

Modeling of Impact Energy Generated by Free Falling Ball

Salina Budin

Aznifa Mahyam Zaharudin

Faculty of Mechanical Engineering

Universiti Teknologi MARA (UiTM), Malaysia

Email: salinabudin@ppinang.uitm.edu.my

aznifa@ppinang.uitm.edu.my

Sugeng Priyanto

Universiti Sains Malaysia, Pulau Pinang

Email: soegeng_priyanto@yahoo.co.id

ABSTRACT

As a common practice in Mechanical Alloying (MA), the mixture of the work materials to be alloyed is placed in a container together with relevant milling medium. The vial and the charge materials are then moved in such a manner to create kinetic energy on the charge materials in the vial. Upon the collisions of the charge materials against each other as well as against the wall of the vial, kinetic energy is converted into impact energy. This impact energy is absorbed by the work materials which are repeatedly flattened, cold welded, fractured and re-welded – important mechanisms in MA. Since MA process utilizes energy generated by impact, it is important to understand the way on how kinetic energy of charged materials is transferred into impact energy. Four events of collision have been identified in the ball milling process: direct collision between balls, collision with sliding between the balls, direct collision between the balls and inner surface of the vial as well as collision with the sliding between the balls and inner surface of the vial. However, the most effective impact event is direct collision between the balls and inner surface of the vial. This paper presents a model of energy conversion and impact energy generation during the collision based on free falling experiment, which is the closest resemblance to the direct collision between the balls and the inner wall of the vial.

Keywords: *Mechanical Alloying, impact energy, collision, free falling*

ISSN 1675-7939

© 2009 Universiti Teknologi MARA, Pulau Pinang and Universiti Teknologi MARA (UiTM), Malaysia.