Preface

How can the safety of devices in high-temperature applications be improved? When high-temperature devices, common in aerospace and nuclear engineering, fail catastrophically, the consequent deaths, injuries and damage can have lasting psychological implications. Safety standards in these fields must therefore be high and enforced. Safety-critical parts must be manufactured for high reliability and incident prevention and response must be well planned.

How can electrical discharge machining be used to manufacture regenerative cooling ducts in nozzles for aerospace applications? Parts designed for aerospace and aeronautical applications often contact combusted fuel that reaches temperatures around 3500 °C, which is hotter than any material can safely sustain. A common method of handling this heat is the use of regenerative cooling channels that flow coolant beneath the surface of the part. Creating these channels can be difficult and introduce modes of mechanical failure to the part. The process of Electrical Discharge Machining (EDM) can help create more reliable channels. Our group failed to produce an EDM machine that could create these channels because of a lack of precision in the tool control and the lack of a high voltage power supply, which should be prioritized by future designs.

How did social groups in the United States work to promote safety in nuclear energy after the Three Mile Island (TMI) disaster? Nuclear power plants pose inherent dangers that must be continuously addressed. The accident at TMI, the worst nuclear incident in US history, transformed perceptions and practices in nuclear power safety. A group commissioned by President Jimmy Carter, the Nuclear Regulatory Commission, and public advocacies produced effective reforms of enduring significance.