LASER SCANNERS, RF62x SERIES

PURPOSE

Non-conact measuring and checking of surface profile, dimensions, deformations, flatness, gaps, volume, 3D models construction.

WORKING PRINCIPLE

Scanner operation is based on the principle of optical tri-angulation.

Radiation of a semiconductor laser is formed by a lens in a line and projected to an object. Radiation scattered from the object is collected by the lens and directed to a two-dimensional CMOS image sensor. The image of object outline thus formed is analyzed by a signal processor, which calculates the distance to the object (Z-coordinate) for each point of the set along the laser line on the object (X-coordinate). Scanners are characterized by base distance (beginning of the range), SMR, for Z-coordinate, measuring range (MR) for Z-coordinate, measuring range for X-coordinate at the beginning of Z (Xsmr) and measuring range for X-coordinate at the end of Z (Xemr).

MAIN FEATURES

- **Measuring ranges from 10 to 1100 mm**
- **0.05% linearity**
- **Sampling rate up to 6379 profiles/s**
- **Scanners with RED, BLUE and IR lasers**
- **Laser Safety Class 2M**
- **Binocular scanners**
- **Trigger and encoder synchronization, mutual synchronization**
- **WEB-interface**
- **Free SDK and examples**
  for Windows, Linux, .NET, MATLAB, LabVIEW
- **Specialized scanners**
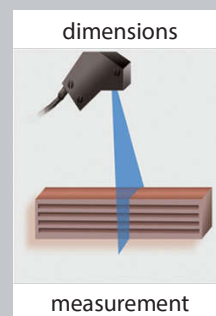 for hole control
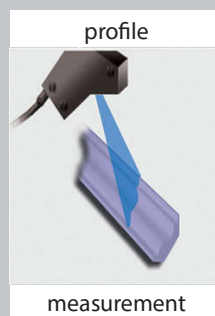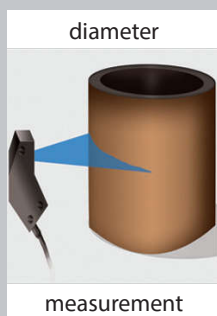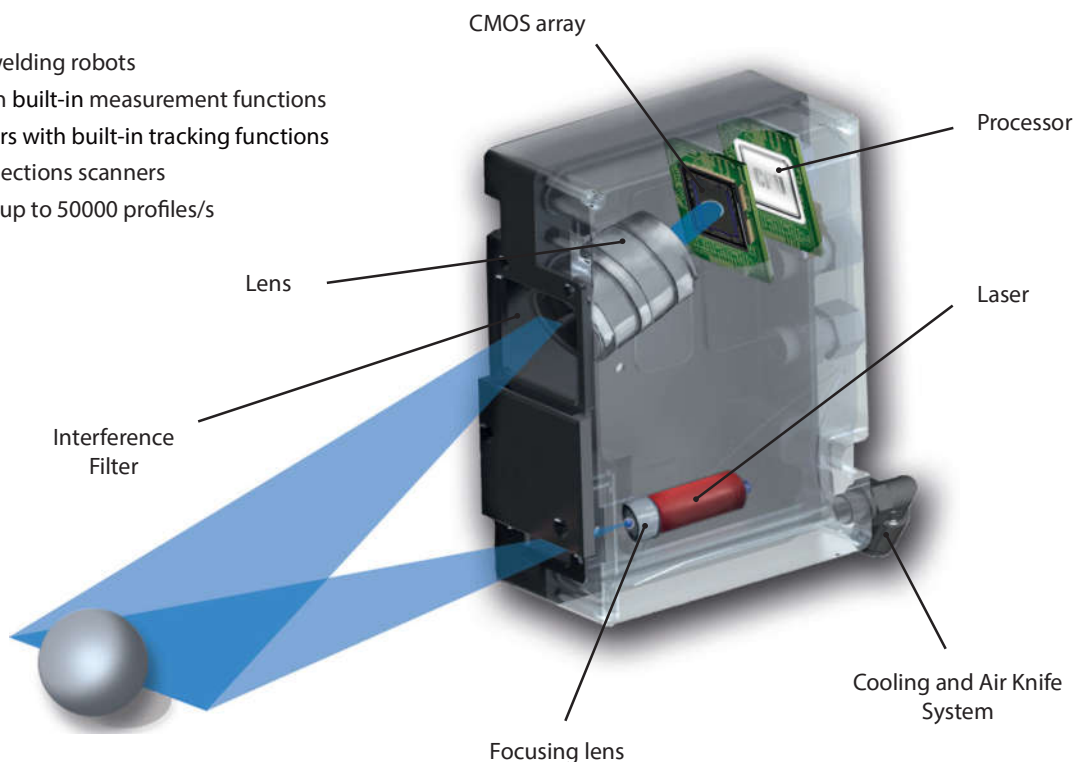
MODELS

