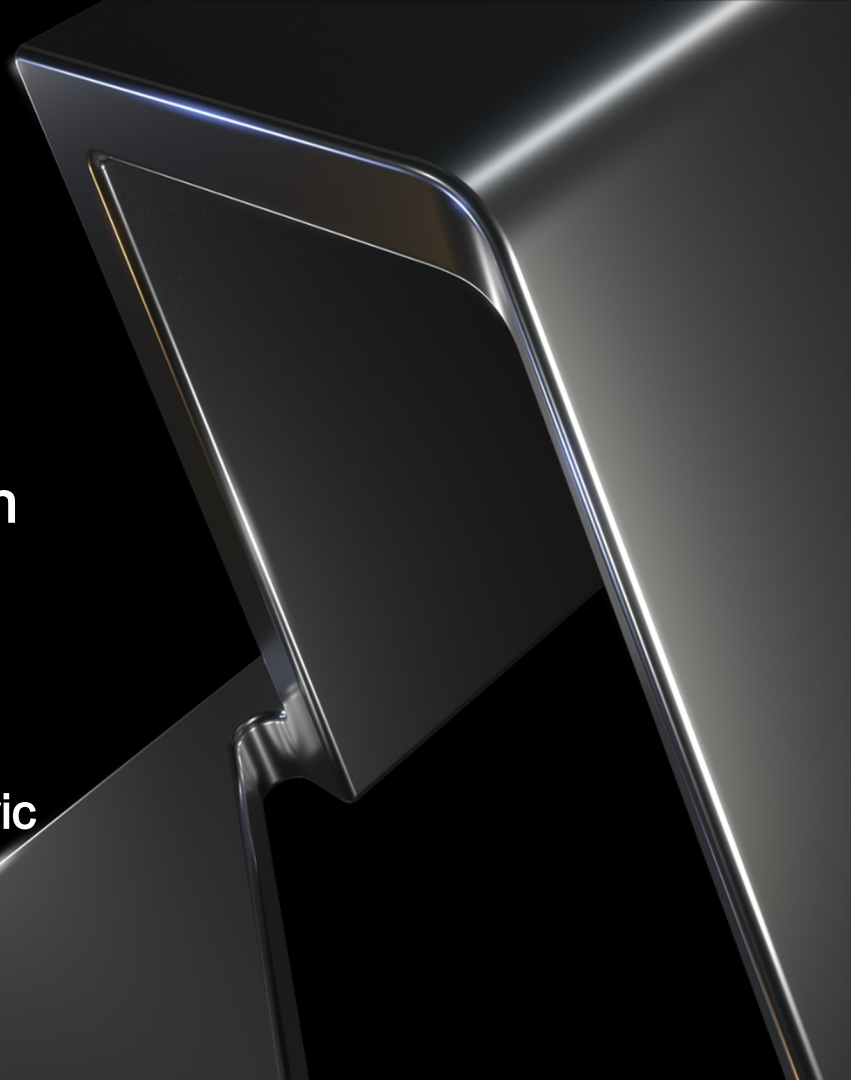
AUTODESK UNIVERSITY

Lightning Strikes Twice: Revisiting Generative Design for Mass Production

Peter Simpson, Richard Hatfield & Nick Markovic



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Introductions

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Who are we?

Peter Simpson

Technical Consultant
Fusion 360 Customer Engagement Organization – Process Specialist Team

