TECHNICAL AND TECHNOLOGICAL CAPABILITIES OF THE PRODUCTION FACILITIES FOR THE MANUFACTURE OF BRIDGE STRUCTURES

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2020

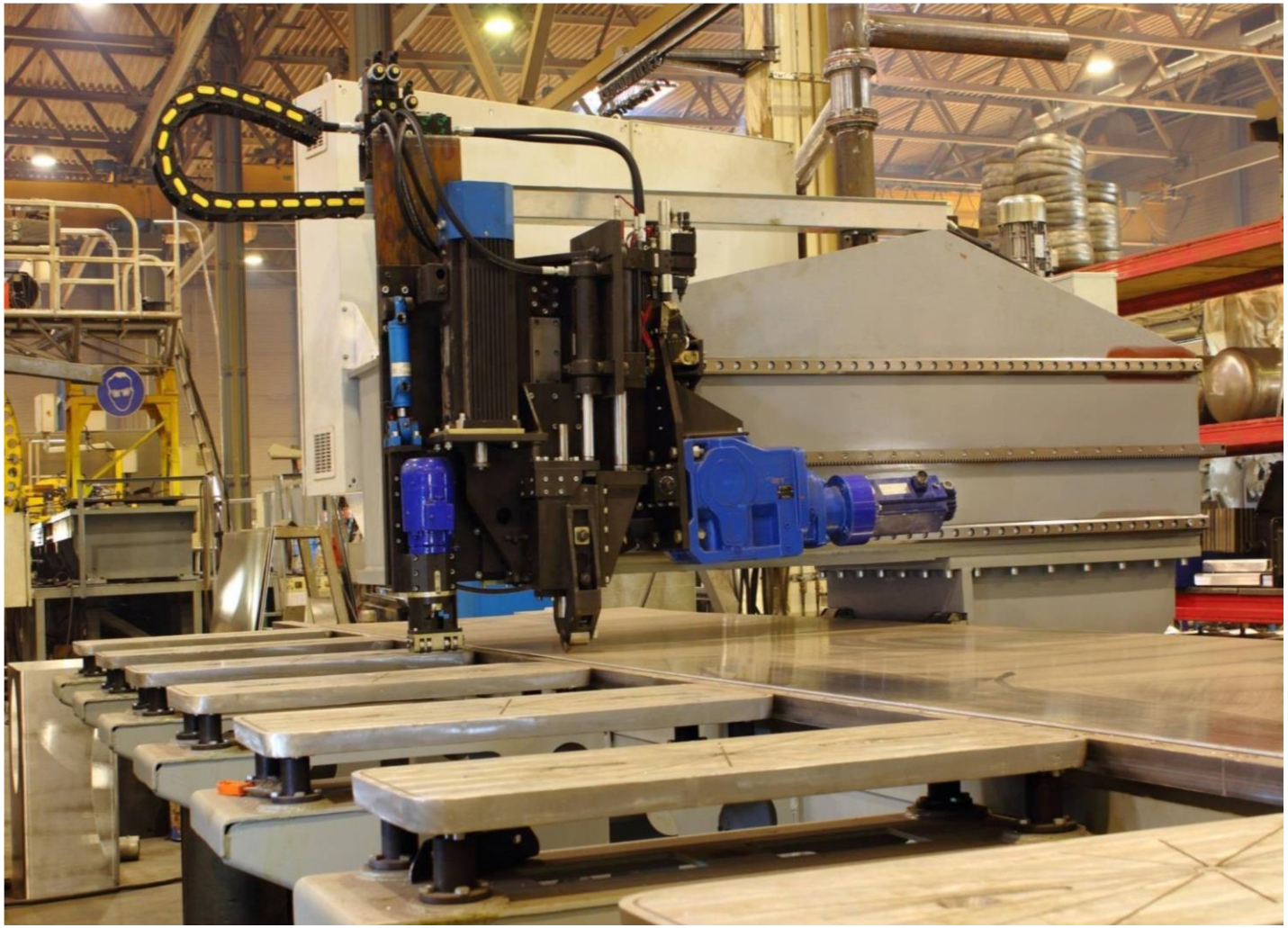
PRODUCTION CAPABILITIES

SESPEL Cheboksary enterprise CJSC is the only enterprise in Russia that manufactures the entire range of products for the transportation of various goods.

