September 2017
NEWS

MAUS
ITALIA

Giotto

Orbital welding heads for tube-to-tube sheet TIG welding

CE

MADE IN ITALY

ENG REV 0

Tubweld

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Giotto

Standard orbital head for tube-to tube sheet TIG orbital welding

GiottoAVC

Evolution of the standard orbital head with **AVC** system for arc height management

Giottoaircooler

Head for aircooler geometry that allows passage over the water tank

MW280-F

Digital inverter generator with integrated microprocessor

General **features** of the Giotto orbital heads

Exclusive TIG welding torch

Unique product of its kind. The new orbital TIG torch has been designed and manufactured entirely by Maus Italia.

New TIG torch

Filler wire driving system

The constant flow and rotation of the spool on the orbital axis increases the accuracy and quality of the weld.

Filler wire

Single key settings

Exclusive capability to adjust the geometry of the weld with the single supplied key.

Single key

Constant angular velocity

The adjustment system, with its 2-channel, 256-pulse digital encoder with continuous feedback, ensures a uniform and accurate weld.

Encoding

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Tubweld

In-house design and manufacture

Giotto

Orbital welding heads for tube-to-tube sheet TIG welding for the manufacture of tube bundle heat exchangers.

Maus Italia presents its new range of ***Giotto*** series orbital heads for tube to tubesheet TIG welding.

Following thousands hours of R&D, tests and prototyping, the result is an outstanding and unprecedented orbital welding head that is a masterpiece developed, manufactured and machined in Italy, with the extreme precision and quality you would expect from Maus Italia.

The series offers a range models for orbital heads which come with a generator of the latest technology and dedicated software.

STANDARD

For tubes from 10.0 to 51.0 mm
(from 0.394" to 2.008")

Tube range

Electrode angle of incidence

The system which we offer for each weld geometry is accurate and repeatable and facilitates geometric set-up operations.

Fixed angle

Management of the welding arc

Continuous monitoring of the arc current ensures constant penetration throughout the weld.

Arc Voltage

Anti-dazzle protection.

Allows multiple operators to work simultaneously on the same tube sheet without the need for personal protective equipment (PPE).

BlockOut

24/7 use

Water cooling system inside the head for significant weld improvement and guaranteed repeatability.

Cooling

Courtesy of VILLA SCAMBIATORI

RMicrometric adjustment

Device for adjusting the distance of the electrode from the tubesheet.

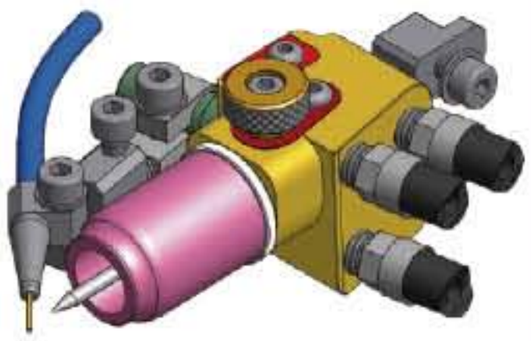
Complete range of tube centring devices consisting of ***HS*** cartridge holding spindles and ***HC*** self-centring cartridges.

GT-12

WTC thrust collar systems customised to the geometry of the tube and to the material to be welded with Maus Italia ***BlockOut*** screen for anti-dazzle protection.

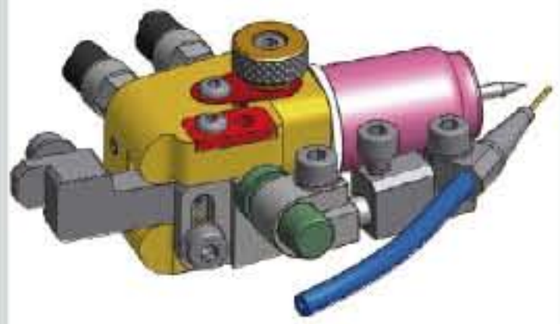
GT-6

Gas2 direct outlet especially for the use of the ***WTC-TT*** thrust collar when welding titanium tubes.



Tangential screw electrode tightening

There is no need for service wrenches and replacement of the worn electrode is fast *(you no longer need to dismantle the ceramic nozzle, its gas diffuser or the filler wire guide).*



Wire feed unit

Fully adjustable in all directions.
All manoeuvres can be performed with the single supplied key.

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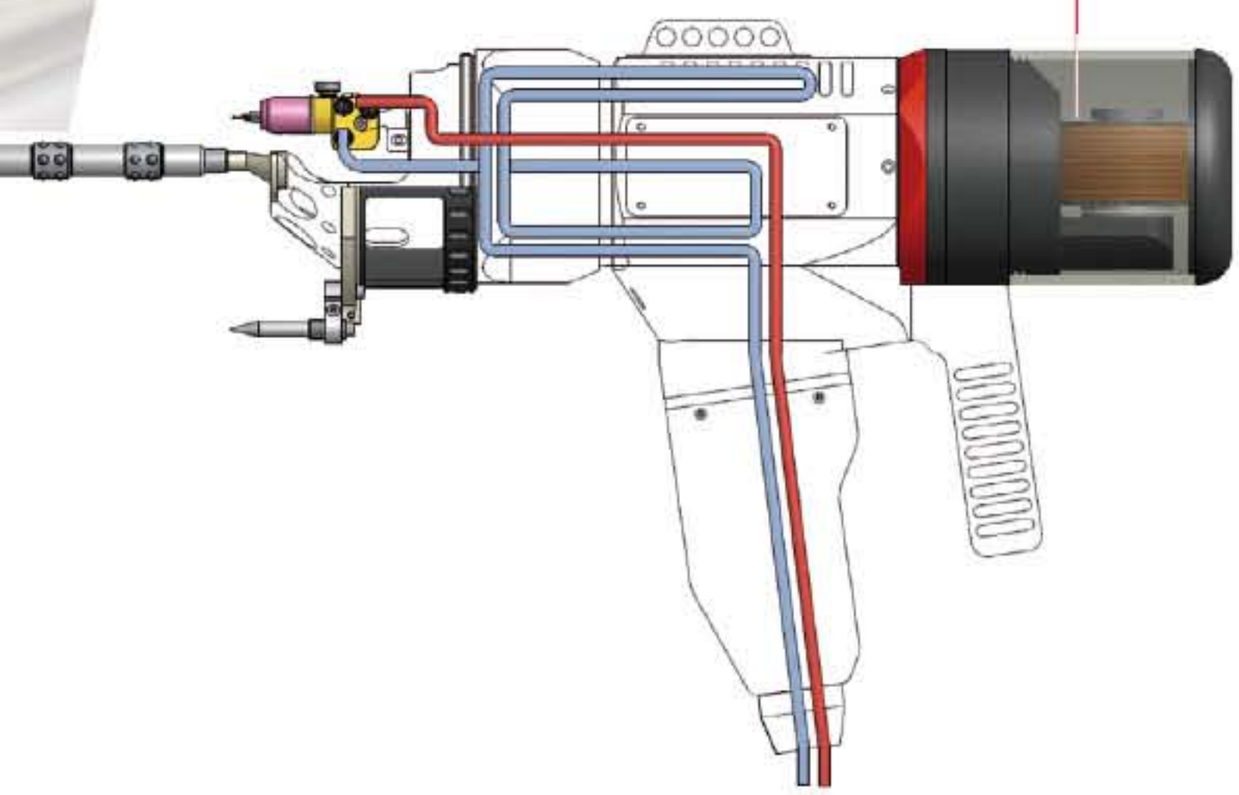
Tubweld

