

'FEAsy' analyzes designs from raw sketches to speed parts creation (w/ Video)

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Going back to the drawing board is much easier now that researchers have developed a new type of design program called FEAsy.

The [program](#) allows the designer to sketch a rough concept of the part and then analyze the part's characteristics while it is still only a drawing, said Karthik Ramani, a professor of [mechanical engineering](#) at Purdue University.

The concept represents a departure from conventional design methods, in which engineers use a painstaking procedure called finite-element analysis to test designs, he said.

Findings were detailed in a paper presented Tuesday (Sept. 1) during the American Society of Mechanical Engineers Design Engineering Technical Conference in San Diego. The researchers received a 2009 Prakash Krishnaswami CAPPD Best Paper Award from the society.

"This is the first research paper that shows the feasibility of the program," Murugappan said.

One major challenge is endowing the software code with the ability to distinguish the difference between lines, circles and arcs, as well as symbols such as arrows drawn by users to describe a part.

"Say I'm a design engineer working for an automotive company and I

want to find out how much stress my conceptual part can withstand," Ramani said. "I want to know where to drill the holes, and what kind of materials to use. I might have hundreds of ideas on shapes and so on."

The program automatically carries out steps including "geometric constraint solving" and "primitive beautification" to clean up the rough sketch.

"The computer has to do what we call sketch understanding," Ramani said. "If I don't close a circle completely, the computer knows I mean to draw a circle and completes it. If I don't draw lines exactly horizontal or perpendicular, the program recognizes these flaws and corrects them."

FEAsy then displays a formal version of the sketch and several alternatives for the designer to choose from, and it also saves the original rough sketch.

"Unlike other drawing programs on the market, you don't have to use specific tools to draw circles and squares and lines," Ramani said. "You just draw, and the computer understands what you are doing."

FEAsy also is "domain independent," meaning it does not assume the part being drawn is for a specific end use, such as an electrical circuit or a bookshelf bracket.

Source: Purdue University ([news](#) : [web](#))

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