RF627 — universal scanners

RF627Weld — scanners for welding robots

RF627Smart — scanners with built-in measurement functions

RF627Weld-Smart — scanners with built-in tracking functions

RF627AVIKScan — weld inspections scanners

RF629 — ultra-fast scanners, up to 50000 profiles/s

CMOS array

Processor

Lens

Laser

Interference Filter

Cooling and Air Knife System

Focusing lens

gaps	diameter	weld joint	profile	object	dimensions
control	measurement	control	measurement	recognition	measurement

OPTIONS

- Cooling plate with air-knife and air/water cooling
- Customized versions with non-standard base, range and housing shape
- Special version for use in vacuum conditions
- Special flexible cable for robotic applications

RF627-	MR, mm	SMR, mm	EMR, mm	Xsmr, mm	Xemr, mm	Size, mm		Weight, g
25/10-8/11	10	25	35	8	11	Fig. 1		0.37
65/25-20/22	25	65	90	20	22			
75/50-30/41	50	75	125	30	41			
70/100-48/82	100	70	170	48	82			
70/150-58/122	150	70	220	58	122	Fig. 2		0.6
95/150-53/106	150	95	245	53	106			
82/200-60/150	200	82	282	60	150			
90/250-65/180	250	90	340	65	180			
180/250-170/278	250	180	430	170	278		L=326	2
190/300-160/300	300	190	490	160	300		L=283	1.9
220/300-203/330	300	220	520	203	330		L=374	2.1
260/400-210/400	400	260	660	210	400		L=350	2.2
325/500-268/500	500	325	825	268	500		L=415	2.3
400/600-320/600	600	400	1000	320	600	Fig. 3	L=490	2.4
475/700-374/700	700	475	1175	374	700		L=558	2.5
545/800-425/800	800	545	1345	425	800		L=627	2.6
615/900-480/900	900	615	1515	480	900		L=696	2.7
690/1000-535/1000	1000	690	1690	535	1000		L=765	2.8
620/1165-430/1010	1165	620	1785	430	1010		L=554	2.5

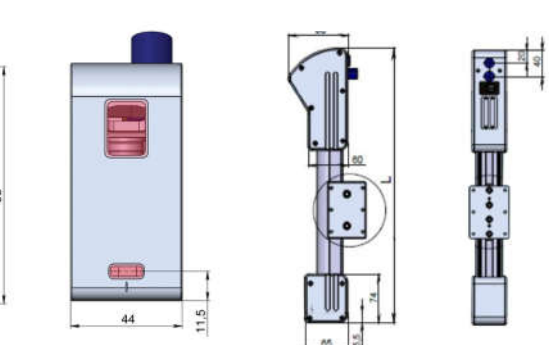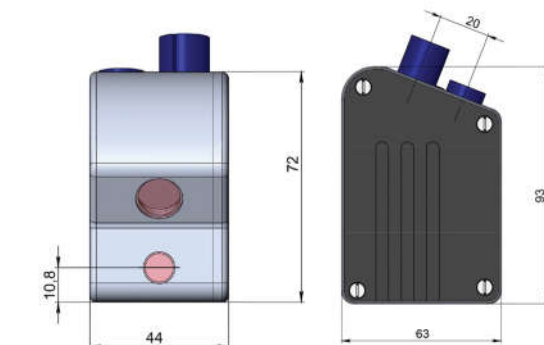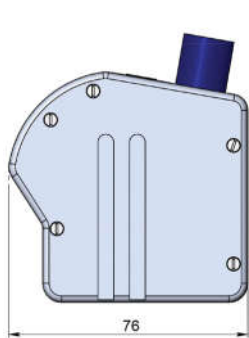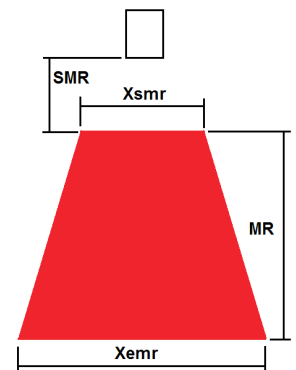| Overall specifications	
Sampling rate, Hz	Full range: 485 or 921 (DS mode), ROI: 4884 or 6379 (DS mode)
Linearity Z, %FS	0.05 or 0.1 for DS mode
Linearity X, %FS	0.1
Resolution Z, %FS	0.01% or 0.02% (DS mode)
Resolution X	648 or 1296 (programmable value)
Environment resistance:	
Enclosure rating	IP67
Vibration	20g/10...1000Hz, 6 hours, for each of XYZ axes
Shock	30 g/6 ms
Ambient temperature, °C	0...+40, (-20...+40 for the sensors with built-in heater), (-30...+120 for the sensors with built-in heater and water/air cooling housing)
Relative humidity	5-95% (no condensation)
Storage temperature, °C	-20...+70
Housing/windows material	aluminum/glass