Giotto

Standard orbital welding head
for tube-to-tube sheet TIG welding.

Transparent protection

The movement and consumption of the filler wire is always under the operator's eye thanks to the transparent protective inspection window.



The ***Giotto*** orbital head is an unprecedented coalescing of new ideas.

The standard version has all the cutting-edge technological features designed by the Maus Italia R&D staff.

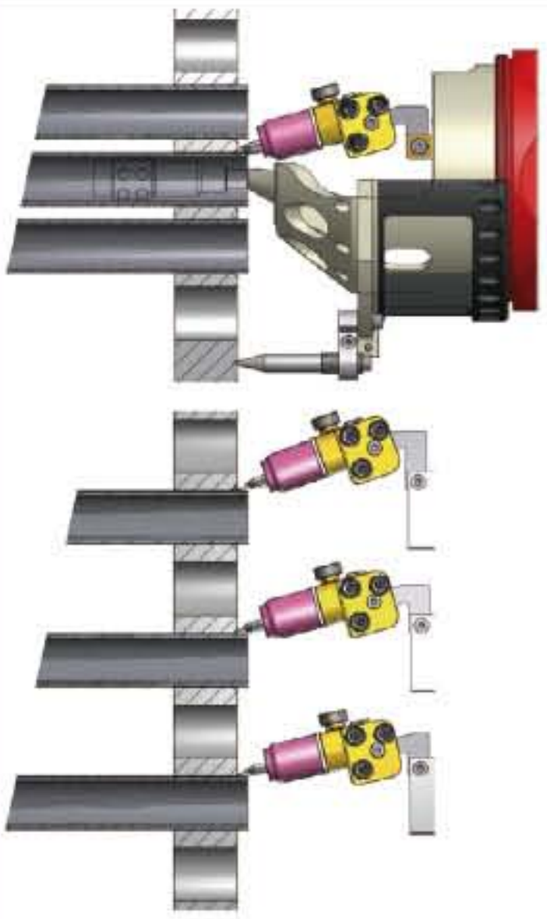
Only intensive use over time in our customers' modern workshops can show the high level of efficiency and quality of the welded product obtained with this new head which has been entirely created by Maus Italia.

Electrode angle of incidence

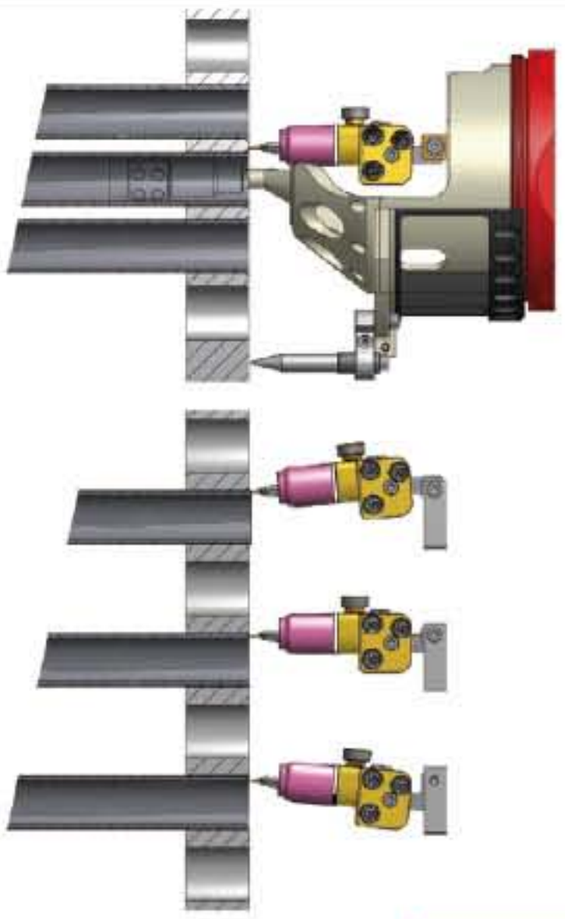
Thanks to the system's components which have preset angles, each welding geometry is accurate and repeatable.

Facilitates geometric setup operations as well as being extremely stable and robust.

