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Failure analysis of a multi-part composite frangible cover

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As an important part of a missile storage and launch system, a missile-launch canister cover is a storage device of an inner missile to protect a warhead to avoid damage and to prevent a leak of inert gas before the missile is launched. In the process of missile launch, the cover should be opened timely, not affecting a normal launch. Due to overweight of the blown part when the frangible cover is opened by the gas flow, it may cause a threat to the surrounding equipment. Therefore, a new multi-part composite frangible cover is proposed and analysed. The multi-part frangible cover is divided into three parts: a frame, weak zones and multi-part blown parts. The effect of structure parameters on the strength of weak zone in the multi-part frangible cover is discussed. Based on the equal-strength design principle, a weak zone selection scheme is developed, and the failure process of the multi-part frangible cover is simulated. The numerical results show that the multi-part blown parts are separated almost simultaneously, which agree well with the experiments.