INSTALLATION FOR THE ” IN SITU” RECONDITIONING OF TRAM RAILS - CONSTRUCTIVE VERSION (Part 1)

Mihaela POPESCU*, Damian RADESCU, Livius MILOS*, Gheorghe GLITA*, Puiu CÂNEPARU*, Felician ARDELEAN**, Aurelian MAGDA*, Adrian SAV*****

* Universitatea POLITEHNICA din Timisoara, mpopescu@mec.utt.ro, lmilos@mec.utt.ro, gglita@mec.utt.ro, amagda@mec.utt.ro

** SC Sudexpert SRL Timisoara, dradescu@zappmobile.ro

*** CTP Arad, asav@ctp.ro

ABSTRACT

The ”in situ” rehabilitation installation for the tram rails was accomplished by a group of specialists, within the AMTRANS national program. The paper presents the mechanical components of the tram rails reconditioning installation by hardfacing. The moduli of the installation are specified together with their performances.

1. INTRODUCTION

The ”in situ” rehabilitation installation for the tram rails was accomplished by a group of specialists, within the AMTRANS national program. The project represents a novelty in the field in our country.

2. TECHNOLOGICAL DEVELOPMENT

Considering the electrical control and driving and its effect within the working system, the mechanised installation for the tram rails reconditioning consists in the following main moduli (figure 1):

Welding carriage (1). The construction of the welding carriage allows its movement at the welding speed, in the prescribed range, on rails with reduced track gauge (1000 mm).

It will assure:

- the welding speed: 0.1 ? 1.0 m/min;
- corresponding working space for the welding operator;
- mounting facilities for the welding installation (welding head, carriages and positioning devices, etc.).

The movement of the welding carriage is made by means of a motoreducer (3), which consists in (figure 3):

? motoreducer I (M) – 150 W; 50 Hz; n motor = 5000 rot/min; II = 1/30; n iesire = 166.6 rot/min;

? worm reducer (2) – worm gear housing in welded metallic construction, and detachable frontal covers for the easy assembling of the component elements; the reduction ratio i2 =1/40;

Observation. By means of the two reducers the total ration obtained is: I = 1/1200 and an output rotation n = 4.16 rot/min.

The motoreducer I (photo 1) , with direct current motor with separate excitation MSAR –150 type is meant, generally for low power driving with the possibility to vary the rotation by changing the voltage.

Technical characteristics	UM	MSAR - 150	
Couple ? 10%	Nm	0.29	0.29
Effective capacity	W	80	150
Supplying voltage	V	42	42
Rotor current + 10%	A	2.8	4.5
Excitation voltage	V	42	42
Excitation current ? 10%	A	0.4	0.4
Nominal rotation ? 10%	RPM	3000	5000
Efficiency –15%	%	80	80
Reducer	1: 30 or 1: 50		
Motoreducer couple ? 10%	Nm	3.6	5.5
Motoreducer weight	Kg	4	4

? devices to palpate rails (4) to maintain the relative position of the welding head versus the reconditioned surface.

MIG/MAG WELDING EQUIPMENT (4)

Due to the intensive working regimes, a MIG/MAG welding source was acquired, KEMPOMIG 4200PULSE type, produced by the firm KEMPPI (Finland). This is a synergic source with inverter and pulsed current having the following characteristics:

- Supplying voltage: 3 – 50/60 Hz; 380-10%…415+6%
- Nominal power 60%DA 28.5 KVA
  100%DA 21.1 KVA
- Supplying/ safety cable 4x6 mm 2-5 /35A

- Nominal current 60%DA* 520A/41V
  100%DA* 390A/33.5V
- Welding current range 40A/12V…520A/41V
- Open circuit voltage about 80V
- Open circuit consumed power 160W
- Working frequency 5KHz
- Efficiency at nominal values 85%
- Power factor at nominal values 0.90
- Depositing temperature -40 … + 60^{o}C
- Working temperature -20… + 40^{0}C
- Temperature range H (180^{o}C) B(130^{o}C)
- Protection degree IP 23
- Sizes length 1100 mm
  width 600 mm
  height 1050 mm
- Weight 150 kg

FU 30 (wire feed speed)

- Working temperature		30 VAC
- Nominal power		220 W
- Loading capacity (60%DA)		600A
- Wire feed speed		0…18 m/min
- Wire diameter:	Fe, stainless steel	0.8 …1.6
	flux cored wire	1.1 …3.3
- Wire role: maximum weight		25 Kg