Protruding tube geometry



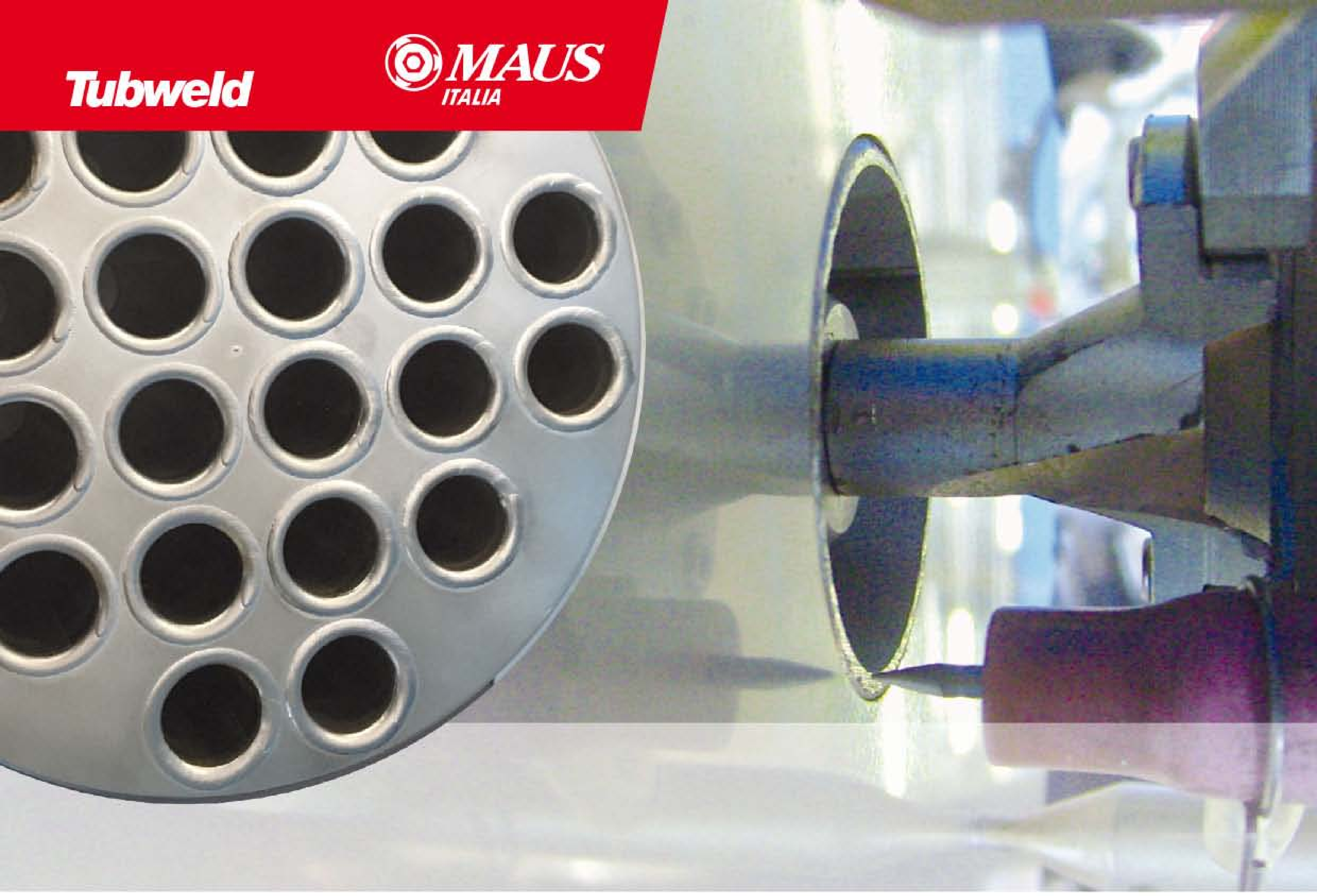
Flush tube geometry



Internal torch cooling system

This efficient system for cooling the Giotto orbital welding heads ensures:

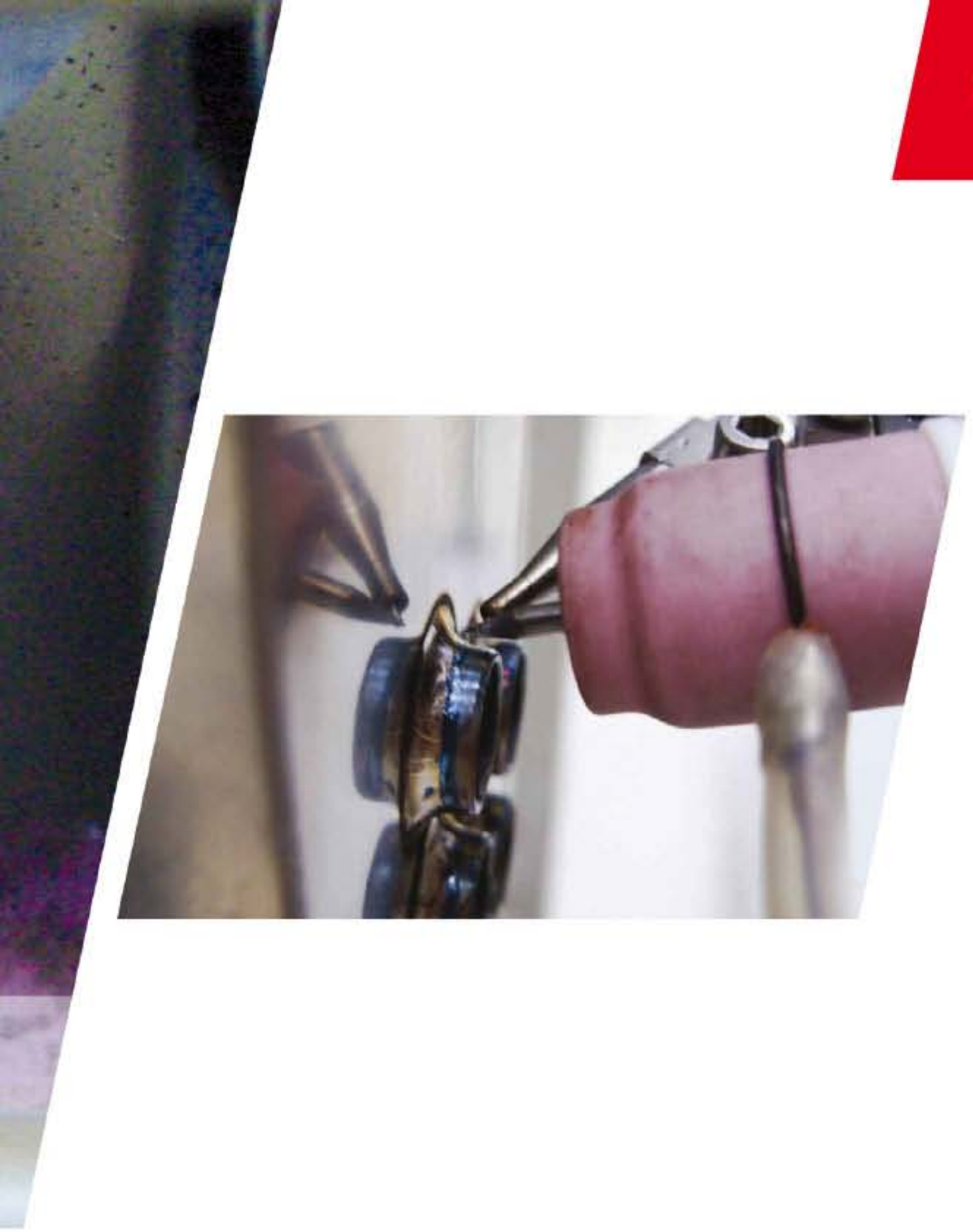
- control over the internal temperature of the rotating joint even at high welding amps;
- continuous use in 24/7 shifts
- high quality of the weld pool (lower average temperature of the electrode and the protection gas crossing it)
- significant improvement in weld performance



