ANNALS of the ORADEA UNIVERSITY.
Fascicle of Management and Technological Engineering, Volume VII (XVII), 2008

MODEL MECHANIC APPROACH OF " DIVIDED MASS IN n BAR" FOR THE CALCULUS OF ENERGY IN VIBRATING TUBE MILLS OF CONSTRUCTION MATERIALS ' INDUSTRY

***Mariana Adriana Prichici*[1] *,Liliana Indrie*[2] *, Sabina Gherghel*[3]**

1,2,3 Oradea University

1 INTRODUCTION

The design of these large grinding tube is related to the following difficulty. Increasing the diameter of the grinding tube will lead to grinding condition being considerably impaired due to increased losses in the transfer of momentum .If losses in grinding results are to be prevented when increasing the size of the grinding chamber , it is necessary to adapt the grinding condition to new geometric condition .This paper attempt to show means and ways to determine the operating range where the most effective grinding effected can be anticipated using simple theoretical consideration of the energy input for vibrating tube mills.

2. REQUIREMENT AND OBJECTIVE

A prerequisite for the following model observation is the assumption that the attainable grinding results are in direct relationship to the energy input .Thus those parameters that have considerable influence on the input energy should be investigated. The parameters that primarily influence the vibration state and thus the input energy , are :

- the vibration amplitude of grinding tube ;
- the size of the grinding chamber ;
- the filling ratio of grinding elements ;

The objective of these observations in the configure the above –mentioned parameters so that a maximum energy can be transferred to the grinding bulk .The investigation of the se problems will be based on the model of " divided mass in n bar"

3.THE MECHANIC MODEL APPROACH OF " DIVIDED MASS IN n BAR" GEOMETRICAL CONDITION FOR IT .

The mechanic model approach of " divided mass in n bar" (fig.1) the entire grinding element bulk is united to n bar with a diameter d , length L and density ρ_{mc} .

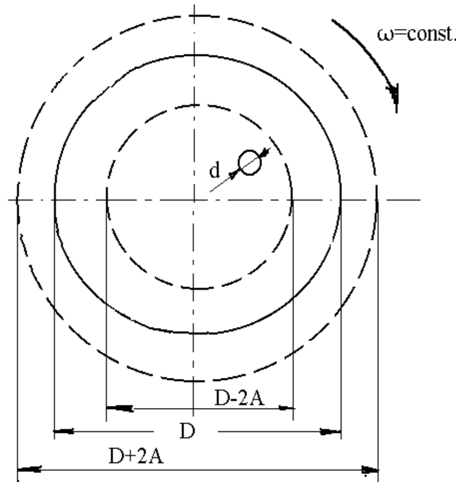

Fig 1 Geometric condition for the "divided mass in n bar" mechanic model

4 CALCULULUS OF ENERGY OF n BAR

The total energy of tube mill

$$E_{tot,bare} = \frac{\pi}{8}\left(k_1\rho_1 + k_2\rho_2\right)\eta \cdot D^2 L\omega^2\left(A^2 + \frac{1}{8}D^2\delta^2\right) \qquad (1)$$

the vibration amplitude A can be calculated with:

$$A = \frac{D}{2}\sqrt{\frac{z \cdot M_{moara} - \frac{\pi}{8}\left(k_1\rho_1 + k_2\rho_2\right)\eta \cdot D^2 L\delta^2}{\frac{\pi}{4}\left(k_1\rho_1 + k_2\rho_2\right)\eta \cdot D^2 L - z \cdot M_{moara}}} \qquad (2)$$

Inserting (2) în expression of total energy (1) one obtains :

$$E_{tot,bare} = \frac{\pi}{32}\left(k_1\rho_1 + k_2\rho_2\right)\eta D^4 L\omega^2 \cdot \frac{zM_{moara}\left(1 - \frac{1}{2}\delta^2\right)}{\frac{\pi}{4}\left(k_1\rho_1 + k_2\rho_2\right)\eta D^2 L - zM_{moara}} \qquad (3)$$

The amount of energy to be fed to the " divided mass in n bar " is shown as a function of filling ratio in the diagram of fig.2 and 3

