

Composites All Around Us

A world forever in transition

When did you first learn about composites?

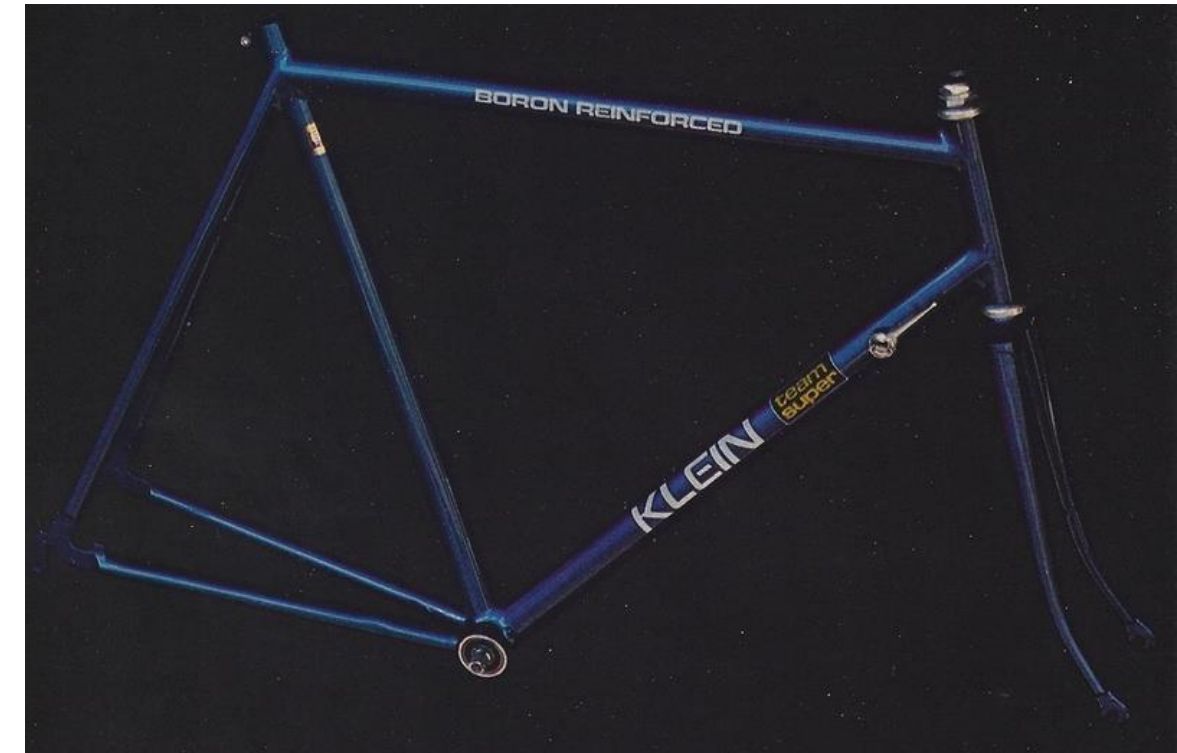
It might have been earlier than you think.



Bicycling Magazine, 1978

Gary Klein's bicycle tubing experiments, MIT

Boron fabric-wrapped aluminum bike frame tubes



Inspiration!

The magazine launched my bicycling obsession and Klein is a big reason I'm a mechanical engineer

