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EXPERIMENTAL DETERMINATION OF ANGULAR VELOCITY VARIATION OF A ROLLER OVERRUNNING CLUTCH

Adriana Ioana PRECUB, **Maria Felicia SUCALĂ**

Abstract: *In this paper it has been determined experimentally the variation of angular velocity for the overrunning clutch, for different speeds of the drive motor and for three crank lengths.* ***Key words:*** *angular velocity, variation, overrunning clutch, roller.*

1. INTRODUCTION

In this paper it has been determined experimentally the variation of angular velocity for the overrunning clutch, for different speeds of the drive motor and different resistant moments.

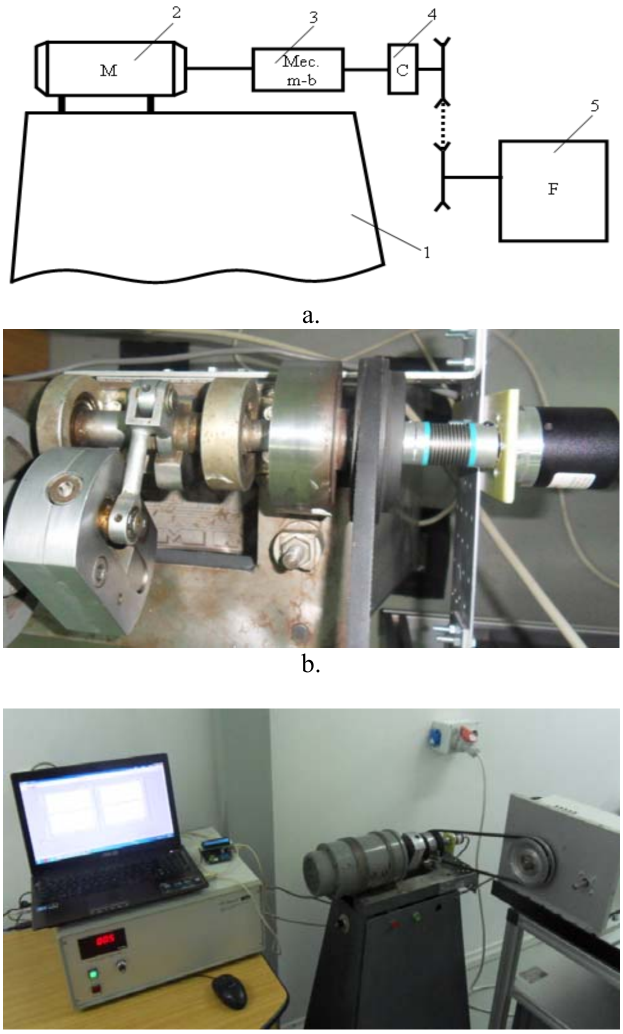
Therefore it was necessary to create a stand in order to test the overrunning clutch present below.

2. DESCRIPTION OF THE STAND FOR TESTING THE OVERRUNNING CLUTCH

The experimental tests were correlated with the existing material in Mechanical System Engineering Department, group of discipline: Machine Elements and Tribology.

The stand for testing overrunning clutches is shown in figure 1. The mechanical part is composed of frame 1, DC motor 2 with an output P=0.55kW and an speed variable n=100-3000 rot/min, the quadrilateral crank rocker mechanism with adjustable oscillations 3, on it's driven element being mounted in console, the overrunning clutch 4 and brake load unit PT500.05 5 (fig. 1,a)[1].

In order to record the collected data from the stand, it has been used a rotary incremental sensor EA44 (fig. 2) connected to a microcontroller AT MEGA 16 (fig. 3), and for graphical display of the results collected from the sensor, in LabVIEW 8.6 software, it has been made an application that allows graphical display of angular velocity [2], [3].



c.
Fig. 1. The stand for experimental tests

Fig. 2. Rotary incremental sensor EA44

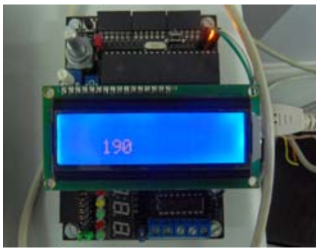


Fig. 3. Microcontroller AT MEGA 16

Figures 4-6 presents the variation of the angular velocity graphs for n=126rot/min and ℓ_1=10 mm and different resistant moments.

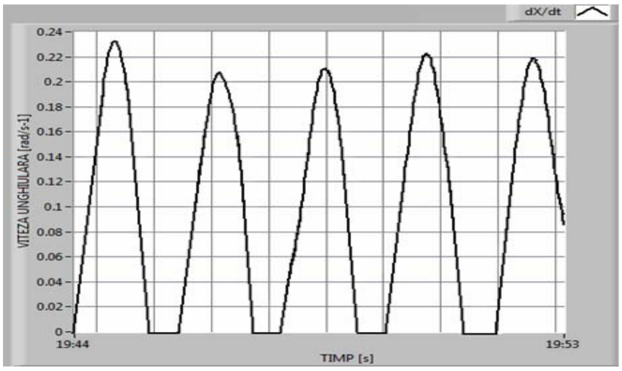


Fig. 4. Variation of the angular velocity for: ℓ_1=10 mm and n=126 rot/min and T_r=1.9 Nm.

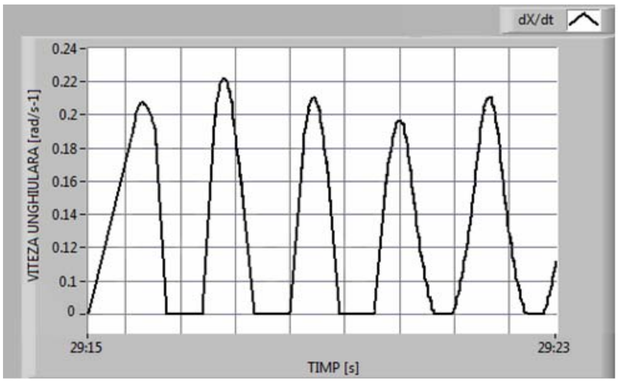


Fig. 5. Variation of the angular velocity for: ℓ_1=10 mm and n=126 rot/min and T_r=2.2 Nm.

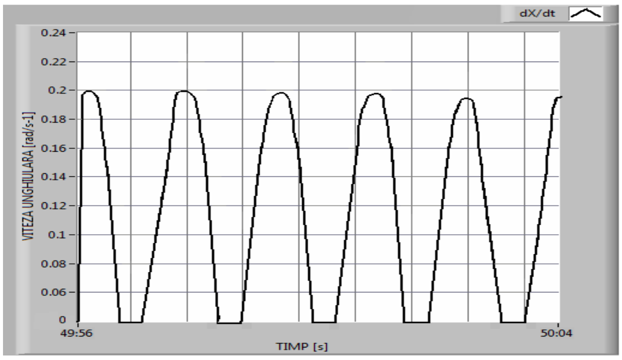


Fig. 6. Variation of the angular velocity for: ℓ_1=10 mm and n=126 rot/min and T_r=2.5 Nm.

Figures 7-9 presents the variation of the angular velocity graphs for n=126rot/min and ℓ_1=20 mm and different resistant moments.

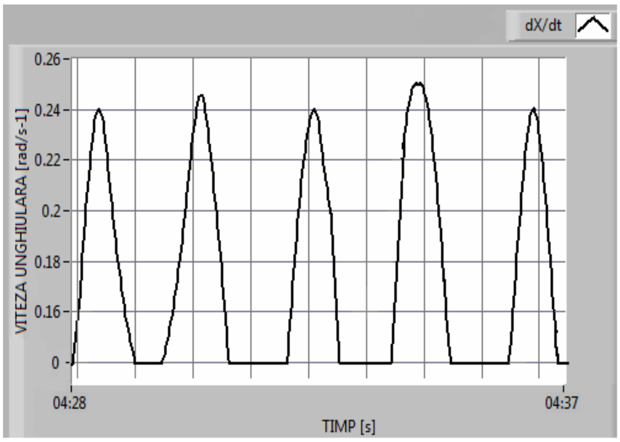


Fig. 7. Variation of the angular velocity for:ℓ_1=20 mm and n=126 rot/min and T_r=1,7 Nm.