Richard Hatfield

Founder and CEO
Lightning Motorcycles

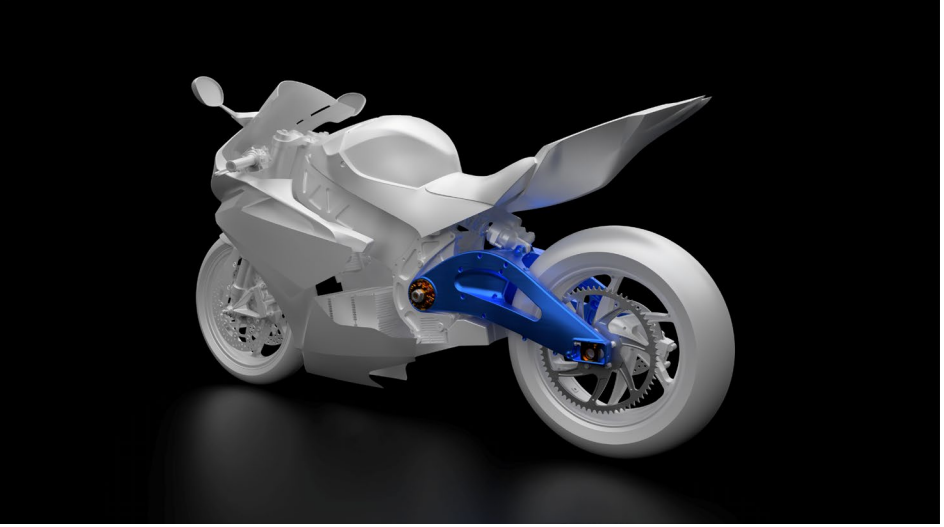
Nick Markovic

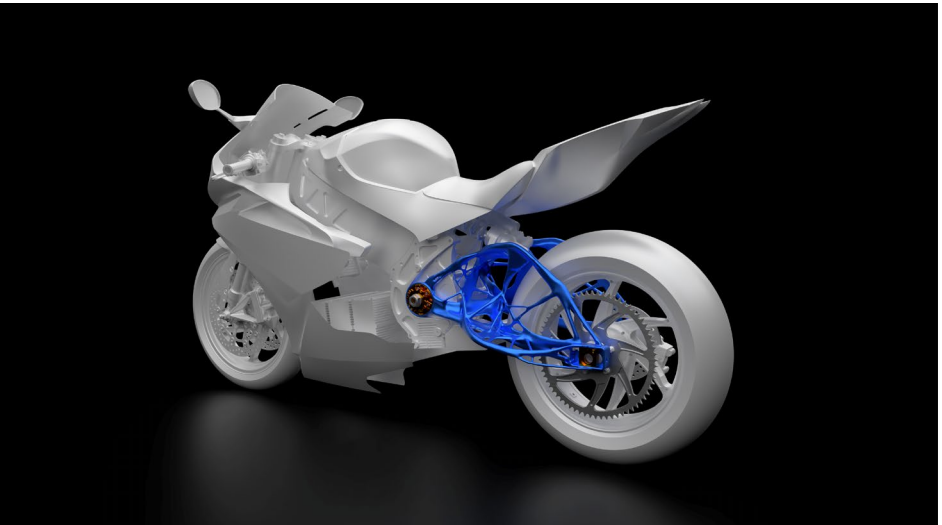
Sr. Research Engineer
Autodesk Research – Manufacturing Industry Futures Team

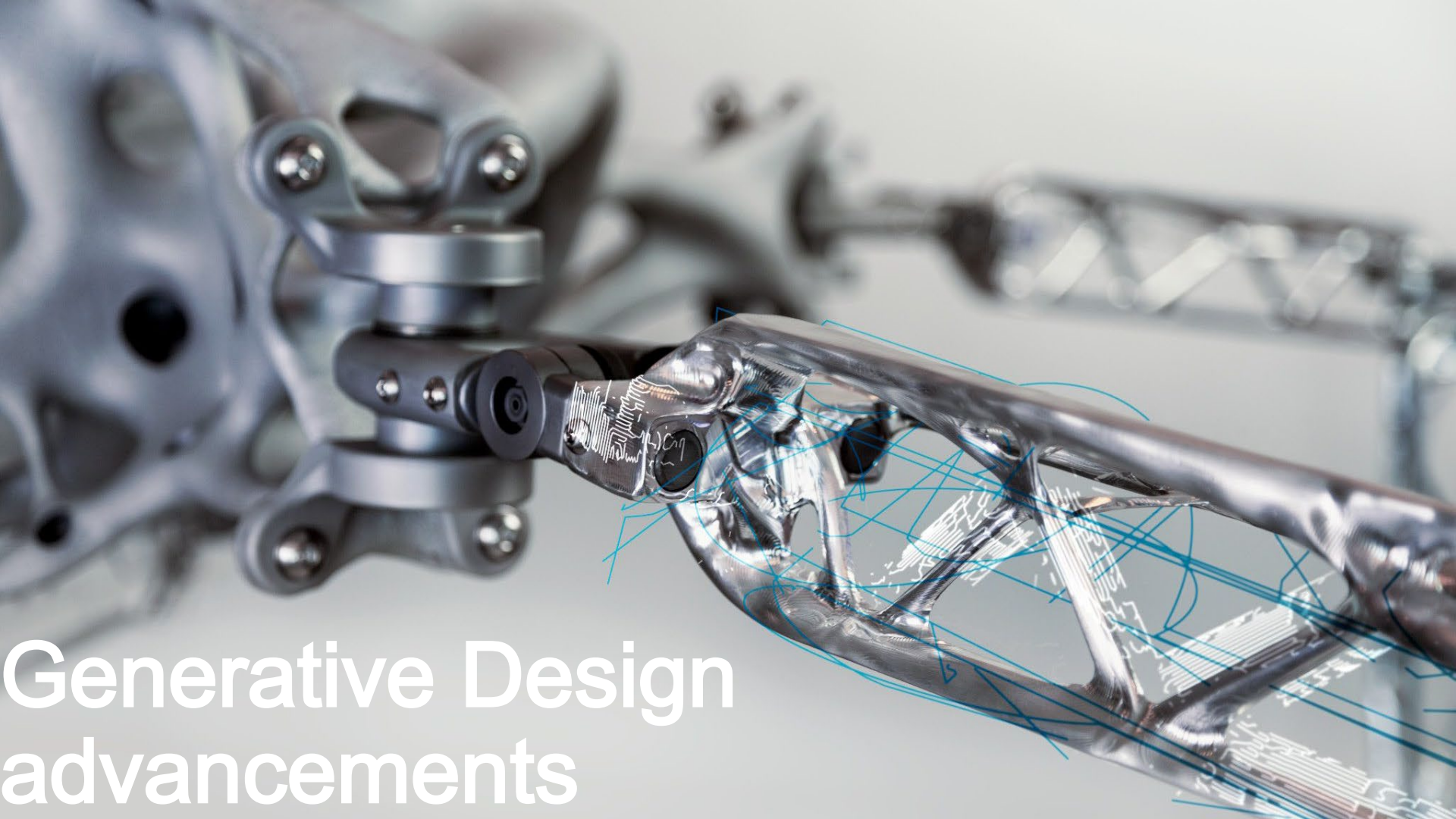
Lightning Motorcycles

PLACEHOLDER – LIGHTNING IMAGERY AND VIDEOS

Previous industrial collaboration and engagement





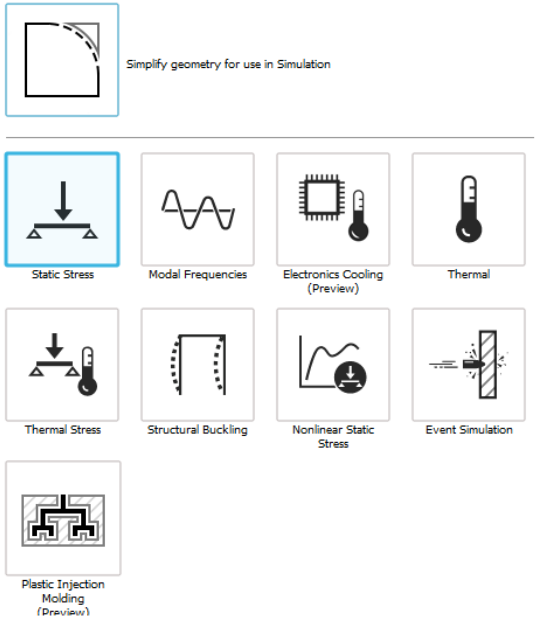


Generative Design advancements

Simulating the Swingarm structural behaviour

Fusion 360 simulation

Simulation portfolio



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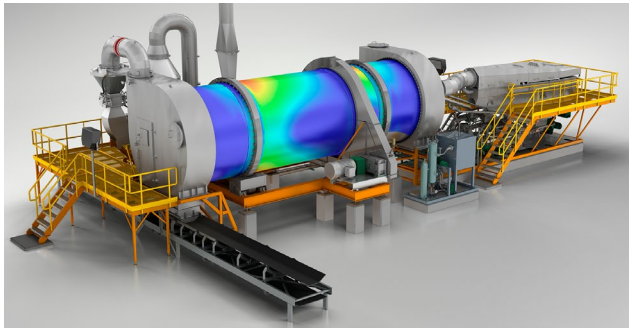


Image courtesy of Brimrock Group Inc. and Mechanix Design Solutions Inc.

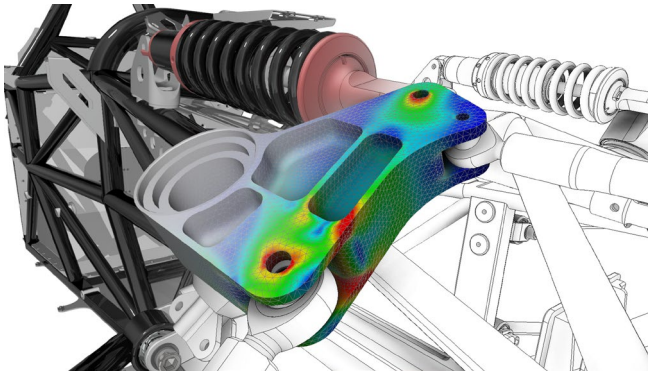
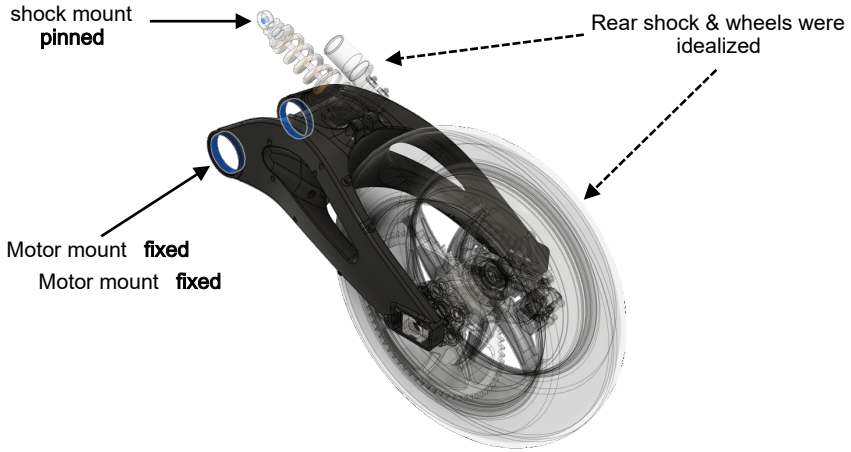
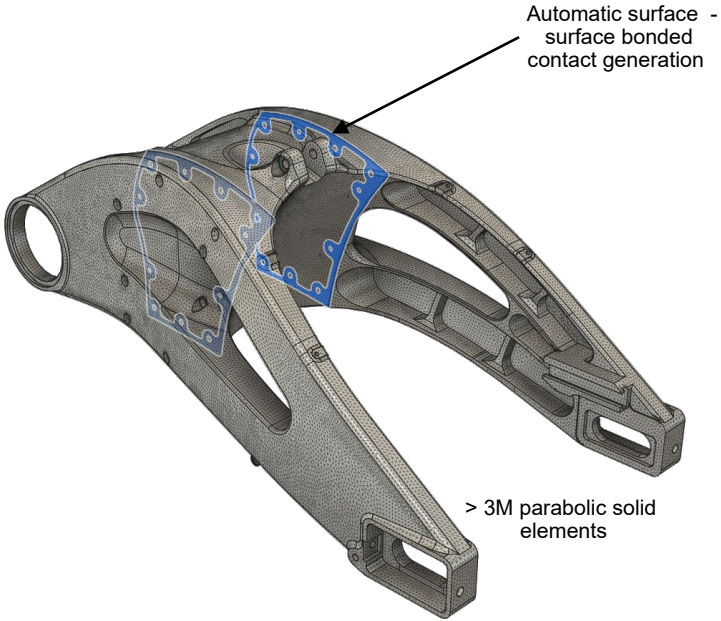


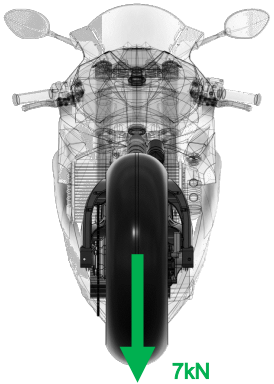
Image courtesy of Briggs Automotive Company Ltd.

Structural requirements

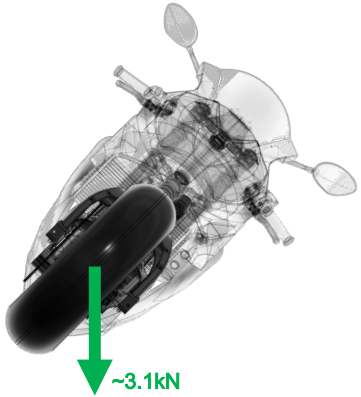




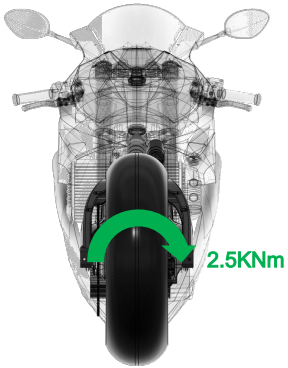
Load case 1



Load case 2 +/- ve



Load case 3 +/- ve

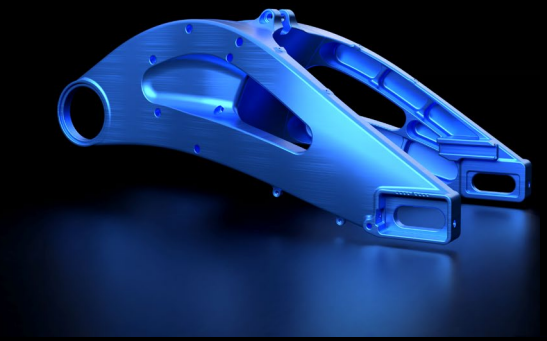


Main objectives:

- Perform linear stress analyses for all load cases to:
  - Calculate the maximum deflections
  - Calculate the maximum surface stress
  - Determine Factor of Safety or $\text{“}FoS\text{"} = \frac{fty}{\sigma_{vM}}$

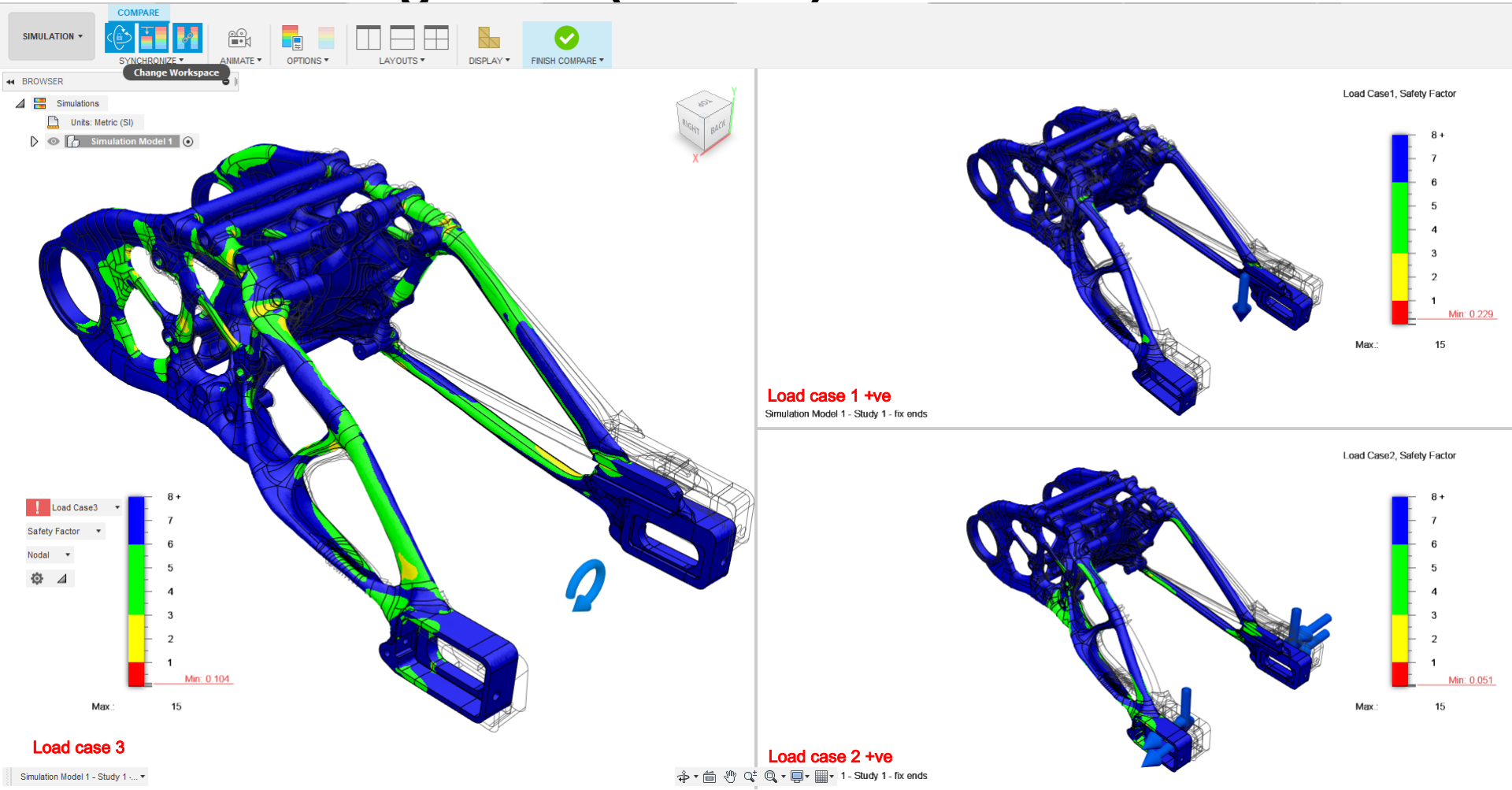
Generative Design outcomes

Design performance comparisons

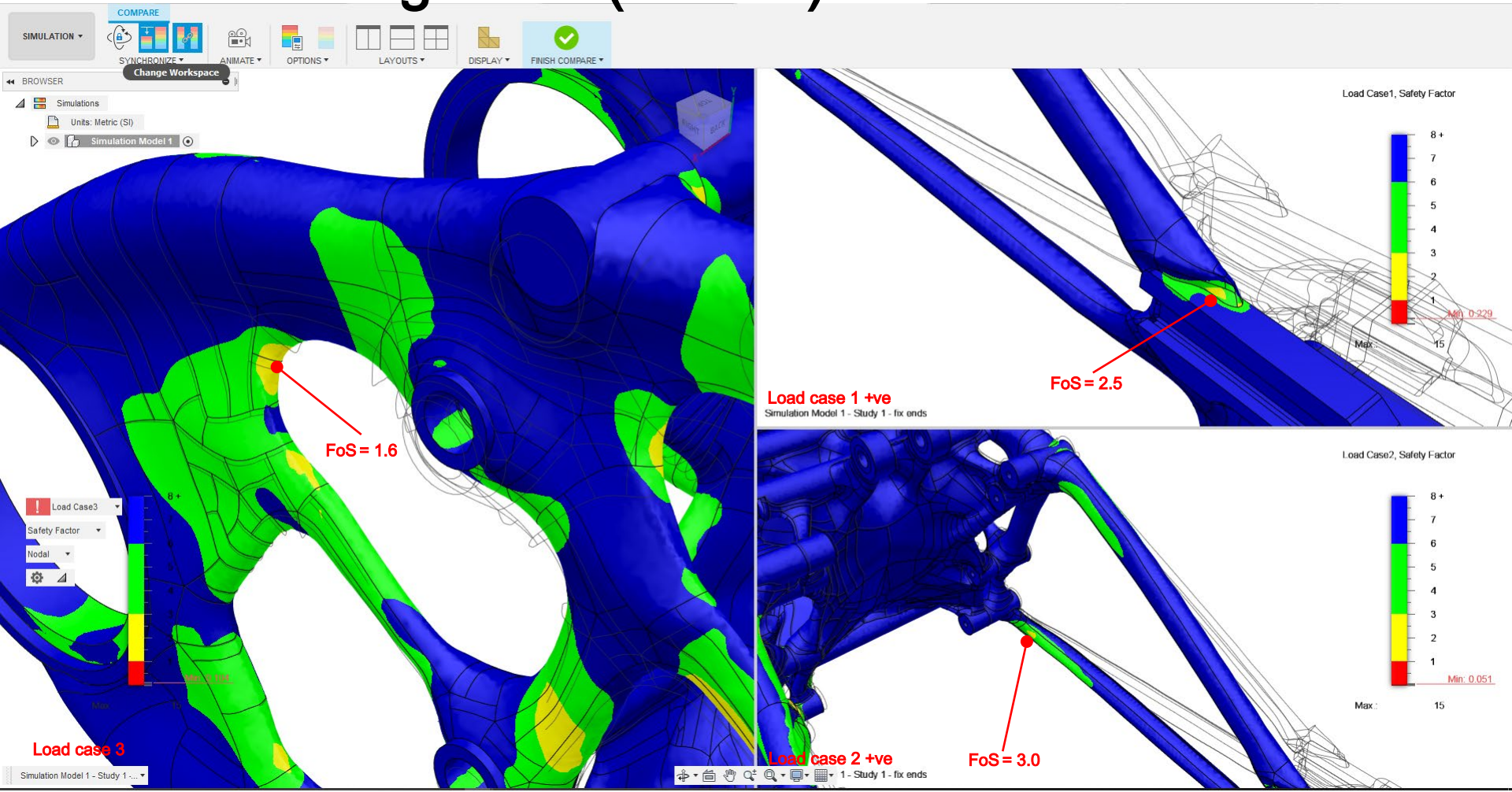
Current Design	GD (2018)	GD (2021)
		