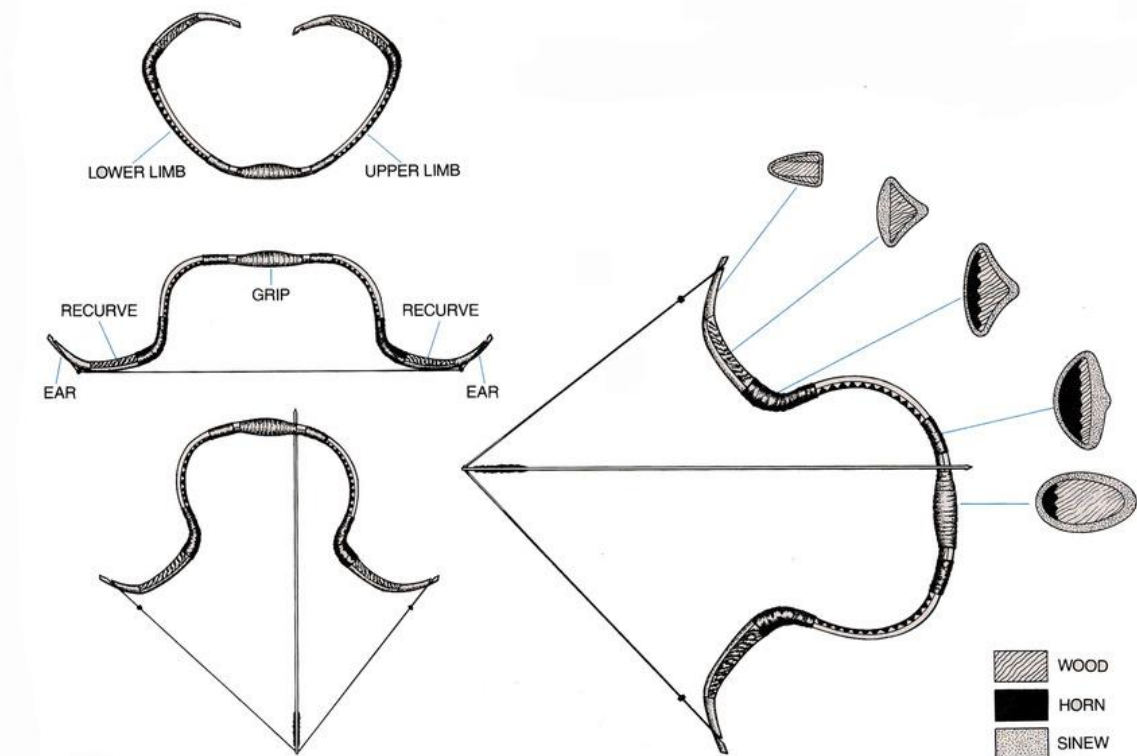
It turns out composites are everywhere

And they have existed for thousands of years



Mud and straw bricks

Circa 7,000 BC



Plywood, including this Egyptian bed, circa 2,500 BC

The Mongol composite bow, circa 1,000 BC

Roman concrete, circa 25 BC

The American
advantage:

Creativity

Our relentless pursuit of new and better ways of
making things, and making things better

Old school examples



The 1953 Corvette: the body was made using a new process by a company that had never made an auto body before



The Kevlar vest: it has saved thousands of lives. Kevlar was invented by DuPont in 1965.



The Continental Gatorskin bicycle tire, with Duraskin composite belting, circa 2005. It saved me countless flat tires.

ADVANCED MANUFACTURING, JIM VINOSKI DEFINITION:

The use of automation to reduce human exposure to the dangerous and dull, with modern tech that rivals our cell phone apps for effectiveness and user-friendliness

A good example:

3D printing



There's a good reason it was invented in America.

Now we're 3D printing carbon fiber bicycles



The 3D-
printed Emery
e-bike

And rockets, too

A Relativity Space rocket...

...being printed by their
proprietary Stargate
Generation 4 3D printer



Composites are not being left
behind in advanced
automation...