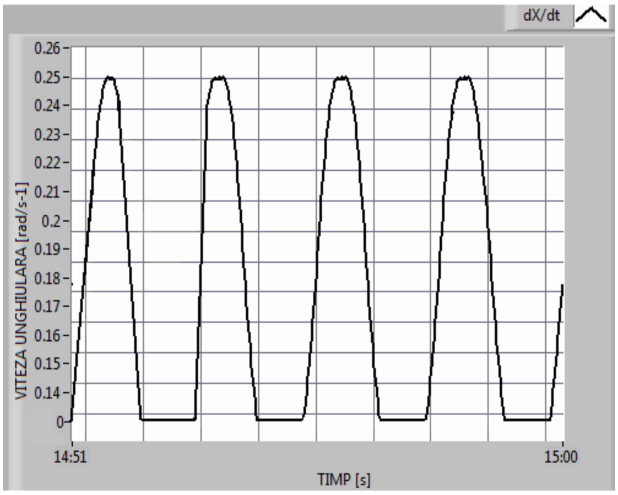


Fig. 8. Variation of the angular velocity for:ℓ_1=20 mm and n=126 rot/min and T_r=2.5 Nm.

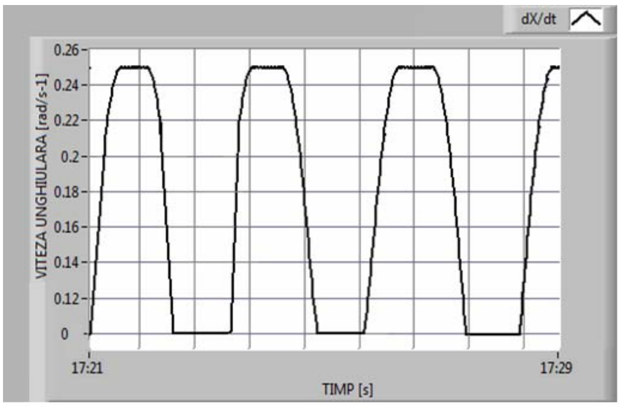


Fig. 9. Variation of the angular velocity for:ℓ_1=20 mm and n=126 rot/min and T_r=3 Nm.

Figures 10-12 presents the variation of the angular velocity graphs for n=126rot/min and ℓ_1=30 mm and different resistant moments.

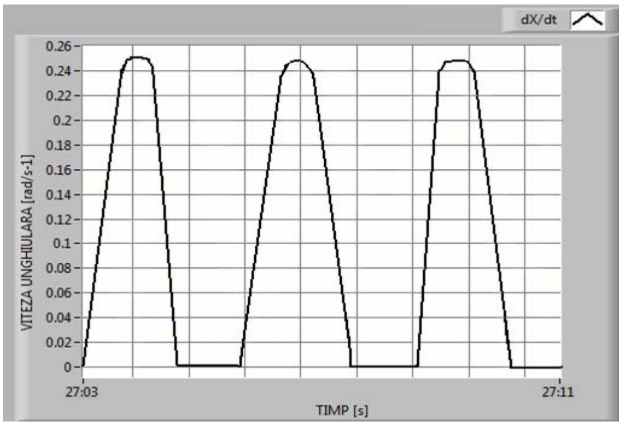


Fig. 10. Variation of the angular velocity for: ℓ_1=30 mm and n=126 rot/min and T_r=2 Nm.

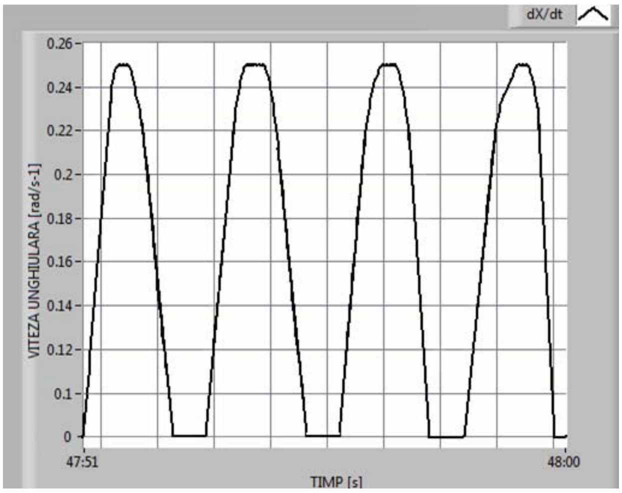


Fig. 11. Variation of the angular velocity for: ℓ_1=30 mm and n=126 rot/min and T_r=2.2 Nm.

