

World's first commercial nanostructured bulk metal

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Large-scale manufacture of nanostructured steel shafts.
Credit: Rolls Royce Plc.

When we think of structural materials, we usually imagine something big, strong and bulky, like steel beams in bridges and buildings, and while we are becoming familiar with composites reinforced with carbon nanotubes and nanofibers, it is yet hard to believe that the structure of bulk homogenous metals can be controlled at the nanoscale with commercial-scale production

In a paper published in the *Science and Technology of Advanced Materials*, Bhadeshia introduces the world's first bulk nanostructured metal in commercial production. The nanostructure-controlled high-strength bainitic steel, where the thickness of bainitic ferrite platelets is controlled between 20 and 50 nm is shown in the figures below.

The review paper explains why nanostructure plays an important role in strengthening materials, and the conditions required to design and develop such "nanostructured" materials. In particular, the biggest challenge is to keep the production cost as low as that of bottled water.

So, what magic is needed to produce low-cost

nanostructured bulk steel? The answer is simple – keep the bulk at 200 °C for 10 days, which will lead to the formation of plate-like bainitic structure. One deficiency of the material is that it is yet difficult to weld, but the author lays out possible solutions to overcome this.

More information: "The first bulk nanostructured metal," *Science and Technology of Advanced Materials*, Vol. 14 (2013) p. 014202. Published in March 11, 2013 at

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