Figure 1	Figure 2	Figure 3

SOFTWARE

WEB-INTERFACE
for scanner parameterization,
image and profile visualization

- ■ **Setting sensor parameters**
- ■ **Data receiving, storage, visualization**
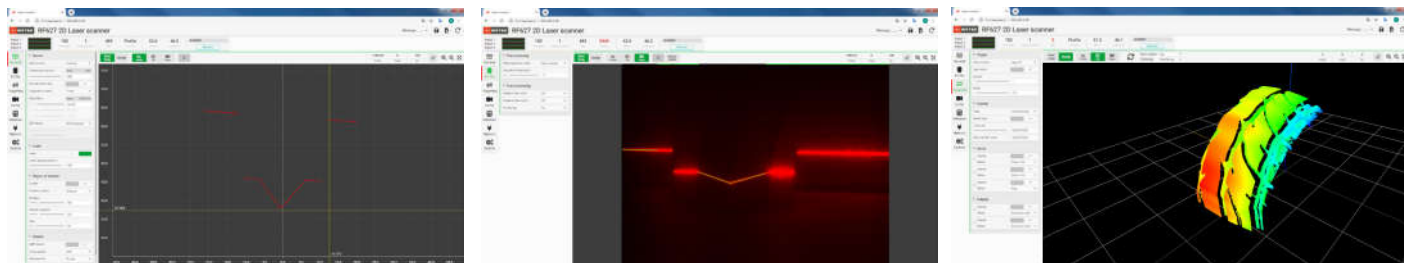
RF627SMART
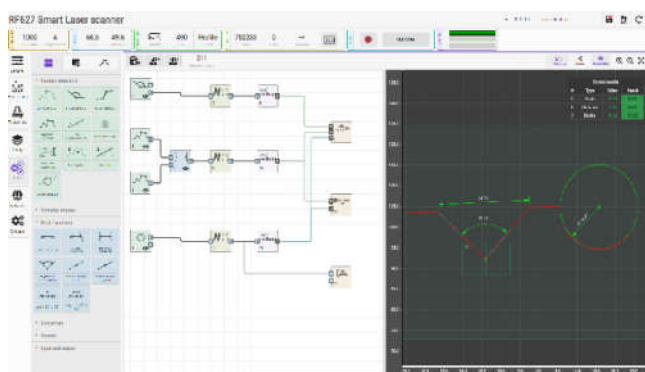
RF627Smart scanner makes it possible to measure geometric parameters of the object profile in real time directly in the scanner without connecting to a computer. Analysis, calculations, measurements, tolerance control are carried out according to the algorithm created by the user. To build an algorithm, a simple and intuitive tool is provided - a computation graph. The graph is formed from a library of ready-made blocks. Various combinations of blocks and connections between them allow the user to create an almost unlimited number of measuring functions, as well as to process profiles of any complexity. Measurement results can be transmitted via various protocols (Ethernet/IP, Modbus TCP, UDP), as well as to the logic outputs of the scanner in order to control the actuators and notify about product suitability.

