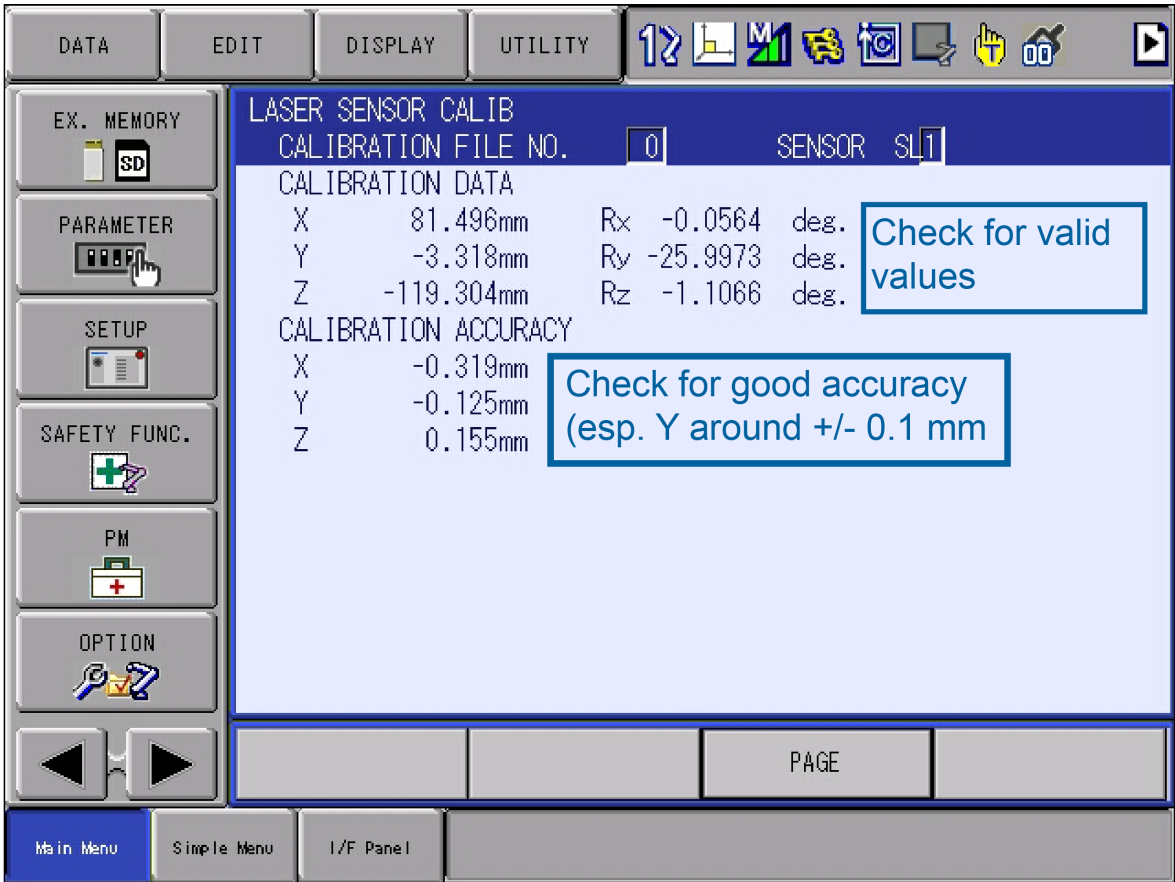
sensing#3 REFP.



sensing#4 REFP.

6.11 Calibration Result

- To check the Calibration Data and the Accuracy select [OPTION] → [LASER SENSOR CALIB]



7 **Setting for Tracking JOB**

(see Chapter 7 in MOTOEYE LT manual)

7.1 **Tracking without a Welding Start Point Search**

This section explains how to make settings for tracking without a search for the start point of the welding.

Those settings can be used when the deviation of the start point of the welding is so small that the laser beam always shines on the welding line while the robot is approaching the start point of the welding.

The sample JOB, "SMPL0", is used as an example

7.2 Tracking of Sample JOB "SMPLO"

<pre> NOP SFTOF SFTOF3D ' -- TL mode [B000]----- ' 0:W/O TRACKING, 1:TRACKING - - '----- SET B000 1 SPEED V=16.7 MOVL V=500 (Standby position) MOVL V=500 (1) LTRCKON SW=B000 LT:1 V=100 (2) 'arcon MOVL (3) LTEDSRCH SW=B000 LT:1 MOVL (4) 'arcof LTRCKOF SW=B000 MOVL V=500 (5) MOVJ VJ=10.0 (Standby position) END </pre>	(1) Approach point Set the approach point so that the laser beam is shone 5 mm to 10 mm before the start point of the welding. (2) Start point of the welding Teach the start point of the welding, and register it as an argument of the macro command, "LTRCKON". (3) Mid-way point to start the search for the end point of the welding Teach a point to specify the start position to carry out the macro command, "LTEDSRCH". (4) End point of the welding Teach a point that is 20 mm to 30 mm away from the actual end point of the welding of the reference workpiece. (5) Escape point Teach a point to specify the tool's escape motion after welding.
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Teach the points (1) to (5) as shown in the following diagram:

