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Experimental Testing of Welding Saw Blade of Ribbon

This paper presents the results of experimental electric welding with pressure butt of ribbon saw blades. The analyzes and tests carried out resulting conclusion is that this process is the best solution for the refurbishment of these blades, provided to make a comeback heat treatment after welding.

Keywords*: saw blade of ribbon, electric welding with pressure, heat treatment*

1. Introduction

In wood industry, saw blades of ribbon is used widely. One of the problems associated with their use is achieving continuity canvas.

This can be done by brazing, MIG/MAG welding or by pressure spot welding butt.

To determine the process and assembly technology, the following aspects are taken into account:

- the amount of blades to be assembled
- quality assembly
- minimum investment at the beneficiary
- the possibility of implementing the technology at the beneficiary
- material blades

2. Experimental results

The blades are running with widths ranging from 9,3 and 260 mm and thick between 0,4 and 1,65 mm, the blade material with a chemical composition according to the table 1.

Table 1. The chemical composition of the blades

Blade	C, %	Si, %	Mn, %	Ni, %	P, % max	S, % max
Narrow	0,7...0,8	1,1...1,3	0,5...0,8	-	0,025	0,015
Wide	0,7...0,8	0,2...0.4	0,3...0,5	2,5	0,025	0,015

In this paper are presented the experimental results obtained from electric butt welding saw blade for ribbon.

It was used for welding butt welding machine type BSG 32/40 adapted for welding these blades. The machine allows for adjustment of the welding current in 6 steps and discharge force in 10 steps. Also, the machine allows the subsequent heating of the weld in order to achieve a local heat treatment after welding. Heating after welding current may be also adjusted in six steps. Figure 1 show the welding and heating current values obtained experimental with secondary cage. [1]

Figure 1. The welding and heating current

The force of discharge varies linearly between 0,5 and 16 daN (scale 1 to 10). In order to determine the optimum welding parameters are fused samples of different sizes. Also welding current values and force ranged discharge, and then the samples were subjected to heat treatments with different values of current heating. Each sample was then subjected to tensile test. The optimal parameters such results are presented in table 2. Figure 2 shows a welded sample untreated thermally and figure 3 shows a welded sample and heat treated to stretch broken.

Table 2. The optimal parameters for welding

parameter / blade (dimensions)	Welding current (step)	Heating current (step)	Welding force (step)	Discharge force (step)	Welding drive [mm]
25 X 0,5 (discharge welded)	3	3	5	6	2
25 X 0,5 (fusion welding)	4	2,3	5	6	2

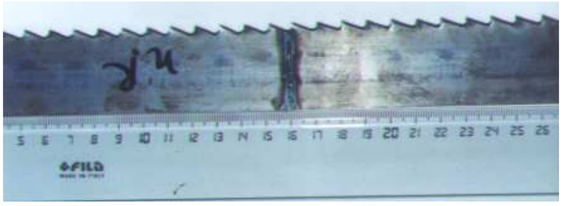

Figure 2. Welded sample untreated thermally

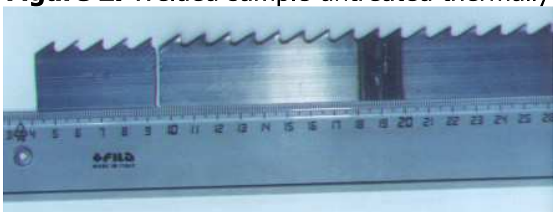

Figure 3. Welded sample, heat treated, to stretch broken

For tensile tests were performed on 5 samples 25x0,5 mm tape, resulting in an average breaking force of 1250 daN, so the ultimate stress it was:

$$\sigma_r = 1250/(25x0,5) = 100\ daN/mm^2 \quad (1)$$

It was noted that the breaking not produced in the weld area. From the welded samples were samples whose microstructures are shown in figures 4 and 5 [2].

Figure 4. Microstructure of ZIT/MB for an untreated thermally sample

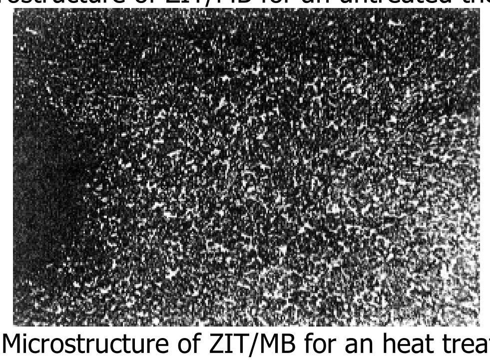

Figure 5. Microstructure of ZIT/MB for an heat treated sample

It is noted that the heat untreated samples the heat affected zone and the base material has a fragile structure of overheating, with martensite and waste austenite 10%. Also cracking is observed. After heat treatment the structure becomes a fine martensite comeback.

The same tests were conducted for hardness testing and the results are summarized in table 3.

Table 3. Vickers microhardness – $HV_{0,1}$

Sample 1 – untreated thermally			**Sample 2 – heat treated**		
MB	ZIT	MA	MB	ZIT	MA
397	514	946	366	336	228
401	498	946	366	345	245
401	498	946	370	339	237

It is observed strong increase in hardness in the weld and heat affected zone to the heat untreated sample.

3. Conclusions

These results permit the appreciation that the electric welding with pressure is the best solution, leading to a higher quality of connection, but also simplifies the procedure and is therefore recommended to apply before other procedures outlined above.

References

[1] Ene T., *Pressure welding technology,* "Eftimie Murgu" University, 2007.

[2] Mitelea I., Budău V., *Materials and heat treatment for welded structures,* Editura de Vest, Timișoara, 1992.

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