3D OPTICAL SCANNER

- ■ **RF635 - 3D scanners on the base of structured light**

PURPOSE
3D models creation and measurement

WORKING PRINCIPLES

The major parts of the structured light scanner are DLP projector, two embedded cameras and digital processor. The lights from DLP projector is projected in different patterns that then become distorted on the object's surface. The cameras capture the distortions from different angles and digital processor calculates the point cloud of the object's surface with high precision.
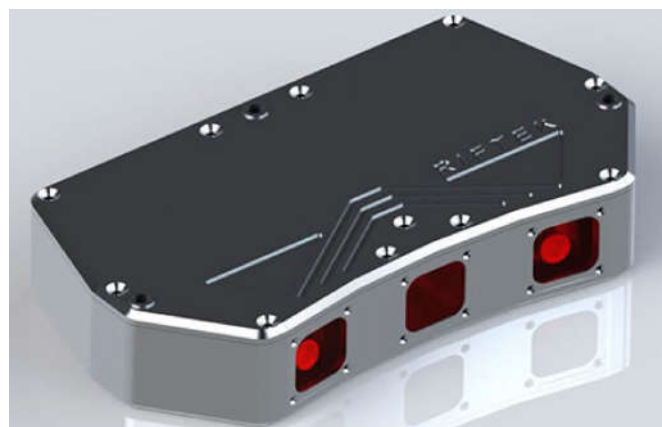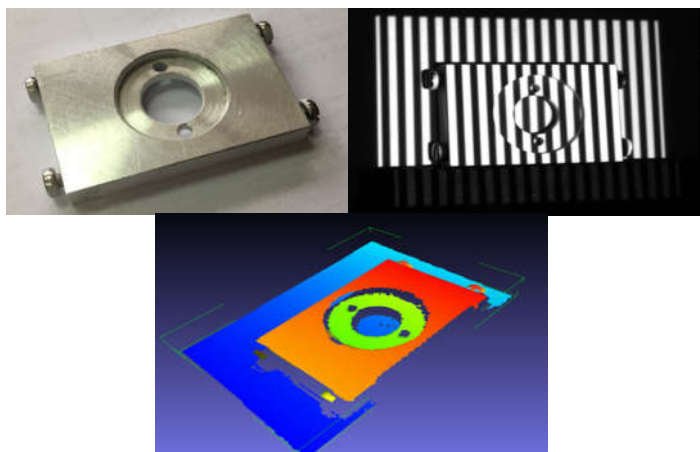
| Parameter	Value
Scan rate, Hz	4
Clearance distance, mm	250
Measurement Range, mm	120
FOV, mm	160 x 100 – 260 x 150
Accuracy (depth), mm	±0.05
Resolution XY, mm	0.08
Inputs	Differential Encoder, Trigger
Outputs	2x Digital Output, RS485 Serial (115 kbaud), 1x Analog Output (4 - 20 mA)
Interface	Gigabit Ethernet
Weight, kg	1.8

MAIN FEATURES

- ■ Laser scanners and software for welding robots
- ■ Recognition, tracking and measuring in real time
- ■ Various protocols for communication with robots

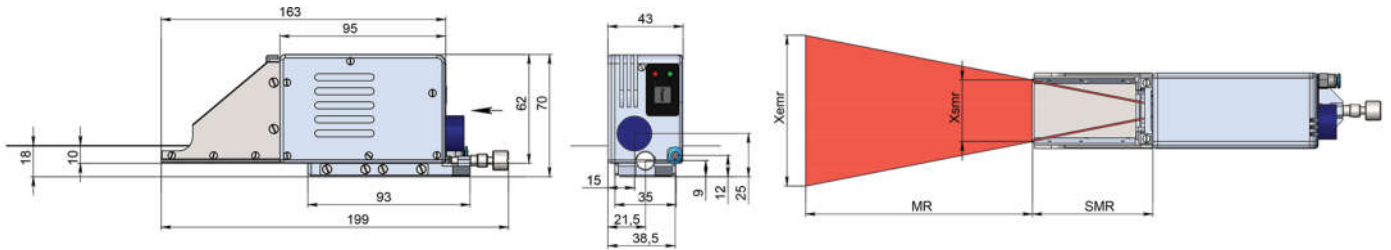| Laser Scanners RF627Weld Series. Working ranges					
Range	SMR, mm	MR, mm	Xsmr, mm	Xemr, mm	Laser
65/25-21/25	65	25	21	25	
70/130-35/86	70	130	35	86	Class 2M
90/250-65/180	90	250	65	180	
For the rest parameters see "Overall specifications" in the previous page.					

