



**MIG Orbital System**



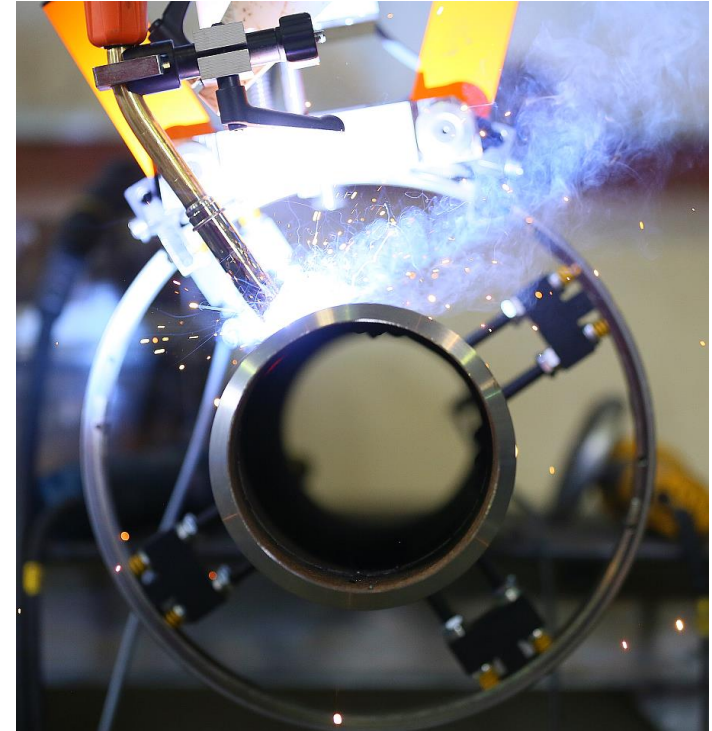
# A5 MIG Orbital System 1500

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Weld the complete circumferential joint with one set of mechanization equipment and one power source. Efficiently from root pass to filler layers with the help of Kemppi special processes.

Example for

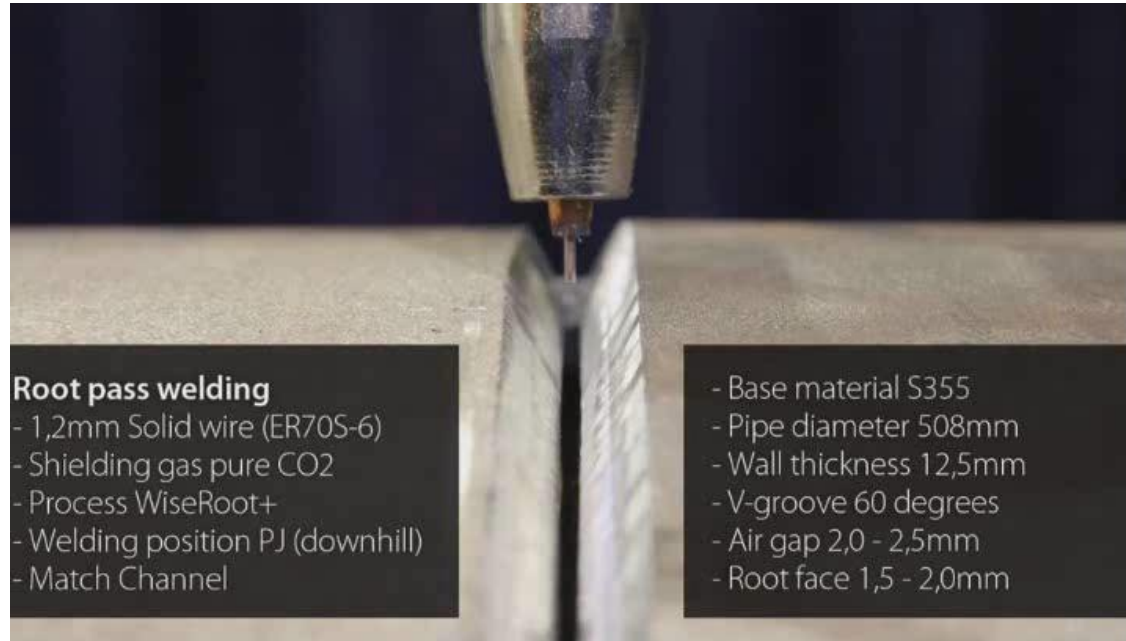
- Pipes and pipelines (Oil, Gas, Water etc.)
- Offshore structures
- Shipbuilding structures
- Wind-power- and Hydro-power-plant components



# Improve production efficiency

- Better welding production efficiency with Kemppi Wise application software
- Weld over **80%** more per day and save **50%** in labor and filler costs with WiseRoot+ (Case example in the appendix)
- Save **26%** in filler material with WiseFusion + WisePenetration combined. (Case example in the appendix)

# WiseRoot+ in orbital welding





# Simplified control

- Time and cost savings with integrated Kemppi user interface.
- Simultaneous control of carriage programs and power source channels; starting, stopping and changing welding parameters done with one button only.
- Eliminates human errors, savings in time and repair costs