Over 1,500 models of:
- Tanks
- Tank semitrailers
- Tilt-type semitrailers
- Grain trucks
- Tank trailers
- Tank-containers

We manufacture semi-trailers from aluminum alloys, low-alloy and stainless steel of 6.5 to 89 m^3 capacities.

STP-14m FRICTION STIR WELDING MACHINE



FRICTION STIR WELDING TOOL

Tool parameters, method and conditions for welding AD0 grade aluminium plates

	Thickness of welded plates, mm				
	25	25	32	35	35
Downward pressure of the tool, kg	1,600	-	1,000	1,500	1,700
Tool rotation speed, rpm	550	400	550	550	550
Tool travel speed, mm / min	150	70	150	150	150
Welding method	1 side	Bobbin Tool	2 sides	2 sides	1 side
Pin length of the tool, mm	24	24.5	17	18	34
Shoulder diameter, mm	40	44	30	30	40

APPLICATIONS (TYPES OF MATERIALS AND THICKNESSES)

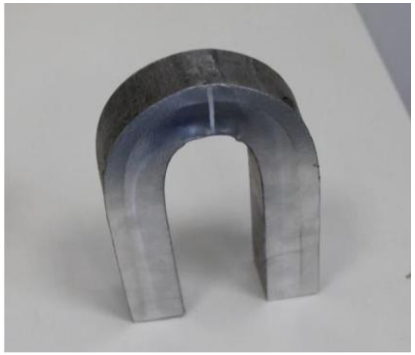
Tool parameters, method and conditions for welding AD0 grade aluminium plates	Metal thickness (MT) of the welded plates, mm				
	25	25	32	35	35
Welding method	1 side	Bobbin Tool	2 sides	2 sides	1 side
Tensile strength, kgf/mm^2	8.04	8.1	9.3	9.2	9.2
Requirements of GOST 17232-99 for AD0 grade aluminum		8		6.5	

Appearance of samples after static tensile tests

MT = 25 mm,
one-side welding

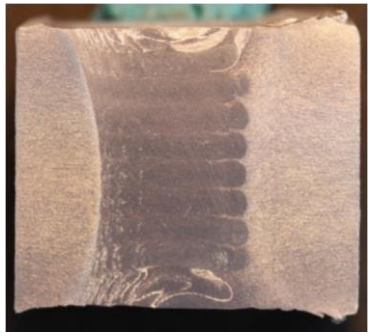
MT = 25 mm,
Bobbin Tool

MT = 32 mm, two-side
welding

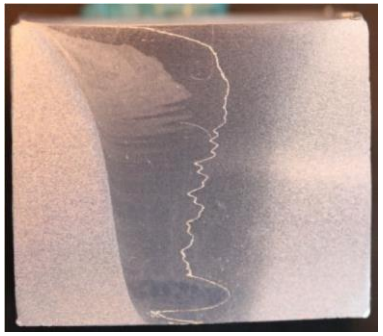


➢ A sample after static bending tests according to GOST 6996-66 (in the stretched zone – the weld root)

APPLICATIONS (TYPES OF MATERIALS AND THICKNESSES)