WTC-TT thrust collar for welding of titanium tubes with Gas2 inlet and **BlockOut** protective screen

WTC-FT thrust collar for welding flush tubes with **BlockOut** protective screen

WTC-PT thrust collar for welding protruding tubes with **BlockOut** protective screen



Giotto

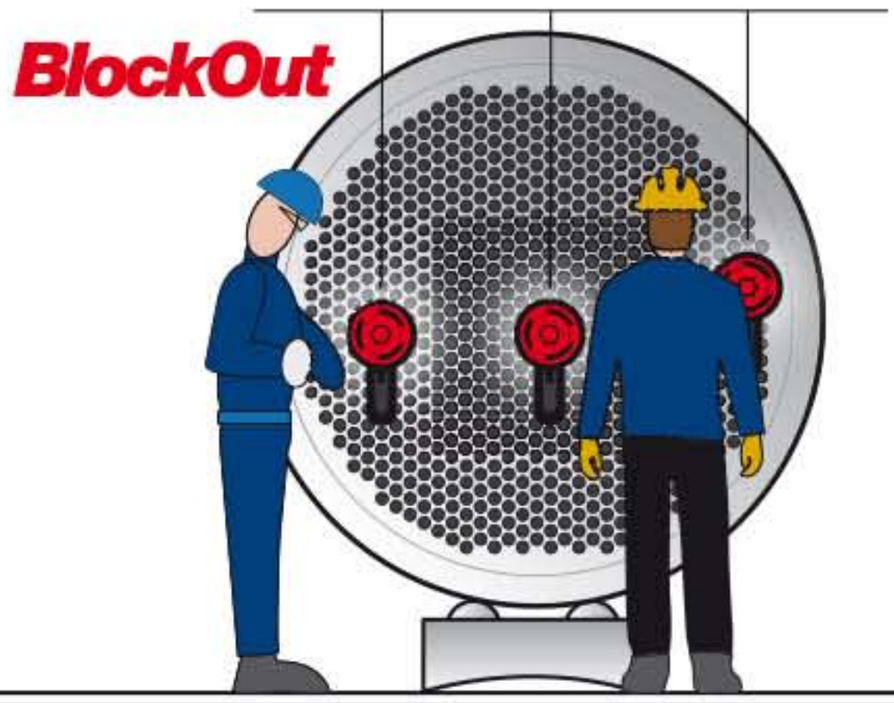
WTC thrust collar systems especially for the geometry of the tube and the material to be welded.

Special attention has been paid to the various thrust collar systems for the classical welding geometries. Last, but not least, there is a protective inspection window for welding titanium tubes. All the systems we offer have the innovative Maus Italia **BlockOut** screens for anti-dazzle protection.

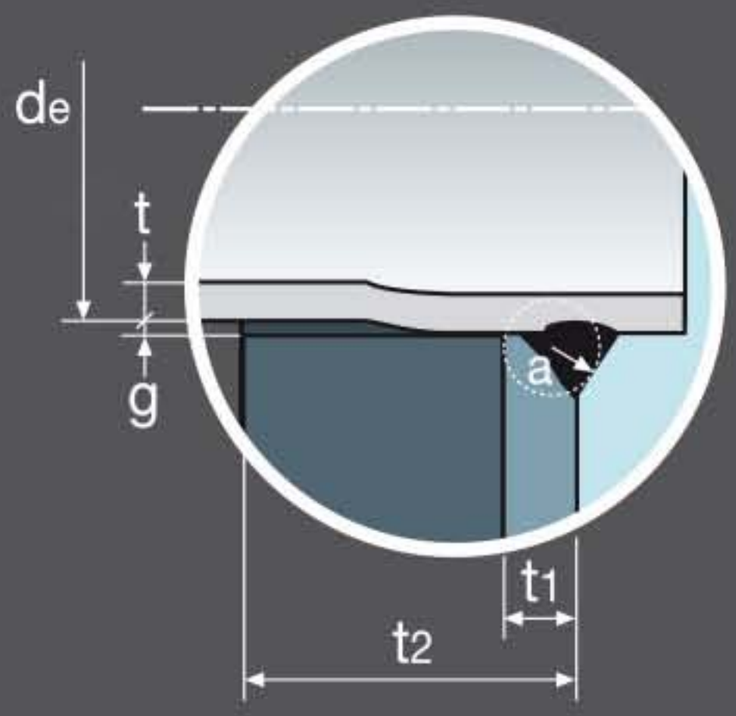
It is now possible for multiple operators to work simultaneously on the same tube sheet without the need for personal protective equipment (PPE) which is often uncomfortable and slows down productivity.