RF627Weld-65/25-21/25 and RF627Weld-90/250-65/180
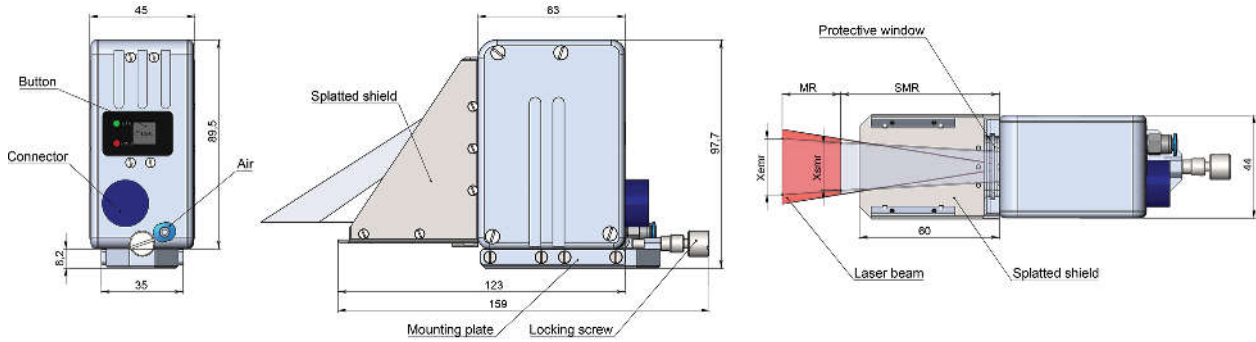
RF627Weld-70/130-35/86

HOW IT WORKS

STEP 1
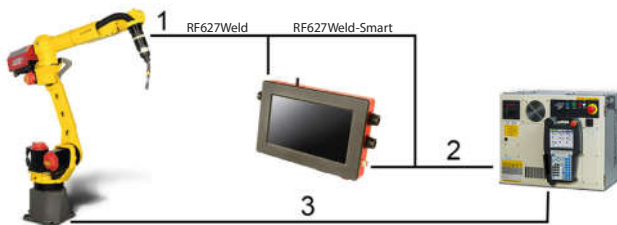
Connect equipment in accordance with functional diagram:
1. Connection between the RF627Weld scanner and the RIFTEK RF017 controller or between the RF627Weld-Smart scanner and the robot controller
2. Connection between the RIFTEK RF017 controller and the robot controller (for RF627Weld) or between the scanner and the robot controller (for RF627Weld-Smart)
3. Connection between the robot and the robot controller

STEP 2

Select **Template**

STEP 3

Robot Exchange Protocols

STEP 4 START WORKING

LASER SCANNERS

touch-screen
rugged case
built-in batteries
Wi-Fi module
adjustable height
magnet wheels with built-in encoder
video camera with LED lighting
2D laser scanner
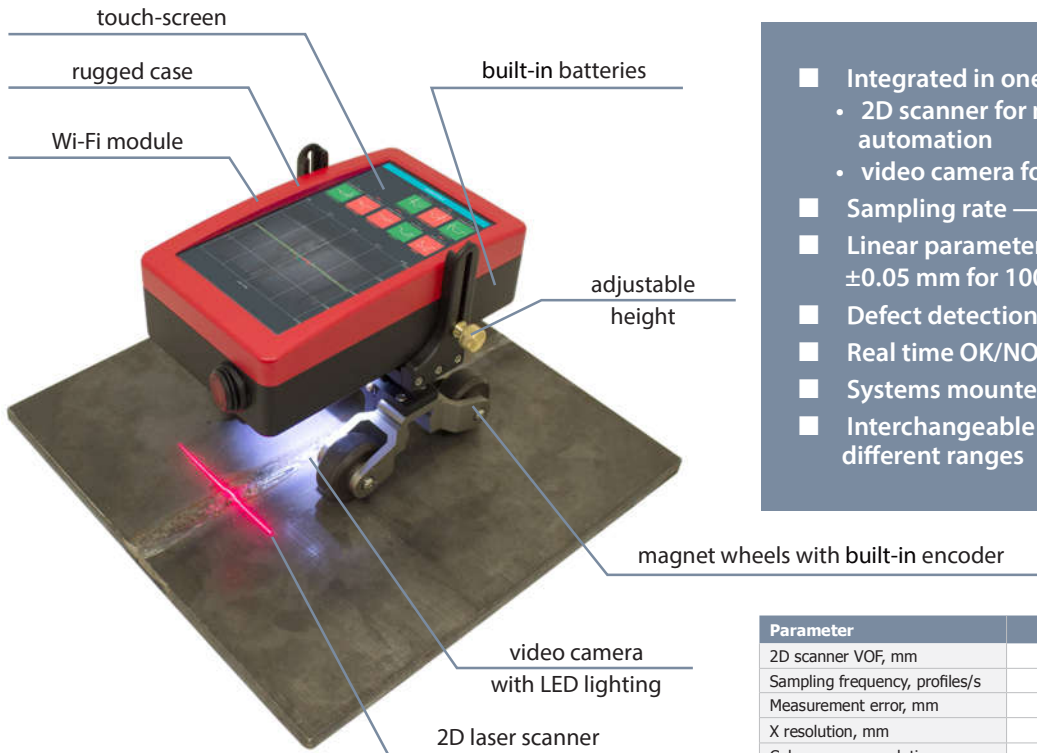
- ■ Integrated in one system:
  - • 2D scanner for measurement control automation
  - • video camera for visual control automation
- ■ **Sampling rate — more than 2000 profiles/s**
- ■ **Linear parameters measurement error — ±0.05 mm for 100 mm range**
- ■ **Defect detection (porosity, cracks)**
- ■ **Real time OK/NOK analysis**
- ■ **Systems mounted on the robot**
- ■ **Interchangeable measuring heads with different ranges**

