



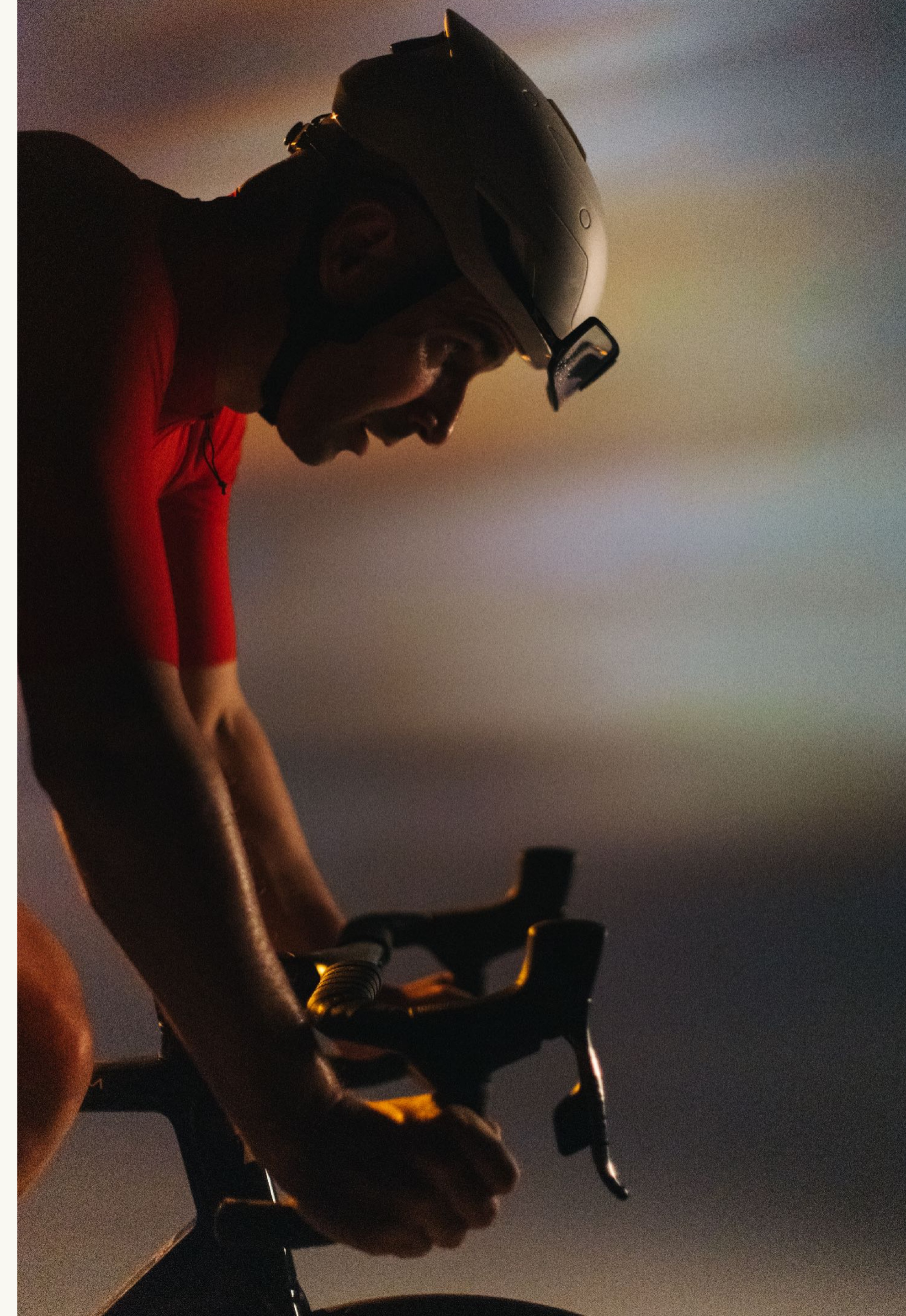
NEW PRODUCT MEDIA WEBINAR – 26 JUNE, 2023