Terms, definitions and symbols in TIG orbital welding

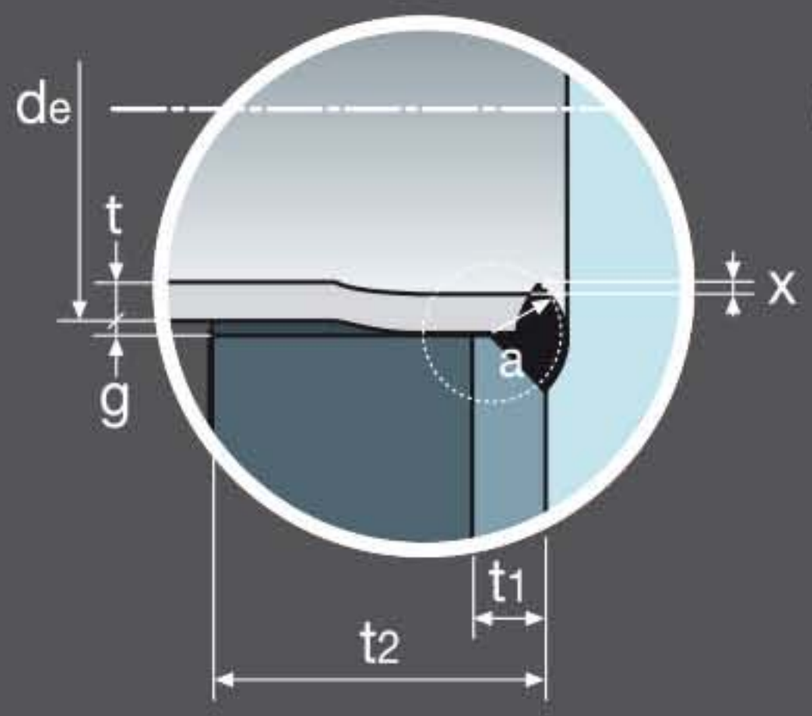
a	bevel thickness *(between the root and weld surface)*
d_e	external tube diameter
g	clearance *(between the external tube diameter and the tube sheet)*
t	tube thickness
t_1	cladding thickness
t_2	tube sheet thickness
x	weld overflow



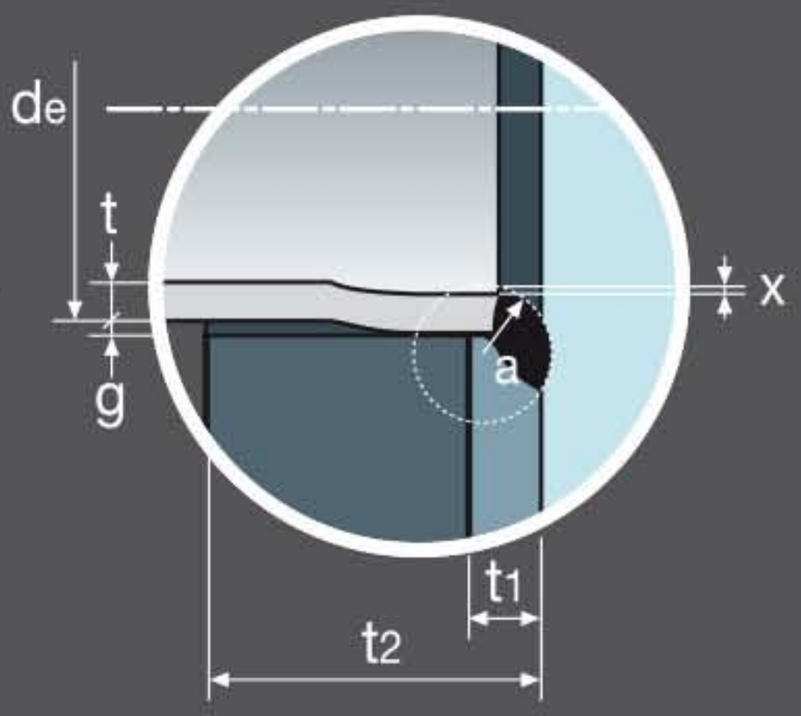
Protruding tube



Flush tube



Recessed tube



Tubweld

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Special AVC system functions

Touch

workpiece search and electrode positioning at the desired distance;

Retract

Pre-set retraction of the electrode and wire nozzle for multiple passes;

Arc height

Continuous movement of the electrode holder depending upon the arc voltage.

GiottoAVC

Orbital head for TIG tube-to-tube sheet welding with **AVC** control for continuous arc voltage monitoring.

In addition to all of the features that are supplied with the standard ***Giotto*** head, the ***AVC*** model includes automatic arc height control thanks to an innovative **manoeuvring system for the torch electrode holder**.

The system's main feature is **control of the 2-dimensional distance of the electrode** which, when suitably combined with the incidence angle of the torch, allows you to manage the height of the arc in both axial and radial directions from the tube being welded.

Automation is **managed by a DC motor driven by an** absolute encoder.

Test X-ray

Tube 3/4" 14 BWG
Material 316L
Tube protrusion 5 mm (0.197")
Tube sheet thickness 125 mm (4.92")

Test X-ray

Tube 1" 18 BWG
Material 304L
Flush tube
Tube sheet thickness 72 mm (2.83")

Mockup section detail

Maus Italia constantly performs **tests on mockups** which are analysed by specialist laboratories so that the welds performed by ***Giotto*** heads are always perfect.

Ohm's First Law relating to AVC management of the voltaic arc in TIG orbital welding.

AVC *(Arc Voltage Control)* is the automatic management of arc height during welding. The principle upon which ***AVC*** is based is Ohm's Law:

$$R = \frac{V}{I}$$

When equal to current intensity **I**, the distance of the electrode from the weld pool **R** is proportional to the voltage of the welding arc **V**. Continuous monitoring of the arc voltage **V** allows modulation of the distance R of the electrode from the weld pool with the aim of obtaining constant penetration across all of the weld.