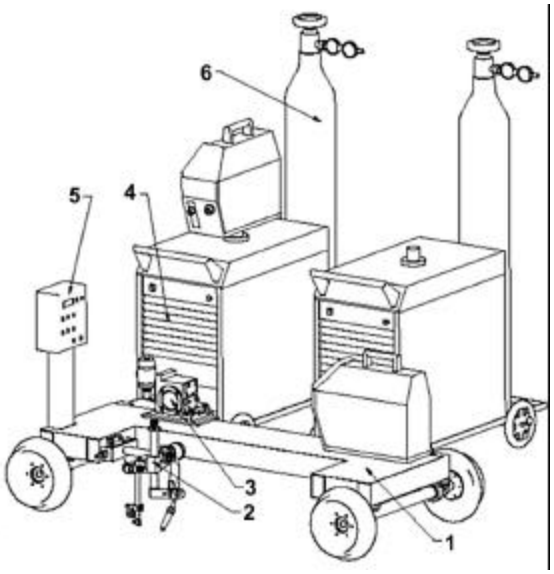

Figure 1. Mechanised installation for rails reconditioning

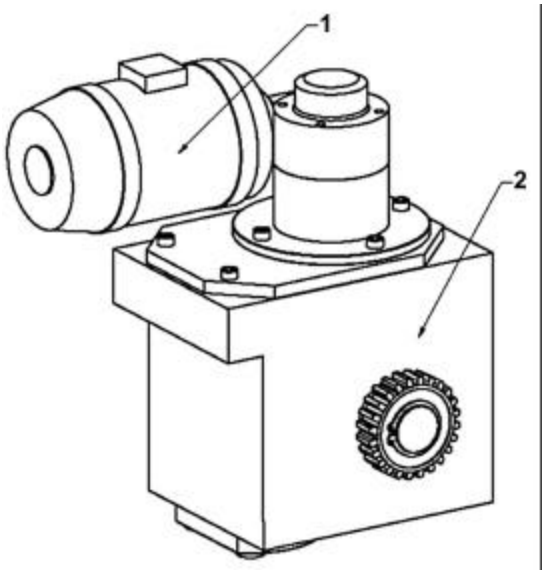

Figure 2. Reducer

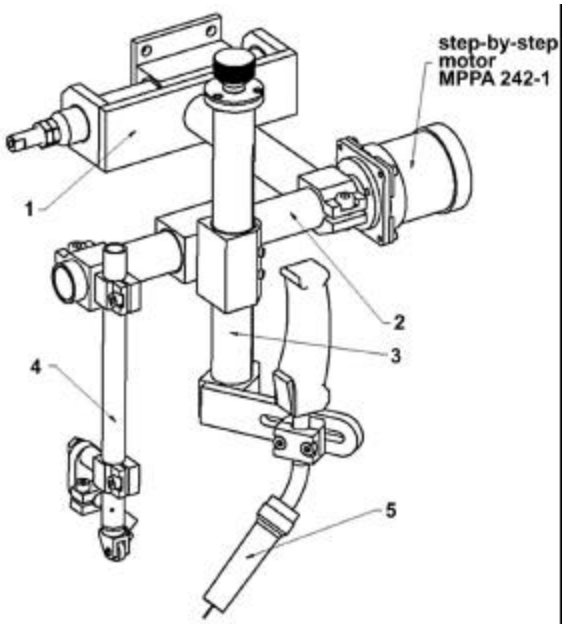

Figure 3. Positioning device for the welding head

Photo 1

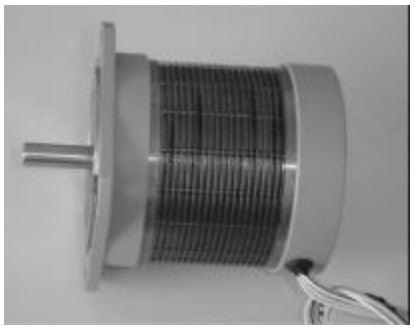

Photo 2

POSITIONING DEVICE FOR THE WELDING HEAD (2)

The positioning device for the welding head consists in (figure 3):

✍ Angular positioning device (1) and fixing the welding head in the optimum welding position, which assures the following adjustement possibilities:

- vertically on the welding head moving direction: - 300…+300;
- vertically perpendicular on the moving direction of the welding head: -600…+600.

✍ Carriage I (3) manually driven, which makes linear positioning movements of the welding head on the vertical (y axis); stroke = maximum 250mm;

✍ Carriage II (2), electromechanical, which makes linear positioning movements of the welding head on the horizontal (x axis); stroke = maximum 250 mm.

The carriage is driven by a step-by-step electric motor MPPA - 242-1 type and the motor couple 1 Nm (photo2)

3. CONCLUSIONS

3.1. The paper presents the mechanical components of the tram rails reconditioning installation by hardfacing.

3.2. The moduli of the installation are specified together with their performances.

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