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WE ARE FACTOR BIKES

- Introductions
 - Rob Gitelis - Founder & CEO
 - Calvin Chan - Chief Operating Officer
 - Graham Shrive - Director of Engineering
- Born from a history of world class manufacturing across the industry
- Global brand and ridership
- Proven range across road/gravel/mountain - competing at the highest levels
- Unique approach to design & manufacturing - with key benefits for the customer
- A challenger mindset



BLACK INC

- Using the best materials, craftsmanship and engineering, we strive to create the highest level of wheels and components
- Black Inc products are engineered to perform at the highest level. Our product line only has one level: the highest
- We believe product testing doesn't end in the factory under controlled conditions. Real-life and hard work cannot be imitated
- Working with world-class athletes allows us to not only prove our products in the factory
- New 28//33 wheelset developed specifically for Factor's new bike to save weight and drag



BLACK INC



ANALYSING THE CLIMBING BIKE COMPETITIVE LANDSCAPE



We observe that the market for climbing bikes has further segmented into two distinct sub-categories:

1. MIXED Climbing



- 850-950g+ weight range
- Hidden cables
- Some aero tube profiles
- Hidden seat post clamps

The mixed climbing sub-category is beginning to mature, with diminishing innovation and increasingly homogenous designs and features

2. PURE Climbing



- Sub-700g weight range
- Little to no cable integration
- Predominantly round tube profiles
- External seat post clamps

The pure climbing sub-category has cooled over the years, despite the relative success of a few remaining products in this sub-category

FACTOR 02 : A CONSTANT EVOLUTION



2017 02

- Landmark lightweight & stiffness
- Ultra-thin seat stays for compliance



2019 02 VAM

- Sub-700g frame + WorldTour ruggedness
- Disc brake-equipped climbing bike



2021 02 VAM

- Full internal cabling (i.e. no drilling)
- D-shaped steerer tube

- 2017 TdF podium
- 2018 Paris-Roubaix podium
- 2018 Strade Bianchi podium
- 2018 World Championships podium

- 2019 TdF mountains classification winner
- 2019 LBL Femmes podium
- 2020 La Flèche Wallonne Féminine podium
- 2020 La Course by Le Tour de France

- 2020 Omloop van het Hageland winner
- 2022 TdF Femmes youth classification podium
- 2022 TdF Femmes climbers jersey

WHAT COMES NEXT?

We asked IPT riders for the barriers precluding them from racing on the O2 VAM more often :

- Not aero enough for descents and flats
- Not as stiff as OSTRO VAM



How do we address this?

