Functionally Graded Materials (FGM)

Tiles that undergo a ballistic test. (Right) Armor plate made of Functionally Graded Material (FGM) after impact by a 7.62mm Armor Piercing (AP) round showing only surface spalling but no penetration. (Left) A normal steel armor plate after impact by the AP round.

Merging the most ideal properties of two different materials is realized in Functionally Graded Materials (FGM). FGMs are characterized by their variation of composition over volume resulting in the integration of the most ideal properties of two different materials. FGMs have been known to increase the level of ballistics protection, up to 20 folds, at a reduced weight. This can be achieved because the FGMs are made up of an extremely hard surface layer (to absorb the energy of impact), a multilayered graded interface and a tough metal backing that accommodates deformation after ballistic impact.