

Impact behavior of W-shaped carbon fiber thermoplastic composite structures

*Shun-Fa Hwang¹⁾ and Ding-Han Chen²⁾

^{1), 2)} *Department of Mechanical Engineering, National Yunlin University of Science and Technology, Douliu, 64002, Taiwan*

¹⁾ hwangsf@yuntech.edu.tw

ABSTRACT

The present work investigates the impact behavior of W-shaped thermoplastic composite structures made of woven carbon fiber and polycarbonate. The thermoplastic composite sheets were thermoformed into W-shaped structures and then they were trimmed into two types of W-shaped structures. One has the ears and the other has no ears. In addition, the stacking sequence of the composite structures was changed from $[(0/90)]_6$ to $[(\pm 45)]_6$. The impact was conducted by a drop weight test machine under 300 Joules. From that, the specific energy absorbed of the four types of specimens was compared. Furthermore, finite element simulation was provided and compared with the experimental results. The experimental results indicate that the structure with the ears has higher specific energy absorbed than that without the ears, and the structure with $[(0/90)]_6$ has higher specific energy absorbed than that with $[(\pm 45)]_6$. The simulation results have the same trend and very good agreement with the experimental results.



Fig. 1 Impact damage of three repeated W-shaped composite structures

¹⁾ Professor

²⁾ Graduate Student