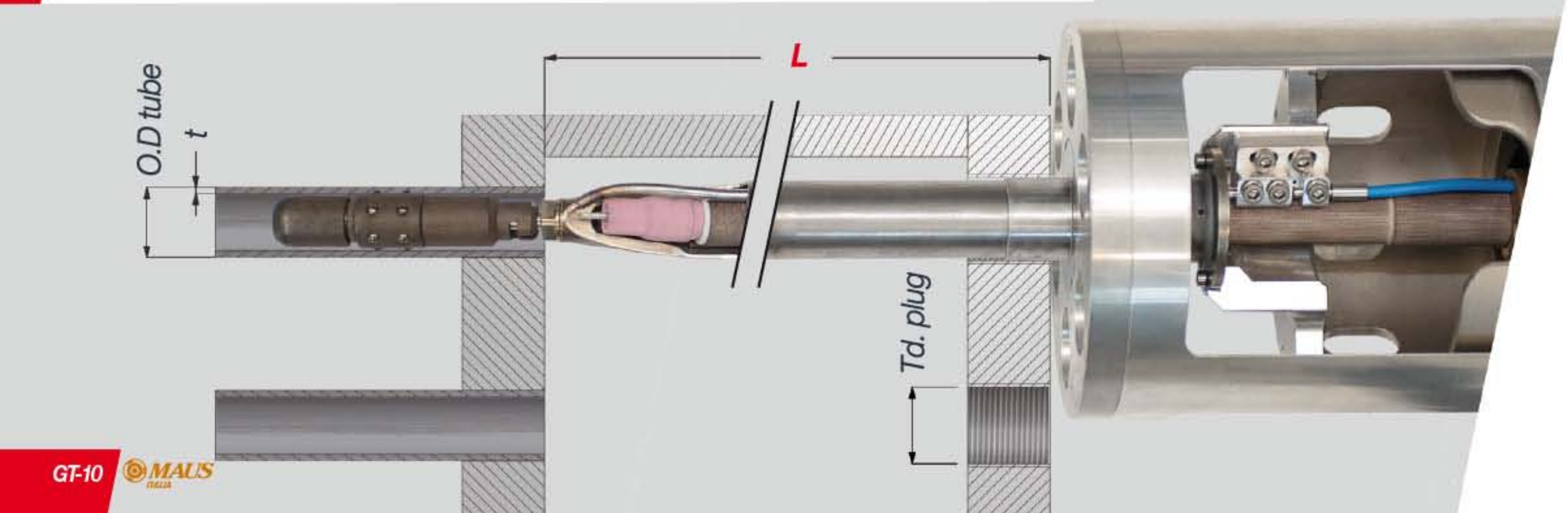
Courtesy of VILLA SCAMBIATORI

The extension has been designed and manufactured by Maus Italia R&D staff according to customer technical specifications.

Optimised feeding of the filler wire

aircooler Geometry

The torch extension allows you to reach the end of the tube to the depth of **L** over the exchanger's water tank.



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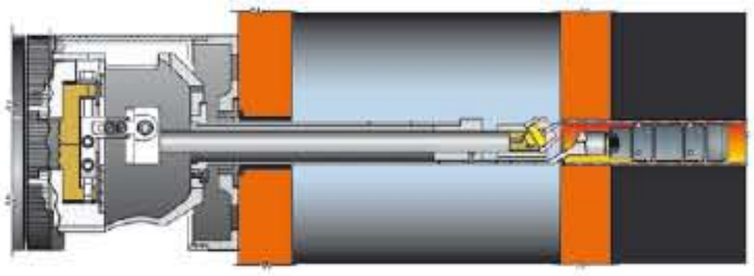
Tubweld



Giotto aircooler

Orbital head for typical aircooler geometry which allows passage over the water tank.

Maus Italia has garnered customer approval thanks to another personalised and innovative solution:

The special transformation which can be made with the extension to the **Giotto** standard torch allows you to reach the far end of the tube over the heat exchanger's water tank.

By passing through its locking cap, it is now possible to weld tubes in aircoolers, guaranteeing unprecedented seal quality.

The special attention paid to the design of the filler wire feed system, which rotates indefinitely with the electrode holder, allows you to reach extreme depths whilst maintaining a constant flow of material throughout the weld cycle.

Giotto aircooler

General features		
Duty Cycle	A (65%)	200
Weld speed (max.)	rpm	6
D standard tube	mm *inches*	25,4 *1*
Welding head cooling		closed liquid circuit
Weld geometry		
Flush tube		standard
Tungsten		
• 2.4		standard
Electrode distance adjustment	mm *inches*	*manual* 12 *0.472*
Wire		
Wire speed		rotating on head
Wire reel (weight/Ø)	kg/mm *lbs/inches*	1/100 *2.21/3.937*
Recommended wire Ø	mm *inches*	0,8 *0.0315*
Wire speed (max.)	cm/min *inches/min*	200 *78*
Dimensions		
Dimensions (LxBxH)	mm *inches*	510+*L*x150x400 *20+Lx6x16*
Weight excluding cables and spool	kg *lbs*	≈ 12 *≈ 26.45*
Cable length	m *ft*	6 *19.7*
aircooler		
Plug diameter (min.)	mm *inches*	26,2 *1.031*
Depth (max.) *L*	mm *inches*	490 *19.291*

Tubweld

MAUS ITALIA

Courtesy of VILLA SCAMBIATORI

Cartridge with expandable sections mod. HSE

Self-centring system particularly indicated for tube-to-tube sheet welding of boilers for int. Ø greater than 57 mm (2.1/4").