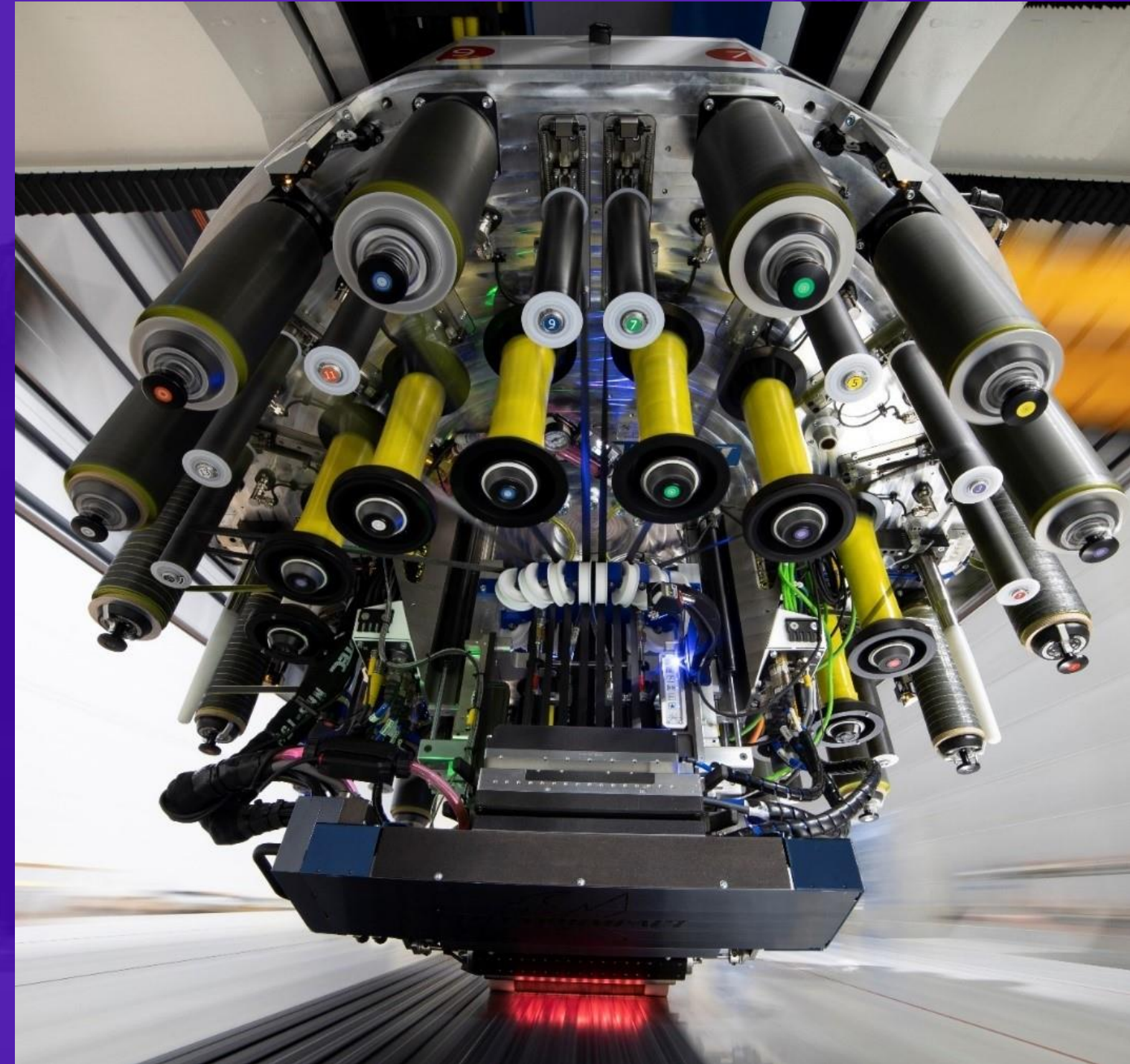
Arris

Additive Molding



Electroimpact automated fiber placement

Automation for forming carbon
fiber airplane fuselages



Shape Corp Pulltrusion



Something not to forget:

The best innovation is
doing something you
can't do with any other
technology

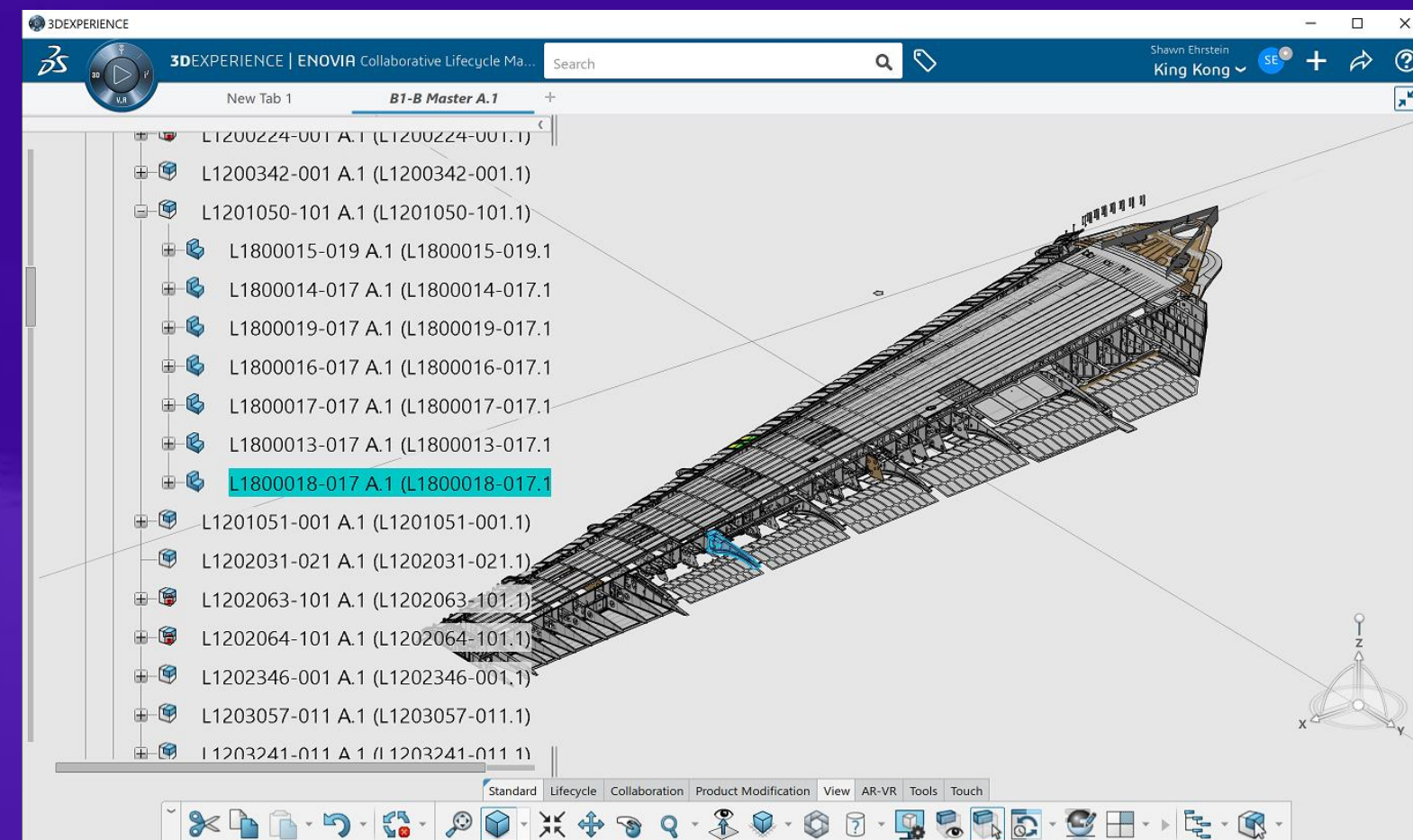
The Toray Carbon Magic bicycle, built
for the 2024 Summer Games



Shaping the future:

AI and machine learning will use data to see patterns humans can't see

Digital twins will open up whole new modes of design and fabrication



And one last thing:

You're changing the world!



My latest road bike, the Ridley Force 22 - I will almost certainly never own a steel-framed bike again