Being on the Cutting Edge

Cutters of diamonds and other gemstones have a high-pressure job with conflicting demands: Flaws must be removed from rough stones to maximize brilliance but done so in a way that yields the greatest weight possible. Because diamonds are often cut to a standard shape, cutting them is far less complex than cutting other gemstones, such as rubies or sapphires, which can have hundreds of different shapes. By coupling geometry and multivariable calculus with optimization techniques, mathematicians have been able to devise algorithms that automatically generate precise cutting plans that maximize brilliance and yield.

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