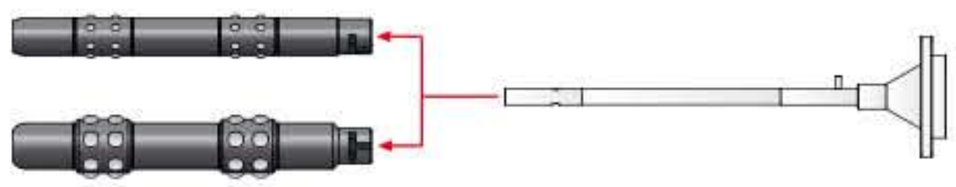
In addition to proper centring, support of the orbital head is also guaranteed for vertical "negative head" applications such as in sugar refinery exchangers

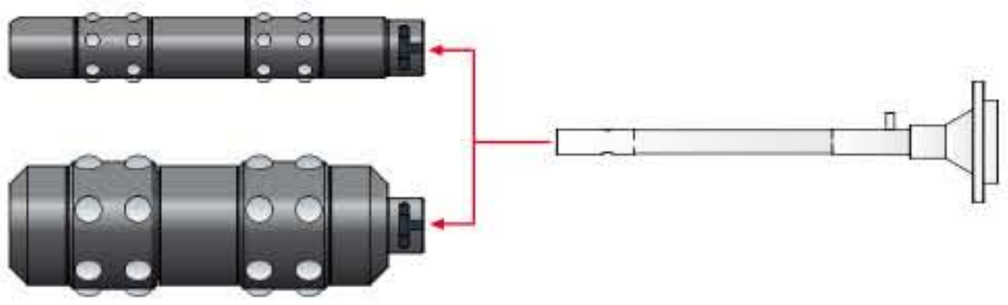
HS and HC

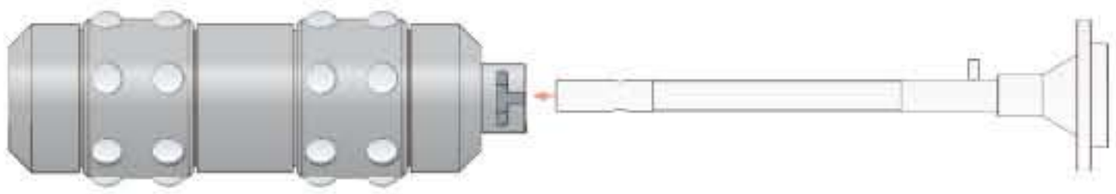
HS Cartridge holder spindles and
HC self-centring cartridges for
Giotto series orbital heads for
tube-to-tube sheet TIG welding.

Tube di		HC Cartridge	HS Spindle
mm	inches	Cod.	Cod.
10,0 ÷ 10,5	0.394 ÷ 0.413	HC-1	
10,5 ÷ 11,0	0.413 ÷ 0.433	HC-2	
11,0 ÷ 11,5	0.433 ÷ 0.453	HC-3	
11,5 ÷ 12,0	0.453 ÷ 0.472	HC-4	HS-A
12,0 ÷ 12,5	0.472 ÷ 0.492	HC-5	
12,5 ÷ 13,0	0.492 ÷ 0.512	HC-6	
12,8 ÷ 14,0	0.504 ÷ 0.551	HC-7	
13,8 ÷ 15,0	0.543 ÷ 0.590	HC-8	
14,8 ÷ 16,0	0.583 ÷ 0.630	HC-9	
15,8 ÷ 17,0	0.622 ÷ 0.669	HC-10	
16,8 ÷ 18,0	0.661 ÷ 0.709	HC-11	HS-B
17,8 ÷ 19,0	0.701 ÷ 0.748	HC-12	
18,8 ÷ 20,5	0.740 ÷ 0.807	HC-13	
19,8 ÷ 22,5	0.779 ÷ 0.886	HC-14	
22,3 ÷ 25,0	0.878 ÷ 0.984	HC-15	
24,5 ÷ 27,0	0.965 ÷ 1.06	HC-16	
26,5 ÷ 29,0	1.043 ÷ 1.141	HC-17	
28,5 ÷ 31,0	1.122 ÷ 1.220	HC-18	
30,5 ÷ 33,0	1.201 ÷ 1.299	HC-19	
32,5 ÷ 36,0	1.279 ÷ 1.417	HC-20	HS-C
35,5 ÷ 39,0	1.398 ÷ 1.535	HC-21	
38,5 ÷ 42,0	1.516 ÷ 1.653	HC-22	
41,5 ÷ 45,0	1.634 ÷ 1.772	HC-23	
44,5 ÷ 48,0	1.752 ÷ 1.890	HC-24	
47,5 ÷ 51,0	1.870 ÷ 2.008	HC-25	
50,5 ÷ 54,0	1.988 ÷ 2.126	HC-26	
53,5 ÷ 58,0	2.106 ÷ 2.283	HC-27	
57,5 ÷ 62,0	2.264 ÷ 2.441	HC-28	
61,5 ÷ 68,0	2.421 ÷ 2.677	HC-29	HS-D
65,5 ÷ 70,0	2.579 ÷ 2.756	HC-30	
69,5 ÷ 74,0	2.736 ÷ 2.913	HC-31	
73,5 ÷ 78,0	2.894 ÷ 3.071	HC-32	
77,5 ÷ 82,0	3.051 ÷ 3.228	HC-33	

Centring of the torch is guaranteed by the spindle + cartridge system. Select the correct combination of **HS** series spindle and **HC** series cartridge by referring to the table (left) according to the internal diameter of the tube.