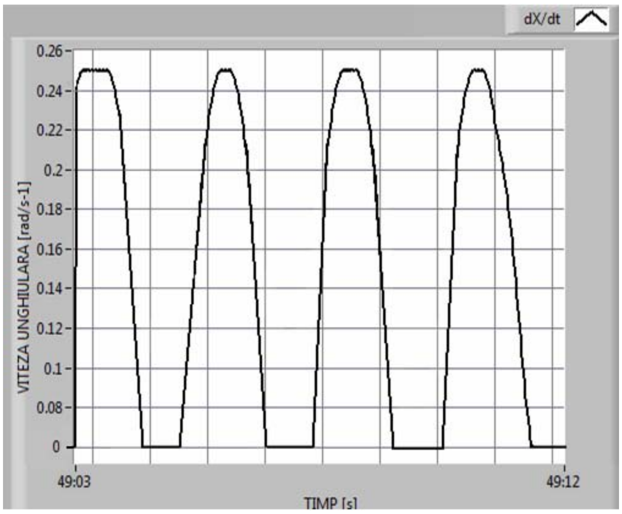


Fig. 12. Variation of the angular velocity for: ℓ_1=30 mm and n=126 rot/min and T_r=2.5 Nm.

Figures 13-14 presents the variation of the angular velocity graphs for n=375rot/min and ℓ_1=10 mm and different resistant moments.

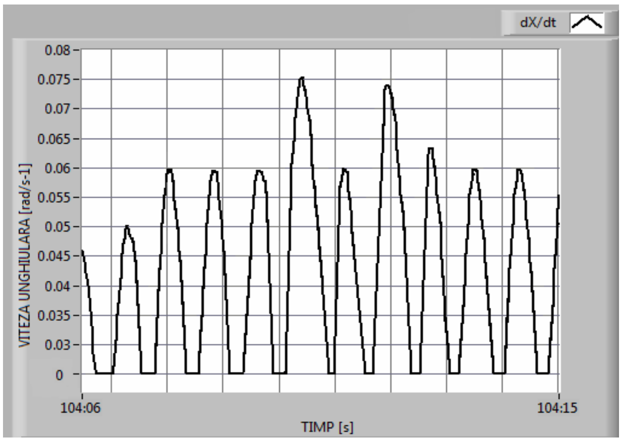


Fig. 13. Variation of the angular velocity for: ℓ_1=10 mm and n=375 rot/min and T_r=2.5 Nm.

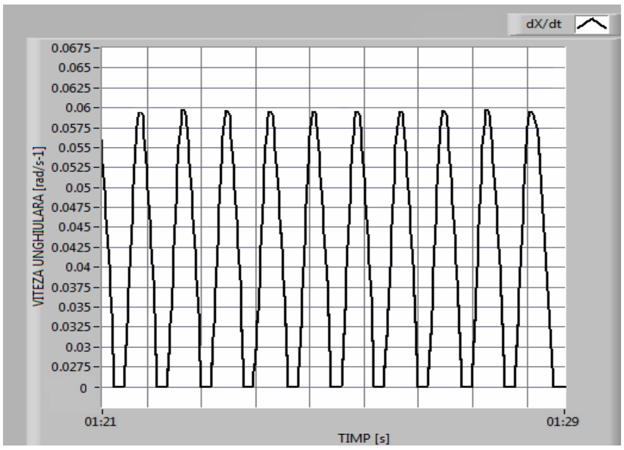


Fig. 14. Variation of the angular velocity for: ℓ_1=10 mm and n=375 rot/min and T_r=3 Nm.

Figures 15-16 presents the variation of the angular velocity graphs for n=375rot/min ℓ_1=20 mm and different resistant moments.