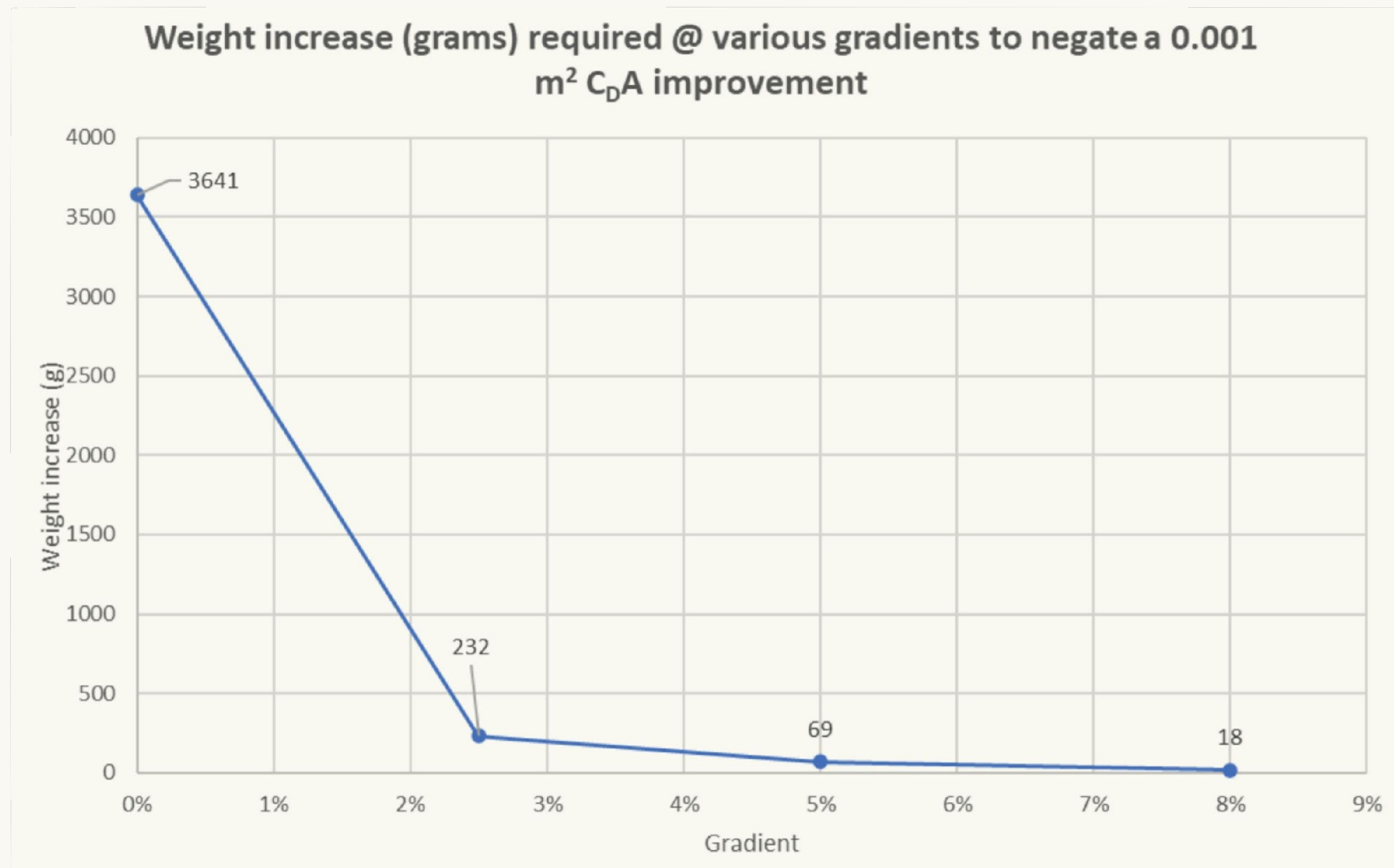


Leverage new rule changes, new technologies, and new production techniques:

- Test the limits of new UCI rules to develop radical new tube shapes
- Apply lessons learnt from OSTRO VAM and OSTRO Gravel to optimize aerodynamics for real-world relevant speeds (e.g. Unbound vs. TdF sprint vs. Ventoux)
- Utilize cutting edge production techniques to redefine the industry-perceived compromise between lightweight and stiffness/aero
- Challenge industry norms by building carbon frame production facility on-site at Factor's R&D offices to achieve never-heard-of prototyping/testing/revision cycles

SHIFTING THE TIPPING POINT

FACTOR



(0.001m² equals approx. 0.5% of system total drag)



RIDER VALIDATION AND TESTING

FAC
TOR





INTRODUCING THE NEW O2 VAM

THE NEW 02 VAM



THE WORLD'S FASTEST CLIMBING BIKE

FACTOR

THE NEW **02** V · ^ · M



Radical seat tube and top tube design concept to enhance in-plane compliance for comfort and energy dissipation

External seat post design eliminate need for wedge-style clamp

Revised fit and go-fast-anywhere geometry

Tapered head tube featuring OSTRO steerer system for maximum aero + stiffness

Aero optimized tube shapes inspired by OSTRO VAM and OSTRO Gravel

6.8kg race weight (i.e. with pedals, transponder, race number)