Aluminium Alloy	Magnesium Alloy	Aluminium Alloy
Die Casting	Investment Casting	3 Axis Milling
$	$$$	$$
7.43 kg	4.58 kg	6.87 kg
	38% mass saving	8% mass saving

Using Fusion 360 simulation to verify the Swingarm mechanical integrity

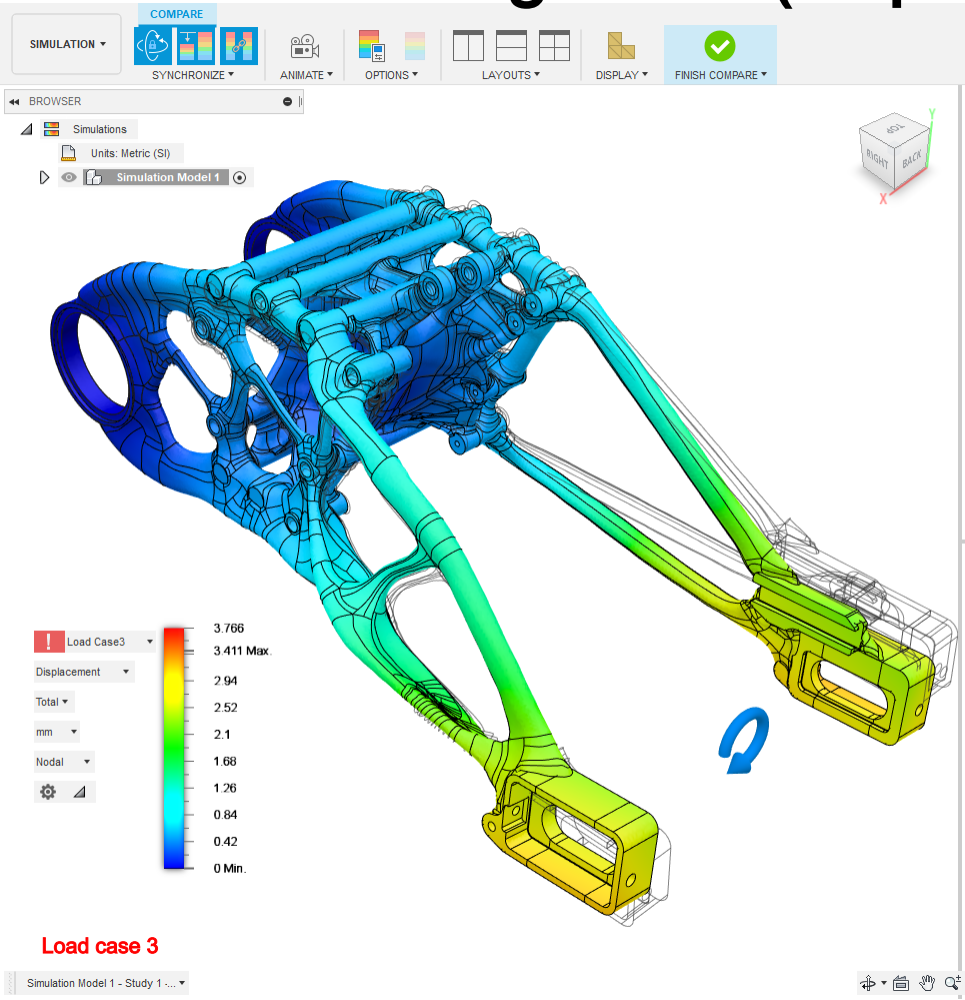
Result investigations (FoS)

