

THERMAL FATIGUE IN EVERYDAY LIFE

Thermal fatigue occurs when materials undergo repeated temperature changes, resulting in mechanical stress and eventual failure. While this term is commonly discussed in materials science and engineering, its effects also resonate in our everyday lives. Below are some instances where thermal fatigue influences the objects around us, along with references to recent research:

Infrastructure, including bridges, tunnels, roads, and other constructions, is vulnerable to thermal fatigue. Daily temperature variations can induce thermal stresses, leading to issues such as cracking, deformation, and compromised structural integrity [1; 2].

Components of engines, exhaust systems, and braking systems in vehicles are exposed to significant temperature fluctuations during operation. This exposure can result in fatigue cracking, warping, and mechanical breakdowns over time [3].

Electronics, ranging from smartphones and laptops to refrigerators and air conditioners, are also prone to thermal fatigue. These devices produce heat during operation and cool down when not in use. The cycle of heating and cooling can cause solder joints to crack, potentially leading to component failure [4]. Similarly, components in household appliances like washing machines and dishwashers undergo thermal cycling, which can impair their performance and shorten their lifespan. Moreover, thermal fatigue can degrade the batteries in electronic gadgets [5].

Coatings on kitchen utensils, cars, and housing materials experience repeated cycles of heating and cooling, which can result in thermal fatigue and subsequent cracking [6].

Like the objects that surround us, our bodies can also be affected by thermal fatigue. A notable example is our teeth, which are constantly exposed to temperature changes [7].

Thus, the influence of thermal fatigue on our lives is significant. Ongoing advancements in materials science, engineering, and technology are fostering the development of innovative solutions to address thermal fatigue in the various objects and systems that surround us.

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