

Origami solution found for folding steel shopping bags

March 31 2011, by Bob Yirka



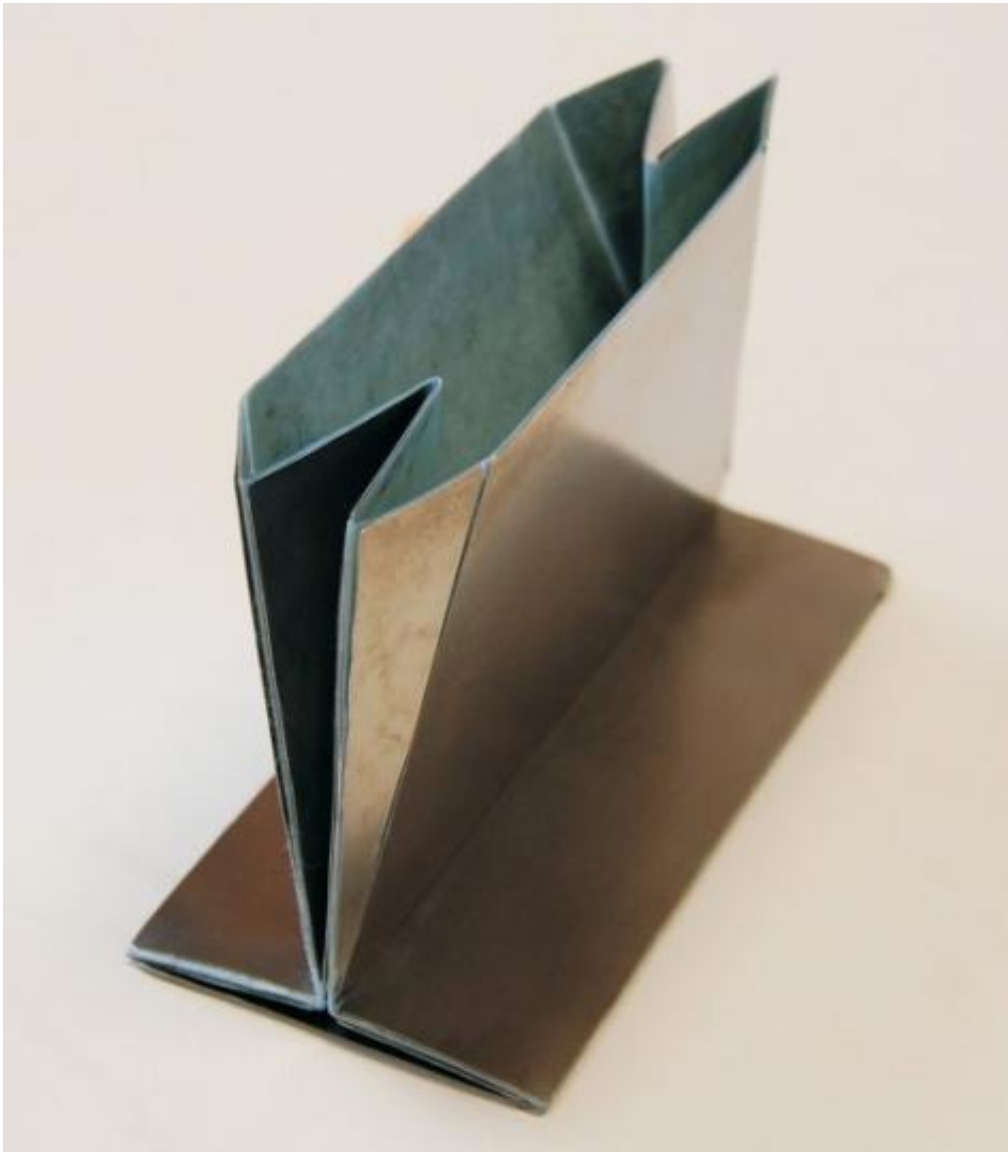
Image credit: Zhong You

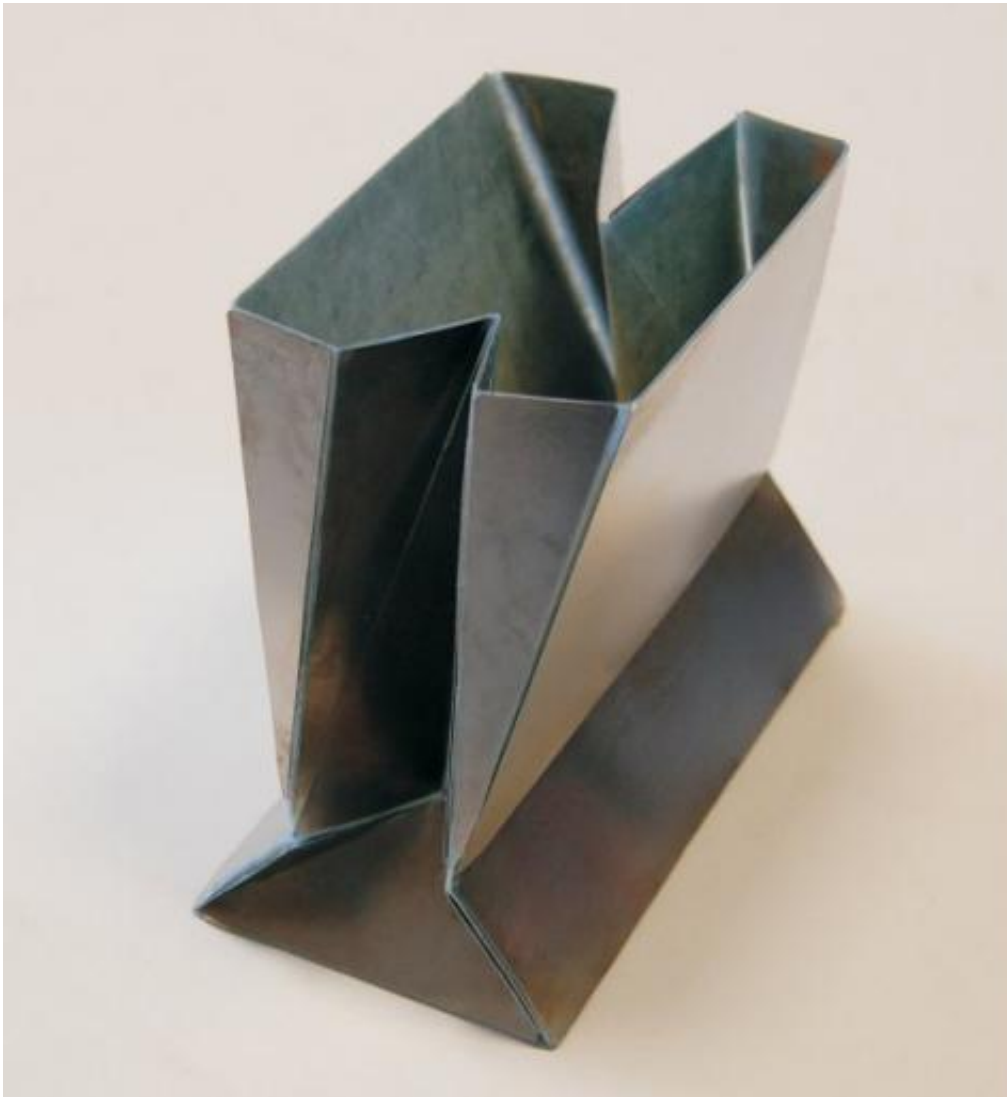
(PhysOrg.com) -- Origami, the ancient Japanese art of folding objects in simple, yet complicated ways, has in recent years been applied to various engineering challenges, such as how to fold up a solar array for transport to outer-space where it can be easily unfolded before use.

Now, Zhong You and Weina Wu, origami engineers at the University of Oxford in the UK, have discovered a way to apply the principles of [rigid origami](#) (where the sides cannot be bent, but soft creases are allowed between flat panels) to the science of paper and cardboard packaging.

The two built on the work of Erik Demaine, a [mathematician](#) at MIT in Cambridge, who in 2004 proposed a theoretical model whereby a tall bag composed of sides with infinitely thin rigid sides could be constructed that could in theory, fold down to a flat state. You and Wu came up with their own pattern of folding and then demonstrated it could work by applying thin panes of steel to a flexible thin, light plastic sheet, which was used to construct a simple tall bag. The tall bag was then compressed down to a single flat structure by bending only at the creases where the folds lay.

The two have published their findings, along with photographs of the steel “shopping” bag in the journal *Proceedings of the Royal Society A*, and hope to apply their work to cardboard boxes as well. You noted in the paper that although steel was used in the paper to make a point, other rigid materials could work just as well.







You also points out that if a cardboard box could be constructed in the same fashion as the tall bag, that it would render obsolete the need to remove the bottom (or top for that matter) of the box when folding it up to make it flat; a feat that would save shippers and others who use cardboard boxes as a part of their business, a lot of time and money.

According to Demaine, the real goal of [origami](#) engineers is to figure out a way to apply rigid folding techniques to bigger, real world type objects, such as buildings, or appliances, so that they could be folded up and put away when not in use.

More information: by Weina Wu and Zhong You, A solution for folding rigid tall shopping bags, *Proceedings of the Royal Society A*, Published online before print March 30, 2011, [doi:10.1098/rspa.2011.0120](https://doi.org/10.1098/rspa.2011.0120)

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