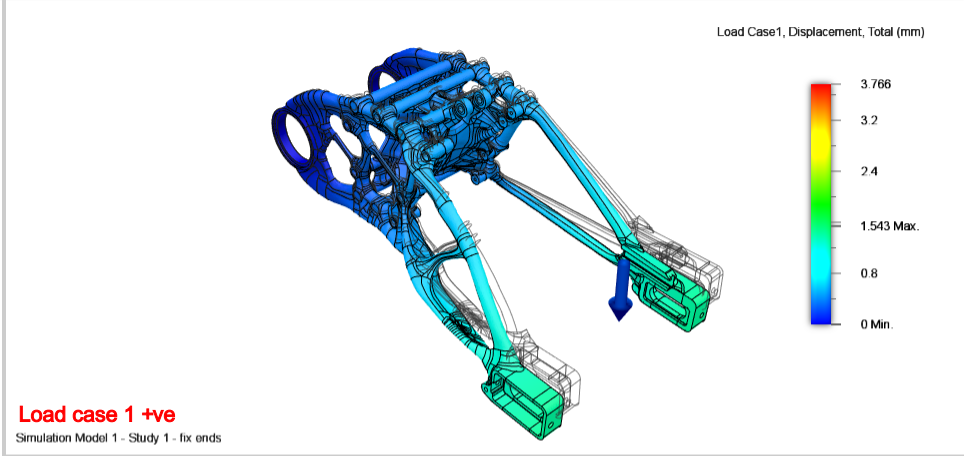


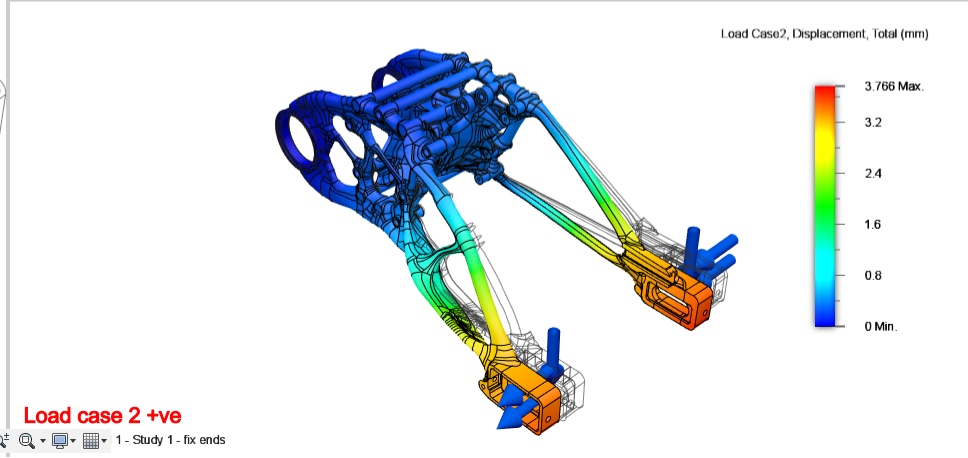
Result investigations (FoS)



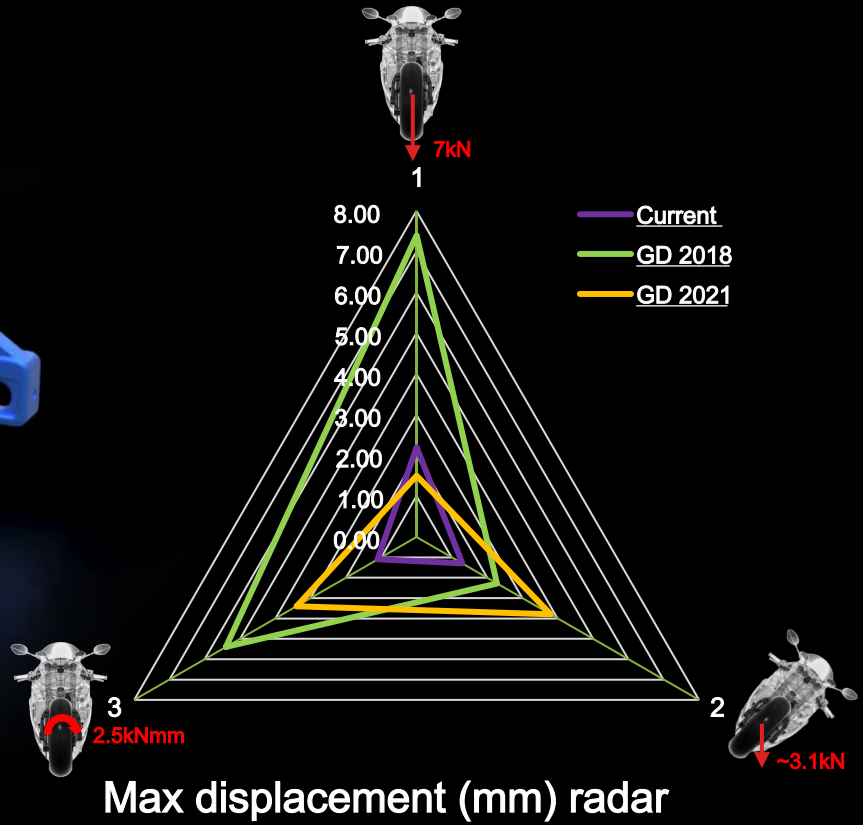
Result investigations (displacement)