Combination of exotic pitch and pan fibers including T1000, M60J and TeXtreme®

All-new Black Inc 28//33 aero climbing wheelset

OSTRO VAM matching stiffness characteristics

Truncated NACA profile Seatstays @ UCI minimum 1cm

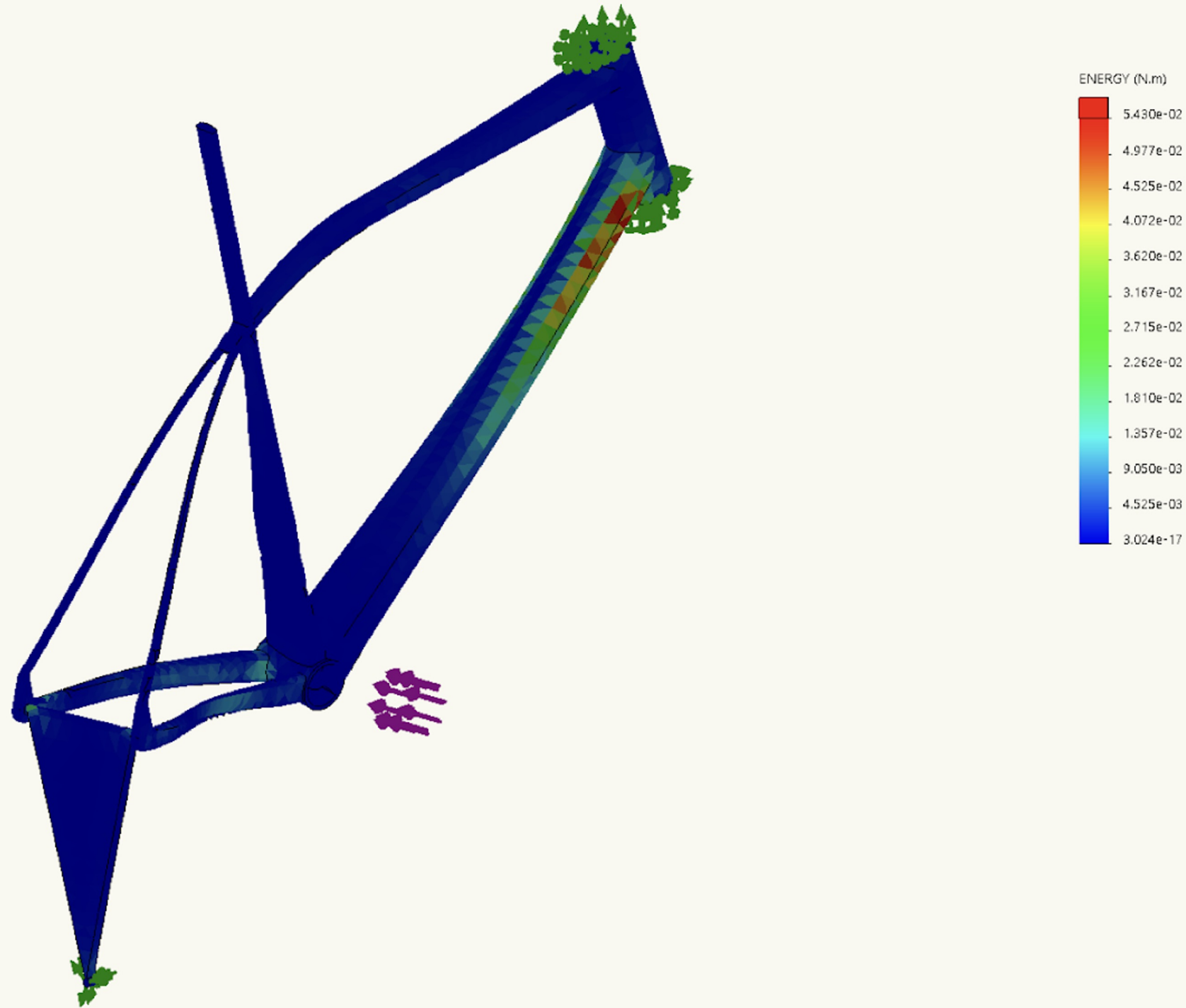
THE ENGINEERING AND DESIGN TOOLKIT

- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)
- Applied optimization techniques
- Industrial design
- Wind tunnel testing
- In-house layup iteration and prototyping capacity
- Team feedback & ride-testing