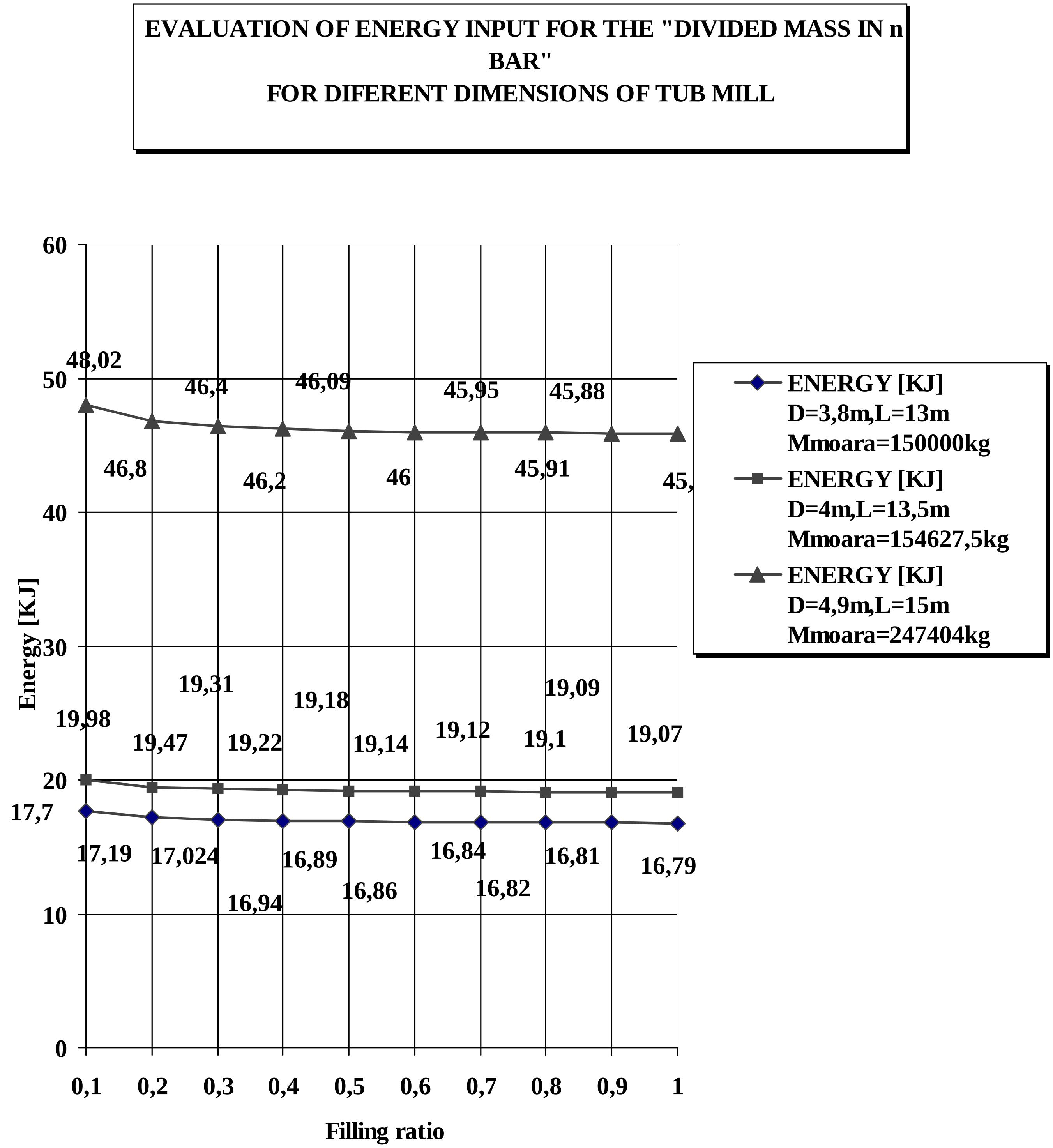

Fig.2 Evaluation of energy input for the “ divided mass in n bar “

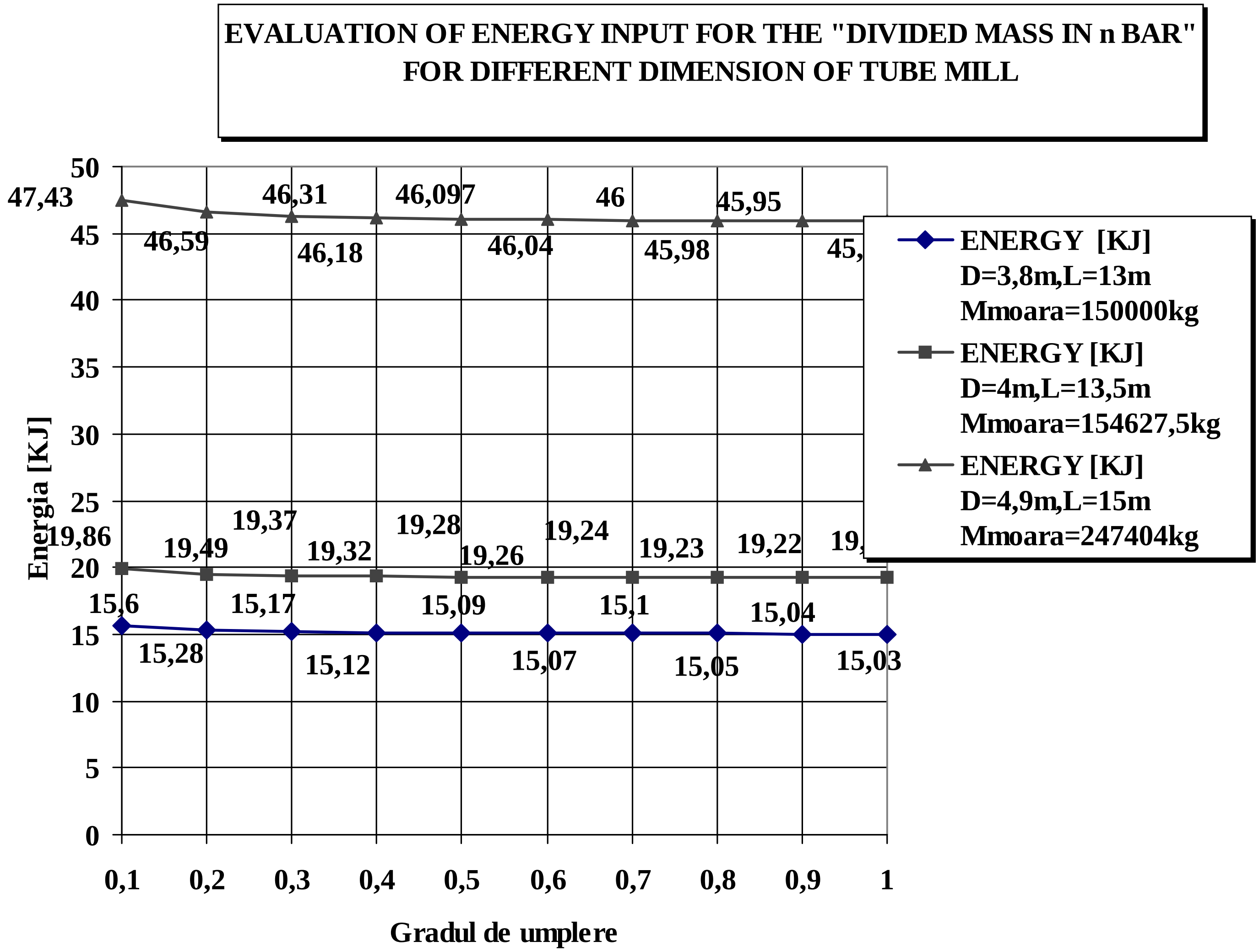

Fig. 3 Evaluation of energy input for the " divided mass in n bar "

5CONCLUSION

From the analyses of evaluation of energy input for " divided mass in n bar " as a function of filling ratio :

- The total energy of group of n bar have a line variation as a function of filling ratio ;
- when the density of grinding material increase the total energy of group of n bar increase
- when the dimension of tube mill increase the total energy of group of n bar increase

BIBLIOGRAPHY

[1] Prichici , Mariana – The dynamic study of crusher balls mills .Some contribution to the dynamic and strength calculation of equipment used in the building material industry –The thesis defense – Cluj Napoca Technic University –2000