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SCHEME FOR THE MODIFICATION OF THE ROTATION SPEED OF THE ROLLING DEVICES WITH STATIC FREQUENCY CONVERTERS

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SUMMARY:

This paper presents an original scheme for maintaining a steady wire stress in the rolling device using an ordinary asynchronous motor supplied by static frequency converter.

KEY WORDS:

wire stress, rolling device,
static frequency converter.

1. INTRODUCTION

The electric drives of the rolling devices are composed by special asynchronous machines with increased sliding. The mechanical characteristic of that motors allows to increase the sliding in the same time with the load torque increasing (at the increasing of the drum diameter).

Because of the increased sliding there are important losses and there is no exact correlation between the decreasing of the rotation speed in the same time with the increasing of the drum diameter and the maintaining of the strength and the linear speed of the rolled material.

This way the "consistency" of the reels decrease and the wire can unfold by the drum. If the motor was rewind the mechanical characteristic was modified and the differences which appears are more pronounced.

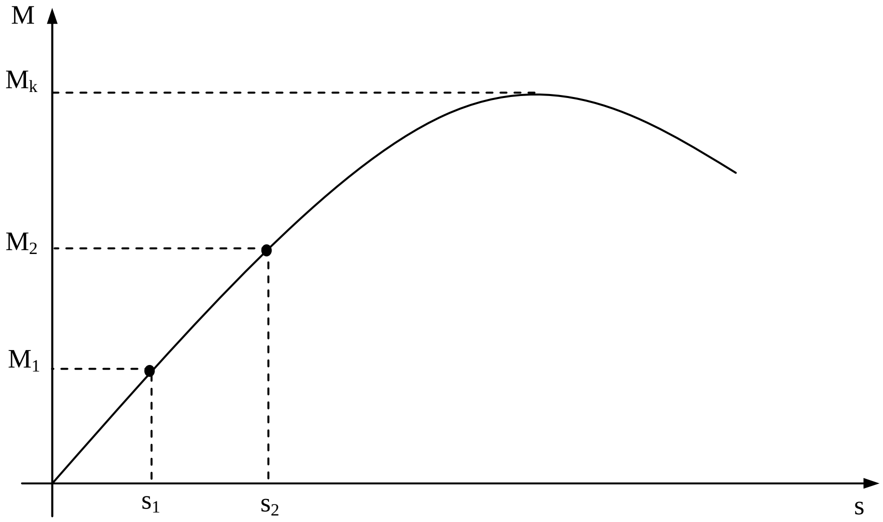

FIG. 1. Mechanical characteristic of the asynchronous motor with increased sliding.

2. THE PRINCIPLE OF THE METHOD

The proposed scheme use a regular asynchronous motor supplied by an static frequency converter (SFC) which is controlled by a distance transducer following the reel diameter.

At the beginning the static frequency converter controls the motor with high speed and after that the speed decrease following a curve imposed by the distance traducer.

This way the linear speed and the wire strength are kept steady.

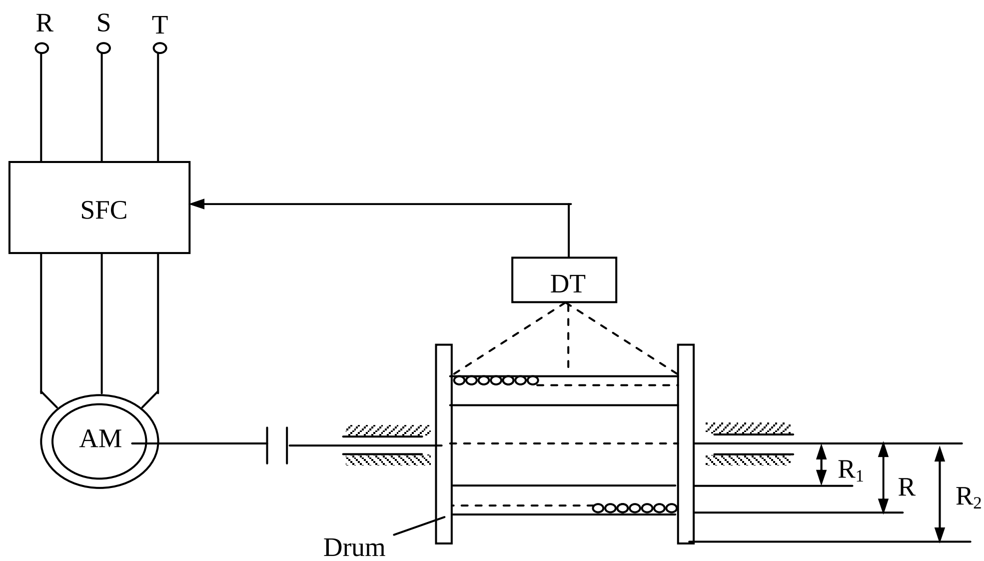

FIG 2. The scheme with static frequency converter and distance transducer

3. EXPERIMENTAL RESULTS

For the experiments was used a strength traducer to see the variation of the wire strength using the old scheme and the scheme with the static frequency converter.

The motors used has the following values: P_N = 2,2 KW, n_N =2920 rpm, I_N = 5,1 A. It was used a ACS 800-01-0004-3 static frequency converter with the rated values: U_N = 400 V, I_N = 5,4 A, I_{MAX} = 8,2 A, P_N = 2,2 KW.

The results of the measurements are presented in the table 1 and table 2.

Table 1

F_R Old scheme	[N]	71	70,95	70,96	70,94	70,92	70,85
Drum diameter	[%]	0	10	20	30	40	50
F_R Old scheme	[N]	70,7	70,63	70,57	70,23	70,05	
Drum diameter	[%]	60	70	80	90	100	

Table 2

F_R New scheme	[N]	71	71	71	71	71	71
Drum diameter	[%]	0	10	20	30	40	50
F_R New scheme	[N]	71	71	71	71	71	
Drum diameter	[%]	60	70	80	90	100	

The linear speed has roughly V = 31 m/s. The strength of the wire in the old scheme is not steady, it's decreasing which lead to a low consistency reel and the possibility to un fold by the drum.

At the scheme with the static frequency converter (table 2) the strength in the wire remains steady at any speed.
(n_{max} = 2920 rpm, n_{min} = 975 rpm at R_1 = 0,1 m and R_2 = 0,3 m).

4. CONCLUSIONS

The scheme has a high endurance and precision and the quality of the obtained reels is steady.

The scheme could be adapted at different diameters and linear speeds by the corresponding setting of the static frequency converter.

5. REFERENCES

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