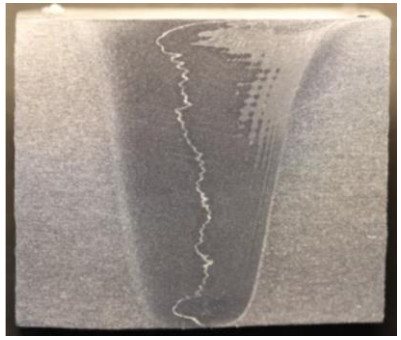


One-side welding

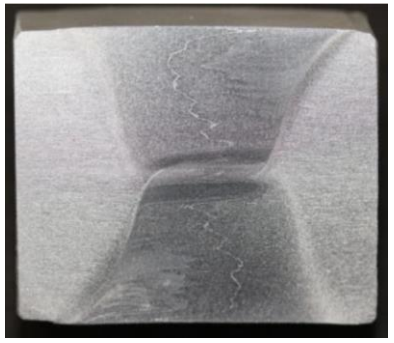


Bobbin Tool

- Welded joint macrostructure (metal thickness 25 mm), magnification ~2

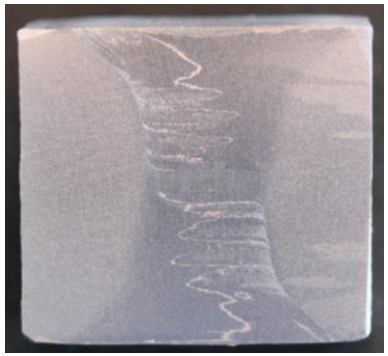


One-side welding



Bobbin Tool

- Welded joint macrostructure (metal thickness 35 mm), magnification ~2

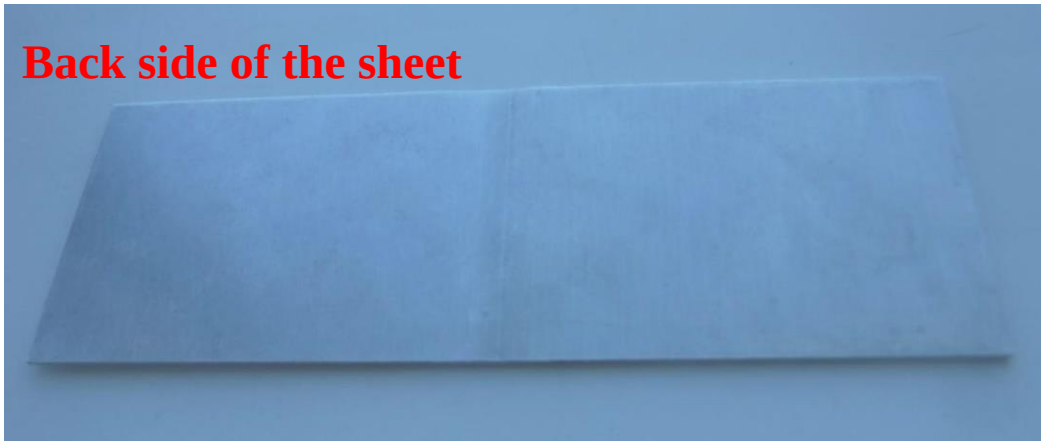


Two-side

- Welded joint macrostructure (metal thickness 32 mm), magnification ~2

- Friction stir welding of copper and aluminium

WELDING OF DISSIMILAR MATERIALS OF DIFFERENT THICKNESSES



Left:
thickness 1mm, D16T alloy

Right:
thickness 2mm, AMg alloy


СЕСПЕЛЬ
Образец односторонней сварки
трением перемешиванием
АМг6 толщина 30 мм

'GABARIT-A' MOBILE FRICTION STIR WELDING COMPLEX

'Gabarit - A' unique mobile friction stir welding complex has been commissioned. Within the overall dimensions of the 40ft container.

For transportation, the complex is mounted on a mobile platform using its own hydraulic supports. This allows its quick utilisation at any production facility and, also, almost removes the restrictions on the dimensions of manufactured semi-finished products associated with transportation on public roads.