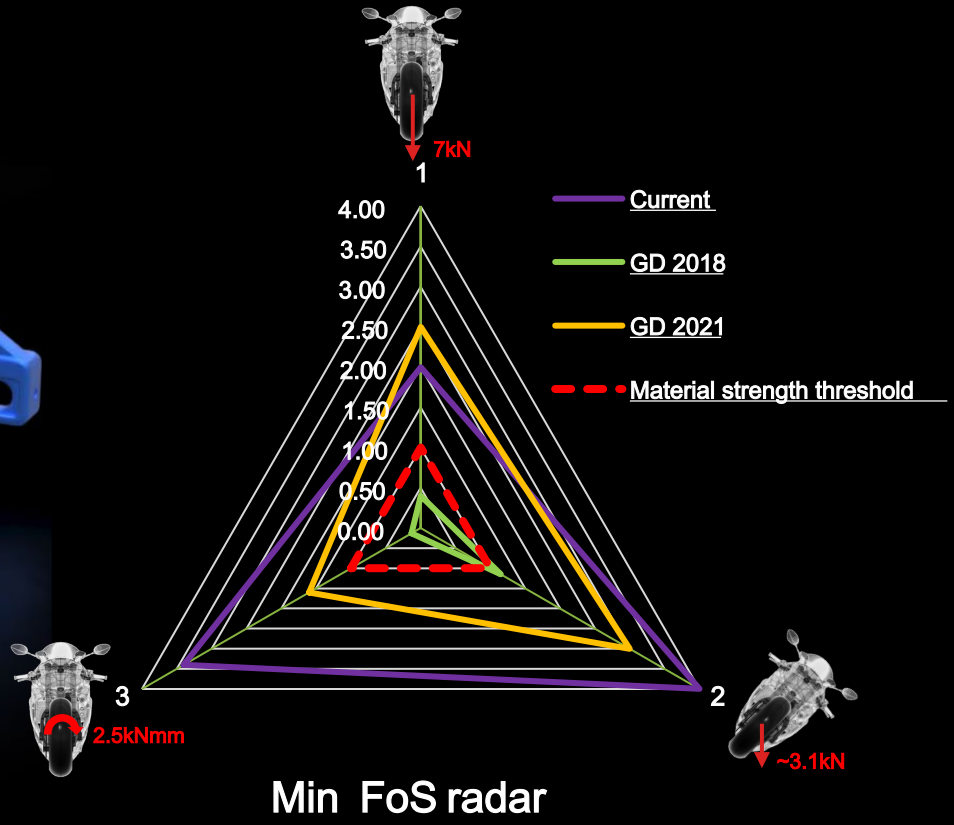


Design performance comparisons



Max displacement (mm) radar

Design performance comparisons



Min FoS radar

Key takeaways & next steps

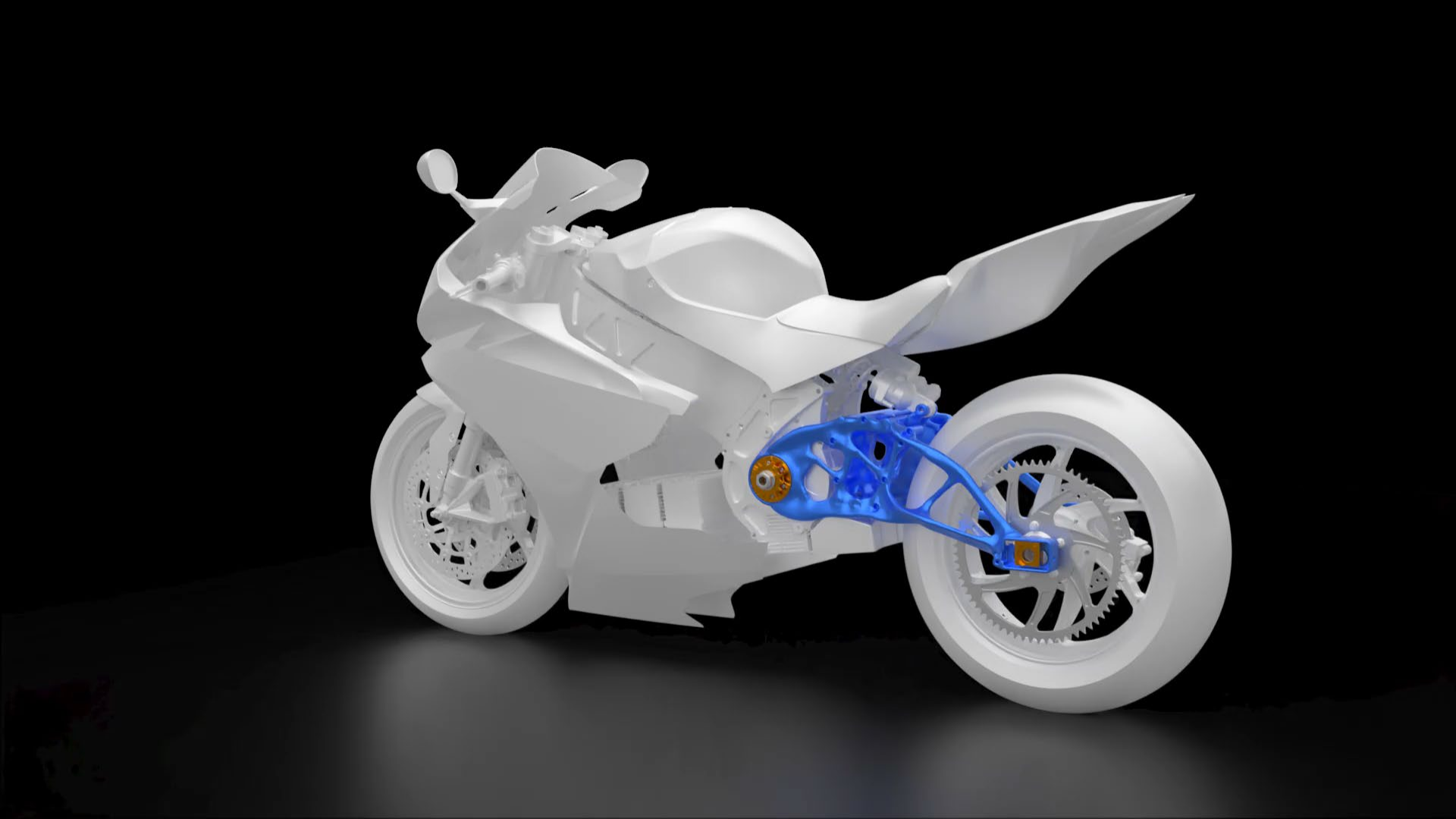
Key takeaways

What have we learnt?

Constant advancements in Generative Design reimagine what we can achieve

Collaboration within Fusion 360 invaluable in this remote working age

Fusion 360's ability to complete each step of Design – Validation cycle invaluable



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