

Ballistics Failure Analysis

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Best practice to address ballistics failure analyses with CAE (Computer Aided Engineering) to solve the performance challenges in armor projects.

When designing a ballistics solution for body armor or other applications, there are many approaches to achieve a certain level of protection. One method may be to copy an existing solution as closely as possible, then physically test to see if the desired results are achieved. Another is to develop prototypes by calculating strength and again physically test. Both methods are prone to errors and multiple tests are expensive.

A third option is to design the ballistics solution using a modern Computer Aided Design (CAD) program. There are several programs available with varying features and price points. These also include basic simulation with more advanced simulation available as an add-in. If necessary, the CAD model can be imported onto a stand-alone simulation application.

It is important that the correct material properties be applied to the CAD model. Material density, Poisson's ratio and modulus of elasticity (Young's modulus) should be included in the material properties. If these properties are incorrectly entered, the product may not perform as expected even though the simulation may indicate otherwise.

It is best practice to run basic simulation early in the design process. This will provide insight in product weight, indicate if the specified material is suitable, and identify areas that do not meet a specified factor of safety. If the simulation fails or the product is too heavy, other materials and thickness may be tested. It is possible to test several design iterations without expensive prototypes and physical testing.

Once the design passes the basic simulation test it may be desirable to use advanced simulation. This can identify areas where less material may be used or other areas that may reduce production costs, as well as identifying possible performance issues not seen with basic simulation. This information can be used to produce a high performing product at the lowest possible cost, benefiting the manufacturer and the consumer.

The use of Computer Aided Engineering and simulation is widely used in virtually every industry, with advances in capability almost daily. These products and techniques will produce products that will save lives in police, military and civilian applications.

Interested in learning more? [Contact us here.](#)