Parameter	Value
2D scanner VOF, mm	Z - 120, X - 30…110
Sampling frequency, profiles/s	>2000
Measurement error, mm	±0.05
X resolution, mm	0.025…0.08
Color camera resolution	1296 x 976
Camera speed, frames/s	120
Laser	red (660 nm) or blue (405 нм), Class 2
Working temperature, °C	-40…50
Measured parameters	width, height, angles, mismatch, undercut and so on

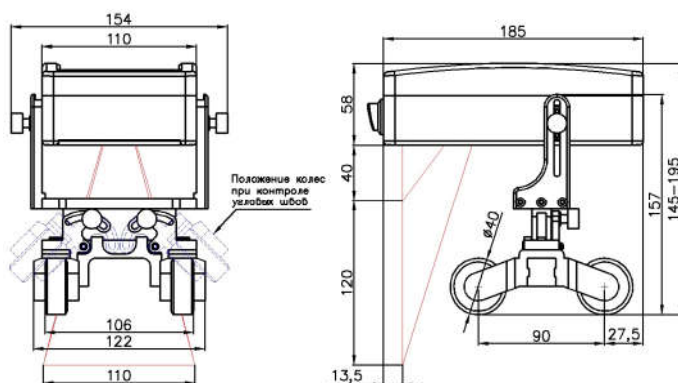## EDGE PREPARATION CONTROL
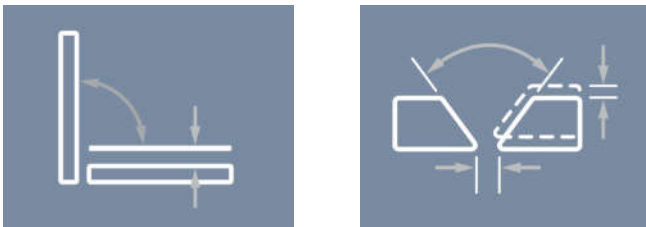
MEASUREMENT OF OFFSET, JOINT ANGLE, GAP WIDTH AND ETC.

WELD CONTROL
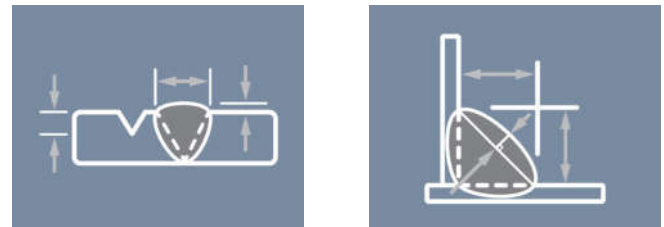
MEASUREMENT OF WELD HEIGHT AND WIDTH, CUTTING DEPTH, CAMBER AND ETC.

DESIGN

3D VISUALIZATION SOFTWARE