

# Stengh evaluation of injection molded CFRTP based on fracture surface analysis

-Effect of injection molding condition-

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**KEY WORDS:** Materials, Composite material, CFRTP, Injection molding, Fracture analysis [D3]

The effects of injection molding conditions and carbon fiber content on the tensile strength of molded products were investigated by fracture surface analysis. Fracture analysis and strength evaluation were also used to comprehensively examine the results. Tensile strength increased with increasing CF content. For injection molding conditions, there was no effect of cylinder temperature on tensile strength, but tensile strength decreased as injection speed increased. Fracture surface observation revealed a black area at the origin of the fracture, and a cavity-shaped forming defect was observed within this area. Furthermore, the amount of fibers around the cavity in the black areas was less than in the other areas and was flatter than the surrounding fracture surfaces. In the black area, cracks initiate from cavities and propagate easily in areas where there are few reinforcing fibers. This black area was defined as the defect area. The larger the area fraction of the defective area, the lower the tensile strength. The area fraction of defective areas increased as the injection speed increased. The strength-dominant factor of injection molded CFRTP is the area fraction of the defective area, which enables strength evaluation.

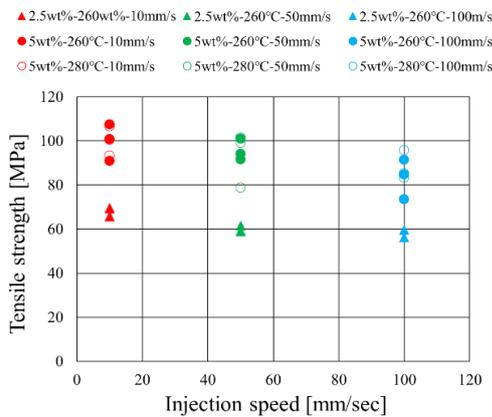


Fig.1 Relationship between injection speed and tensile strength

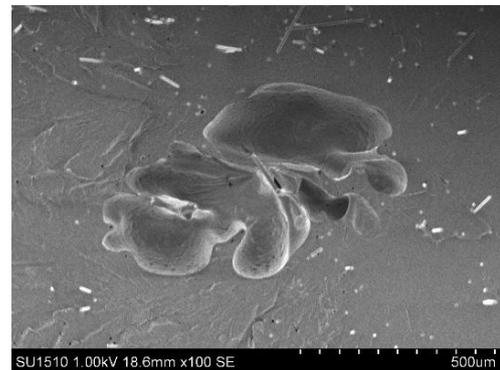


Fig.3 Defective area (SEM image)



Fig.2 Fractured surface (Microscope image)

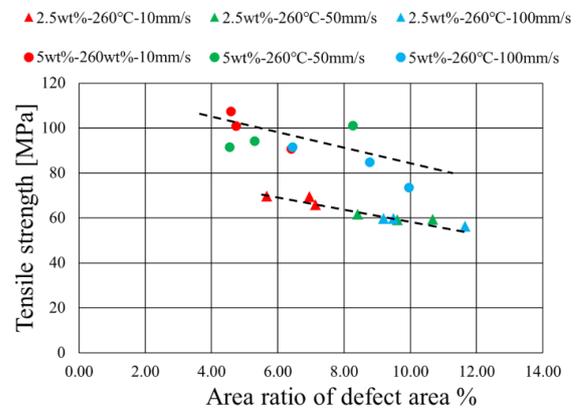


Fig.4 Relationship between area ratio of defect area and tensile strength