

## ENGINEERING THE MIND: HOW MINDFULNESS CAN BENEFIT ENGINEERS

In this article, Reji Varghese explores research conducted at Stanford University by Beth Rieken, Sheri Sheppard, and Shauna Shapiro between 2015 and 2017 examining whether mindfulness meditation could help engineering students become better at innovation and creative problem-solving. The findings were later published in a 2019 Harvard Business Review article titled 'Mindfulness for Engineers'.



Source: Magic Wand Media

**F**or decades, engineering excellence meant tighter tolerances, better productivity, lower rejection rates, and solving problems efficiently within known constraints.

Those things still matter. But manufacturing has changed. Engineers today work with automation, robotics, sensors, software, lightweight materials, electrification, and increasingly, AI-assisted systems. Problems rarely stay confined in one department anymore.

A question that is beginning to emerge across engineering education and industry is: Are engineers being trained only to execute processes, or are they also being trained to observe carefully, question assumptions, and innovate?

Research by Beth Rieken and her colleagues at Stanford University offers an interesting perspective. Their work explored the relationship between mindfulness and innovation in engineering students.

The word mindfulness creates confusion because many people associate it with wellness programs or meditation apps. But the Stanford research approached it more practically. In this context, mindfulness refers to the quality of attention a person brings to a task. Focus matters, but so does curiosity, openness, and the ability to notice without rushing toward conclusions.

On the shop floor, this is not abstract at all.

An experienced machinist listening to a spindle sound and quietly saying, "Something is not right," is demonstrating mindfulness. So is the fixture designer who asks why a part is being clamped a certain way simply because "we've always done it like this." Many major engineering problems announce themselves quietly before they become visible on a report.

### Convergent and Divergent Thinking

One part of Rieken's research involved engi-

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neering students being given divergent thinking tasks. Divergent thinking is simply the ability to generate multiple possible solutions instead of moving immediately toward one correct answer. That matters because engineering education traditionally rewards convergent thinking. Students are trained to solve structured problems using established formulas and methods. Analytical rigor is essential but over time it can also condition people to search for predefined answers rather than fresh possibilities.

In one experiment, participants were asked to think of alternative uses for a brick and also consider design solutions for a flood-retaining wall. Students with higher baseline mindfulness consistently generated more original ideas and considered a wider range of factors.

A second study involving nearly 1,400 engineering students across the United States found that mindfulness strongly predicted what researchers called 'innovation self-efficacy' – confidence in one's ability to innovate.

What stood out most was not concentration alone. The strongest predictor was a mindset of openness and curiosity, what Zen traditions sometimes call a 'beginner's mind'.

### **Steve Jobs, Apple, and Mindfulness**

Steve Jobs often spoke about something similar. Long before mindfulness became fashionable in Silicon Valley, Jobs was practising Zen meditation and studying Eastern philosophy. In Walter Isaacson's 2011 biography of Steve Jobs, Jobs is quoted as saying, "If you just sit and observe, you will see how restless your mind is. If you try to calm it, it

only makes it worse, but over time it does calm, and when it does, there's room to hear more subtle things – that's when your intuition starts to blossom and you start to see things more clearly and be in the present more. Your mind just slows down, and you see a tremendous expanse in the moment. You see so much more than you could see before. It's a discipline; you have to practice it." That way of thinking shaped Apple's design philosophy too. Jobs believed simplicity was much harder than complexity. Many engineers will recognize the truth in that immediately. It is easy to keep adding sensors, features, menus, and layers of software. It takes real clarity to remove what is unnecessary. Manufacturing companies today face a similar challenge.

### **Are Engineers Being Trained to Execute and also Innovate?**

Many organizations unknowingly train engineers to avoid uncertainty. Processes become rigid. Hierarchies discourage questioning. Young engineers quickly learn that the safest path is usually to follow established methods quietly and avoid mistakes.

That creates consistency. It can also slowly suffocate initiative.

India's Manufacturing sector is entering a phase where innovation becomes increasingly important. Competing on cost alone is no longer enough. Whether in Aerospace, Automotive, EVs, Defence, Medical Devices, or Precision Engineering, Indian manufacturers are moving toward higher-value work. That transition requires a different kind of engineering mindset.

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