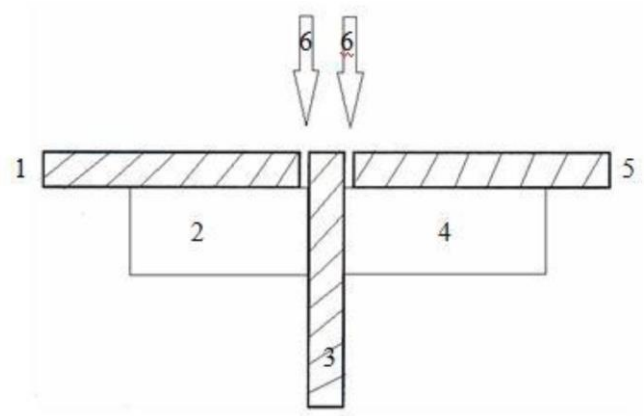
'RUZKHIMMASH' MOBILE FRICTION STIR WELDING COMPLEX FOR MANUFACTURING R/W WAGONS

The complex is equipped with two welding stations:

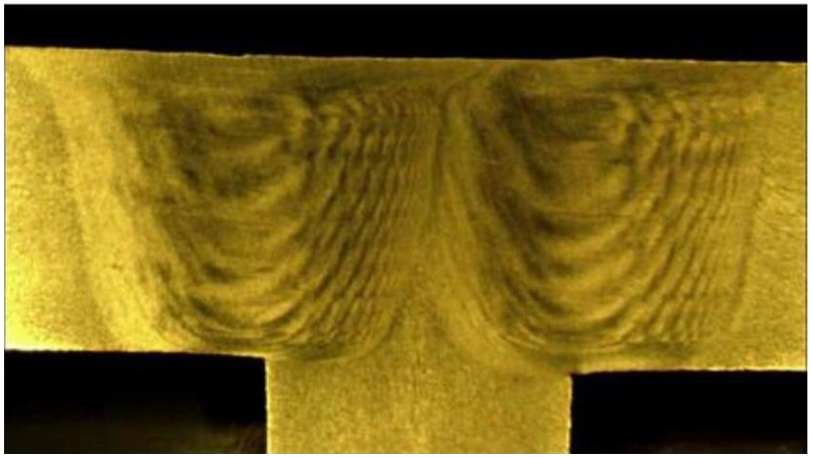
- For welding together profiles and sheets;
- For welding shell plates.

APPLICATION OF FRICTION STIR WELDING TO MAKE A T-JOINT

The use of friction stir welding to make a T-joint in the manufacture of spanning structure's elements solves the problem of welding 10mm-thick 1915T aluminum alloy at the junction places of the corner plates, gives advantages in welding rate, in product quality, in energy saving and in the abandonment of using an expensive welding filler material.



Sketch of structural elements of a T-joint weld.
1, 3, 5 - welded plates,
2, 4 - backing bar without flare;
6 - FSW tool



Macrostructure of a T-joint weld (1915T, 10 mm)
magnification ~ 4

ORTHOTROPIC DECK OF 6082 ALUMINIUM ALLOY

ALUMINIUM
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APPLICATION OF FRICTION STIR WELDING IN BRIDGE CONSTRUCTION

In the Nizhny Novgorod Region, 2 pedestrian bridges over M-7 "Volga" Federal Highway were commissioned.

Each structure is 38 meters long, 6.5 meters wide, and weighs 22 tonnes, which is three times lighter than a similar steel structure.

ALUMINIUM ASSOCIATION

PROSPECTS

- **RECONSTRUCTION OF STEEL-REINFORCED CONCRETE BRIDGES -** replacement of reinforced concrete slabs of the roadway with an aluminum orthotropic plate will significantly reduce the load on the existing structures, increase the load capacity of the whole structure.
- **CONSTRUCTION OR RECONSTRUCTION OF BRIDGES IN HARD-TO-REACH REGIONS**, where the possibilities of delivering materials, structures, and equipment are limited by the weight or by the time period (a limited season of works).
- **RECONSTRUCTION** of bridges and overpasses **over busy highways**, where there is no possibility of long-term restrictions or interruptions of the traffic
- **CONSTRUCTION** of bridges and overpasses **in low-temperature regions**.
- **CONSTRUCTION OF FOOTBRIDGES,** including those with high requirements for their architectural appearance.

ALUMINIUM ASSOCIATION

Thank you for your attention!

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