# Easy to use

- Only one power cable needed
- Accurate speed control and two drive motors
- Pre-defined programs for different pipe sectors
- Possible to use two wire feeders with the same power source
- Carriage can also be used for horizontal and vertical joints and welding with or without weaving



# A5 MIG Orbital System 1500

- a) Welding equipment
  - Welding power source with Kemppi Wise processes
  - Wire feeder
  - Welding torch
  
- b) Carriage driven by electrical motor equipped with gun clamping modules
  - Circular rail (ring), different sizes available to cover pipe and tube sizes up to outer diameter of 1500 mm
  - Torch weaving module
  - Remote controller



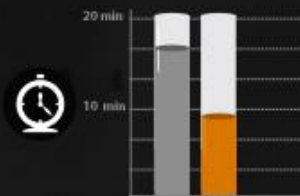




**KEMPPI**

# Weld over **80 %** more per day and save **50 %** in labor and filler costs with **WiseRoot+**

Pipe welding test with WiseRoot+  
MIG/MAG vs. **WiseRoot+**



Welding travel speed = 16,8 min/m  
Welding travel speed = 8,8 min/m



Time spent on one pipe = 28 min  
Time spent on one pipe = 14,6 min



Creates slag and spatter A lot of after work costs



**No slag & spatter**  
**Less after work cost**



Welded pipes per 8-hour work day  $\approx$  3,5  
Welded pipes per 8-hour work day  $\approx$  6,6

Comparison table for root pass welding of a 530 mm pipe  
Arc time = 20 % and labour costs = 30 € per hour  
See calculation.

# Weld over **80 % more** per day and save **50 %** in labour and filler costs with **WiseRoot+**

## MIG/MAG

Groove area for filling & capping



### Root pass

Filling material:

∅ 1,2 mm solid wire (Fe)

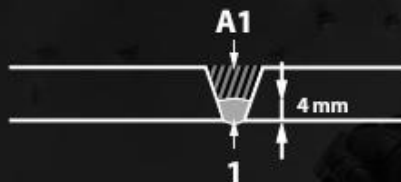
Welding travel speed:

120 mm/min

PF, vertical up

Groove area:

A1 = 67 mm<sup>2</sup>



### Filling and capping passes

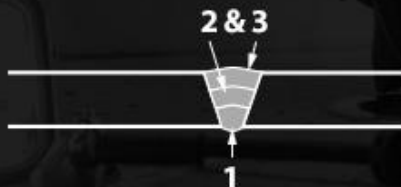
Filling material:

∅ 1,2 mm flux-cored wire

Welding travel speed:

2. pass 220 mm/min = 4,5 min/m (PF)

3. pass 250 mm/min = 4,0 min/m (PF)



Time: 16,8 min/m

Length (8 h): 6 m

Labour cost: 8,4 €/m (30 € per hour)

Filler cost: 9,44 €/m

### Total welding time and costs

## WiseRoot+

Groove area for filling & capping



### Root pass

Filling material:

∅ 1,2 mm solid wire (Fe)

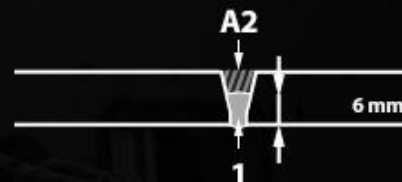
Welding travel speed:

220 mm/min

PG, vertical down

Groove area:

A2 = 33 mm<sup>2</sup>



### Filling and capping passes

Filling material:

∅ 1,2 mm flux-cored wire

Welding travel speed:

2. pass 230 mm/min = 4,3 min/m (PF)



Time: 8,8 min/m

Length (8 h): 11 m

Labour cost: 4,4 €/m (30 € per hour)

Filler cost: 5,03 €/m

### Total welding time and costs

# WiseFusion & WisePenetration combined

Narrower groove angle, 26 % saving in the groove area, produces approximately 26 % shorter welding time.

A study carried out by the Lappeenranta University research group in cooperation with Helsinki Arctech shipyard showed that it is possible to reduce the joint angle from 45° to 30° degrees, see figure.

With 25 mm plate thickness, the cross-sectional area of the joint preparation is about 26 % smaller with a 30° groove, than with a conventional 45° groove angle. Fewer welding runs are needed to complete the joint, which reduces the welding time, and less filler material is needed. For example, there is €26,000 saving each year only in filler material if one assumes an annual filler metal cost of €100 000 with this joint design.

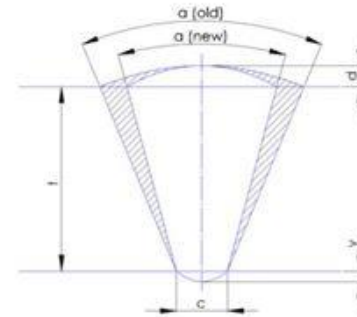


Figure 7. Old and new groove shapes. The old 45° groove on the left and the new 30° groove on the right [21].

Measures of the groove		Old	New
t	Thickness	25 mm	25 mm
a/2	Bevel angle	22.5°	15°
c	Gap	4 mm	4 mm
y	Root reinforcement	2 mm	2 mm
d	Reinforcement	2 mm	2 mm
Groove area		388 mm <sup>2</sup>	289 mm <sup>2</sup>
Weld mass		3.1 kg/m	2.3 kg/m