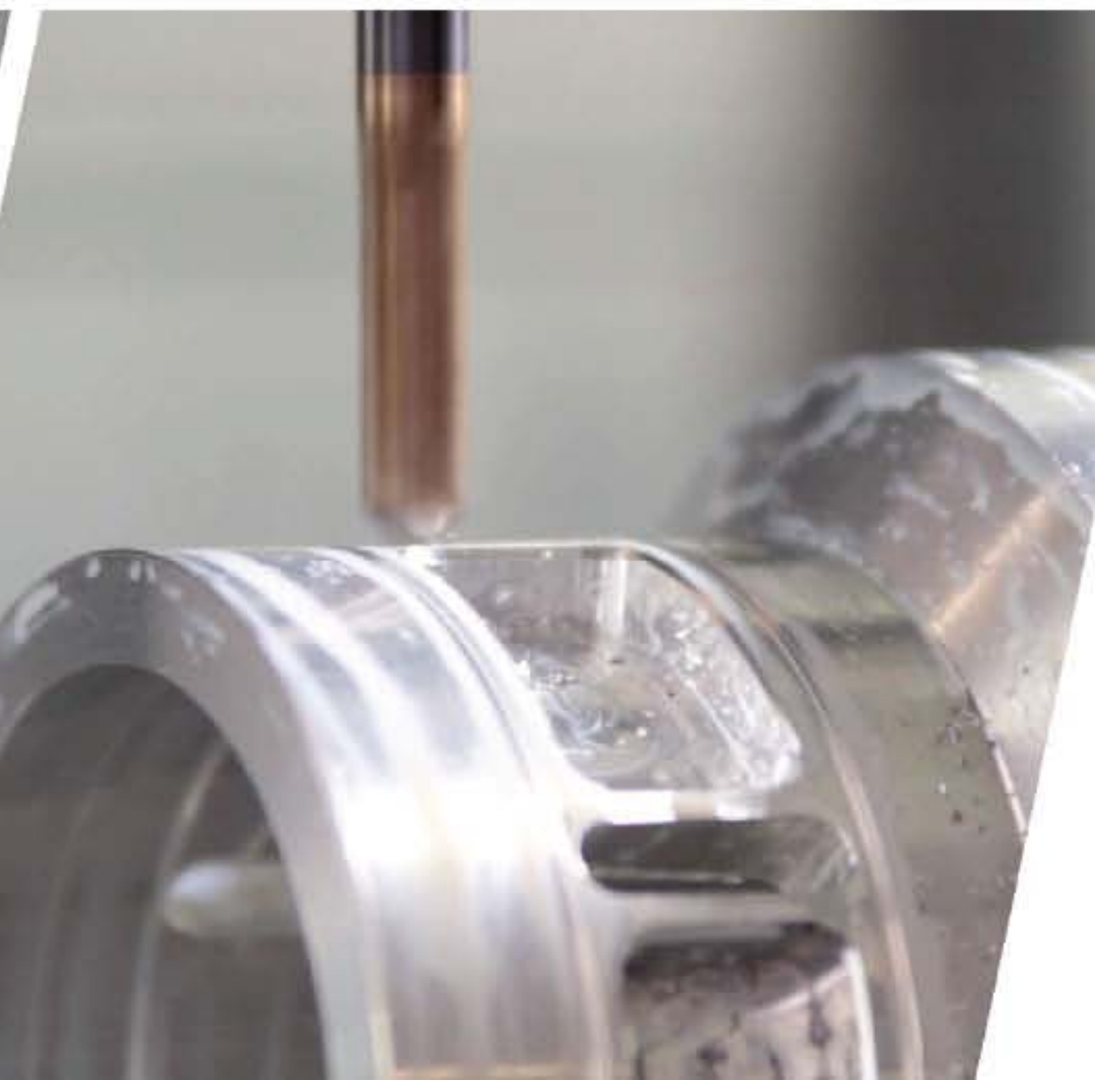
These and other combinations only on request. Maus Italia technical staff are available for advice on the ideal solution.

Giotto

In-house design and manufacturing

Each component of the **Giotto** TIG orbital heads has been designed and manufactured entirely by Maus Italia.

General features		Giotto	GiottoAVC
Duty Cycle	A (65%)	250	250
Weld speed (max.)	rpm	6	6
ID Tube	mm *inches*	10 *0.393*	10 *0.393*
OD standard tube	mm *inches*	51 *2.008*	51 *2.008*
Welding head cooling		closed liquid circuit	closed liquid circuit
Weld geometry			
Flush tube		standard	standard
Recessed tube	mm *inches*	3,0 *0.118*	NA
Protruding tube (max.)	mm *inches*	12,0 *0.472*	10,0 *0.393*
Tungsten			
• 1.6		opzional	opzional
• 2.4		standard	standard
• 3.2		opzional	opzional
Electrode distance adjustment	mm *inches*	*manual* 12 *0.472*	*automatic* AVC 12 *0.472*
Wire			
Wire speed		rotating on head	rotating on head
Wire reel (weight/Ø)	kg/mm *lbs/inches*	1/100 *2.21/3.937*	1/100 *2.21/3.937*
Recommended wire Ø	mm *inches*	0,8 *0.0315*	0,8 *0.0315*
Wire speed (max.)	cm/min *inches/min*	200 *78*	200 *78*
Dimensions			
Dimensions (LxBxH)	mm *inches*	510x150x400 *20x6x16*	510x150x400 *20x6x16*
Weight excluding cables and spool	kg *lbs*	12 *26.45*	13 *28.66*
Cable length	m *ft*	6 *19.7*	6 *19.7*



MW280-F

Inverter generator with integrated microprocessor.

Duty cycle

200 A (10 min/40°C.) 35% d.c.

145 A (10 min/40°C.) 60% d.c.

110 A (10 min/40°C.) 100% d.c.

Compact and lightweight, the ***MW280-F*** generator is offered by Maus Italia to control the ***Giotto*** series TIG welding orbital heads.

Available on "carriage pickUp" with cylinder holder and closeable compartment for housing the orbital head, the ***MW280-F*** generator is also ideal for on-site servicing.

It stands out due to the following features:

- Integrated water cooler with water control
- Intuitive touch-screen colour operating panel
- Multilingual
- Remote control with 10 m cable
- Routing of the current (welding, rotation axis, bleed gas and wire feed)
- Recording of imported heat energy
- USB port for transferring and recording data
- Integrated printer for welding data reports

MW280-F

Supply		
Mains voltage	Volt - Ph	230 - 3
Operating voltage	Volt	10,2 ÷ 18,0
Open-circuit voltage	Volt	44
Mains fuse	A	16
Cos phi		0,99
Welding current AC/DC (stepless)	A	5 ÷ 200
Capacity		
Cooling power (on 40°C, 1l/min)	W	500
Coolant capacity	l *US gal*	1,8 *0.47*
Coolant throughput (max.)	l/min *US gpm*	3,0 *0.79*
Dimensions		
Length	mm *inches*	650 *98*
Width	mm *inches*	420 *78*
Hight	mm *inches*	1480 *27*
Weight	kg *lbs*	38 *84*
Colors	RAL	3020-9011
Degree of protection	IP	23

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