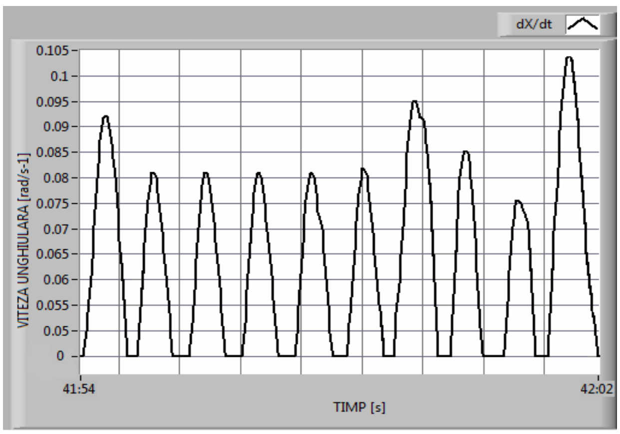


Fig. 15. Variation of the angular velocity for: ℓ_1=20 mm and n=375 rot/min and T_r=2.5 Nm.

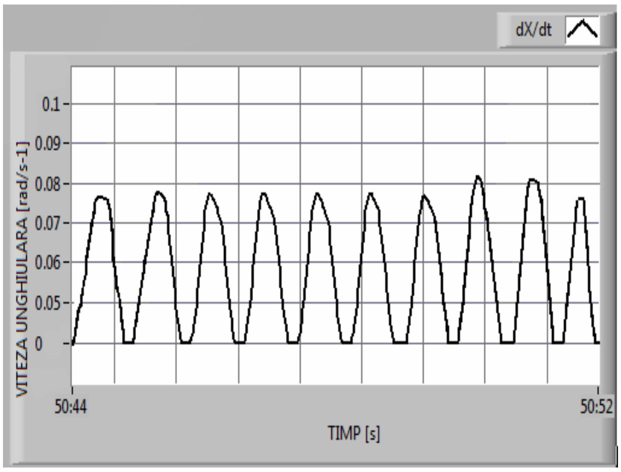


Fig. 16. Variation of the angular velocity for: ℓ_1=20 mm and n=375 rot/min and T_r=3 Nm.

Figure 17 presents the variation of the angular velocity graph for n=375rot/min and ℓ_1=30 mm and different resistant moments.

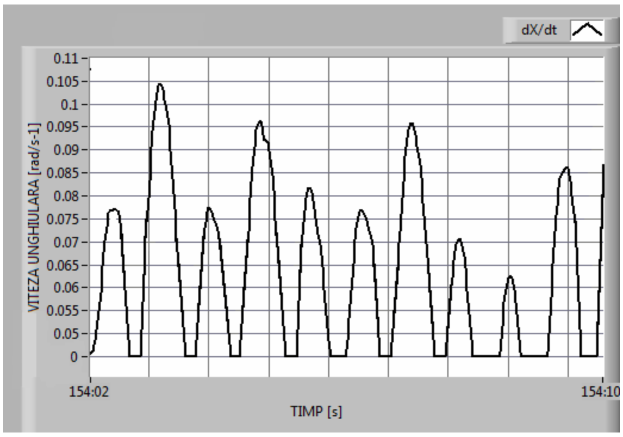


Fig. 17. Variation of the angular velocity for: ℓ_1=30 mm and n=375 rot/min and T_r=2.8 Nm.

3. CONCLUSION

Following the interpretation of the results we can drown the following conclusions:

- the overrunning clutch works only in the presence of a resistant moment, clearly noticing the two moods (wedging and debugging);
- it can be seen that along with the application of a higher resisting moment, it decreases the amplitude oscillation of the angular velocity;
- at the same speed, but changing crank length ℓ_1 = 20 mm, respectively ℓ_1 = 30 mm, it increases the amplitude oscillation of the angular velocity;
- increasing speed, it decreases the amplitude oscillation of the angular velocity.

4. REFERENCES

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DETERMINAREA PE CALE EXPERIMENTALĂ A VARIAȚIEI VITEZEI UNGHIULARE A CUPLAJULUI UNISENS CU ROLE

Rezumat: In aceasta lucrare s-a determinat pe cale experimentala variatia vitezei unghiulare pentru un cuplaj unisons cu role, pentru diferite turatii ale motorului de antrenare (126 rot/min si 375 rot/min) pentru cele trei lungimi ale manivelei, 10, 20 si 30 mm.

Adriana Ioana PRECUB, PhD student, Techical University of Cluj-Napoca, Mechanical System Engineering Department, E-mail: ioana_precub@yahoo.com.

Maria Felica SUCALĂ, Prof. Dr. Ing., Techical University of Cluj-Napoca, Mechanical System Engineering Department, E-mail: Felicia.Sucala@omt.utcluj.ro.