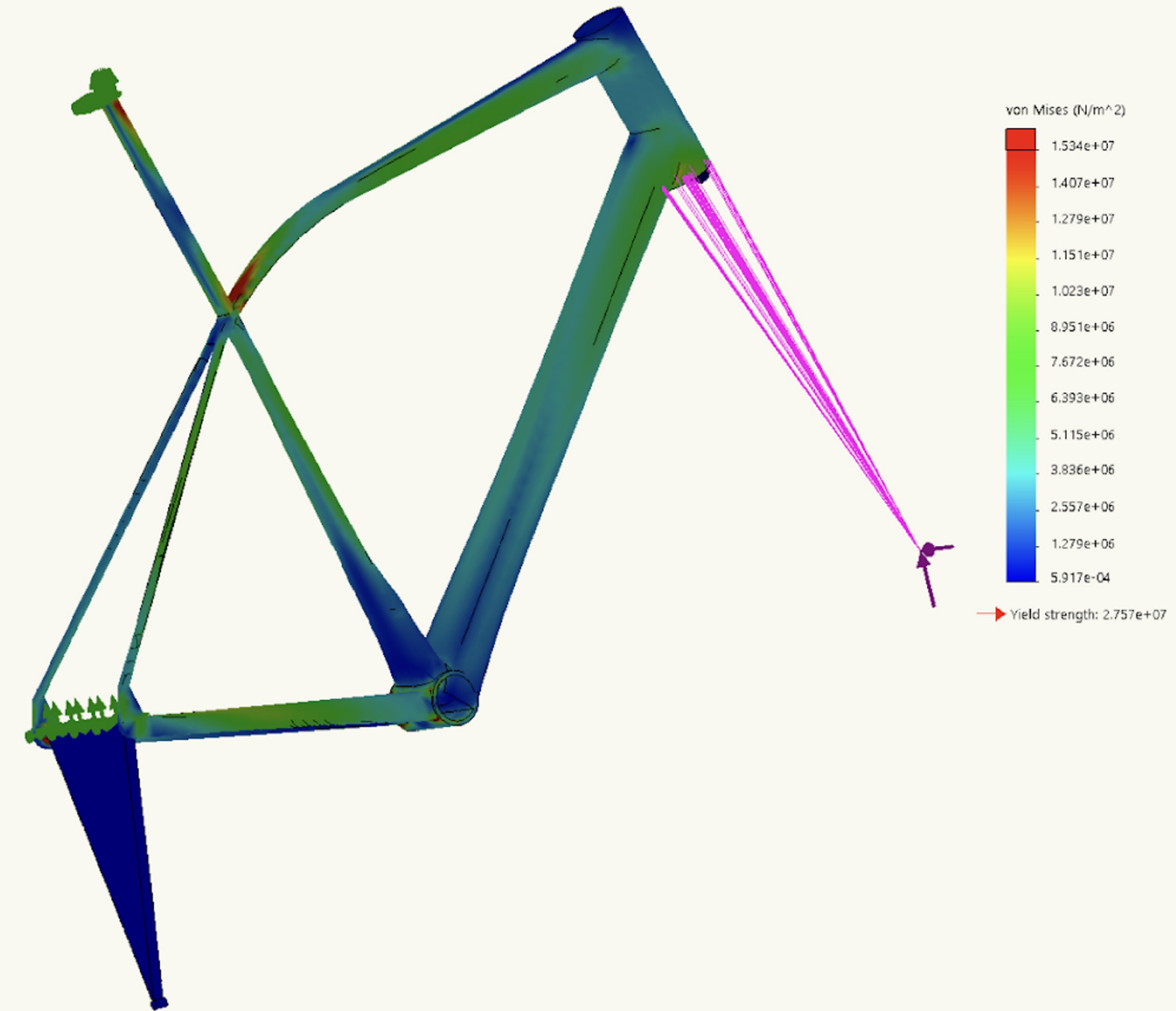
THE ENGINEERING AND DESIGN TOOLKIT

FEA FOR RAPID CONCEPT EXPLORATION



BB LOAD CASE:

- Stress distributed down the downtube and in the chain stays
- Little/no stress on top of top tube
- Strain energy highly concentrated at lower bearing seat
- Very little stress or strain being taken by top tube or ST

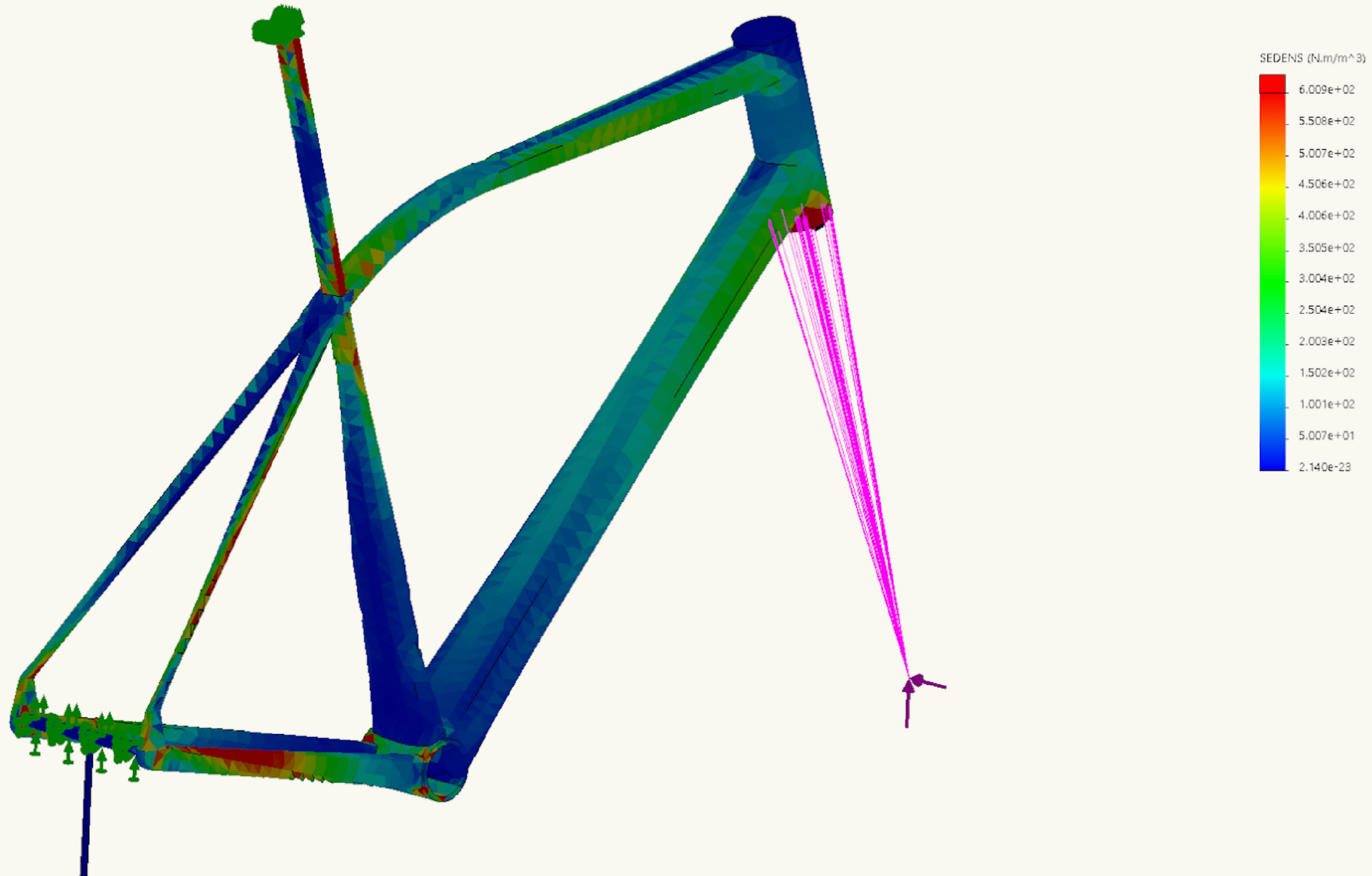


TORSION CASE:

- Stress focused on DT and TT again
- Appears to be better distributed with a smaller TT, working the DT more
- Again, very little stress on top of top tube

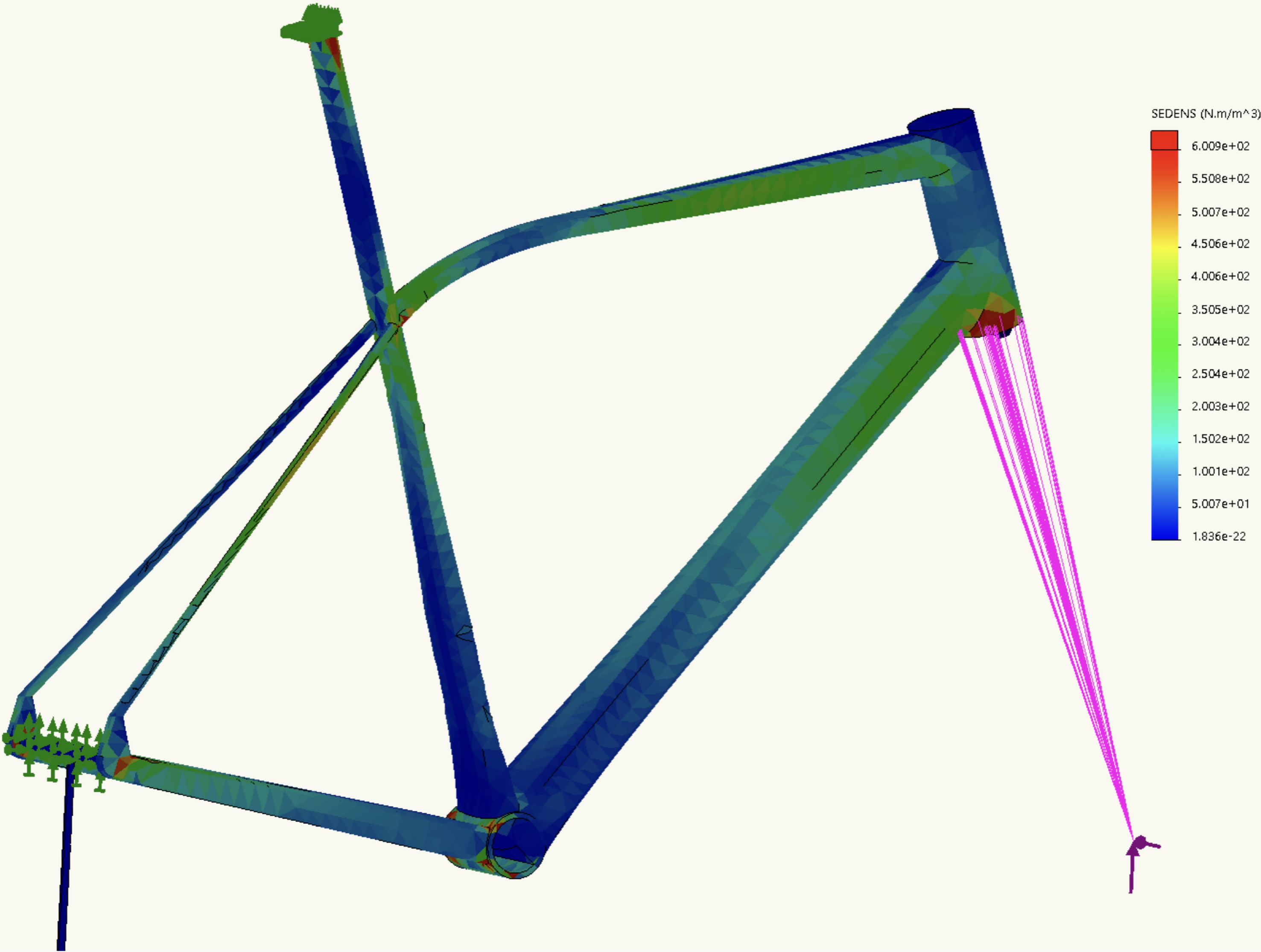
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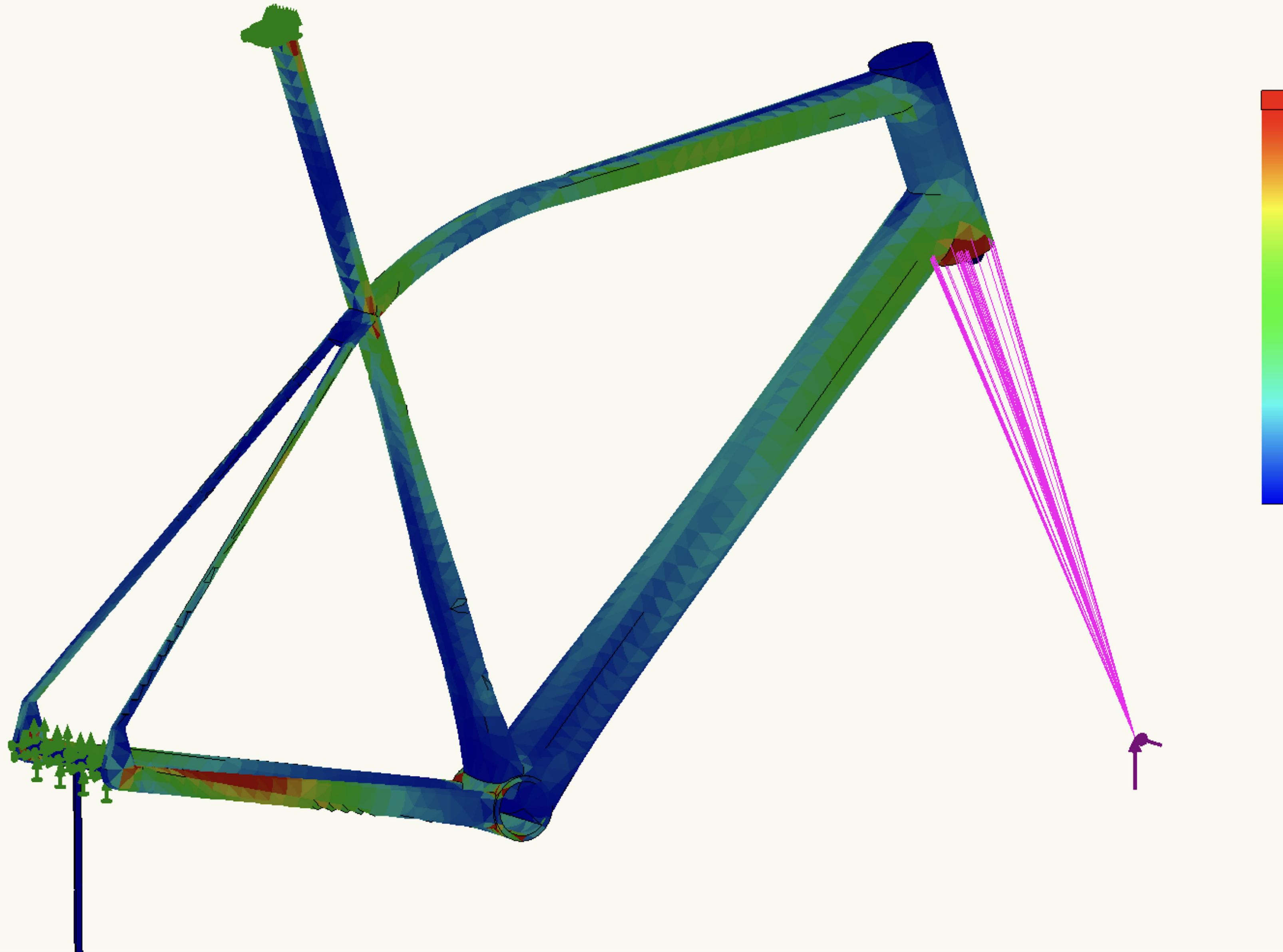
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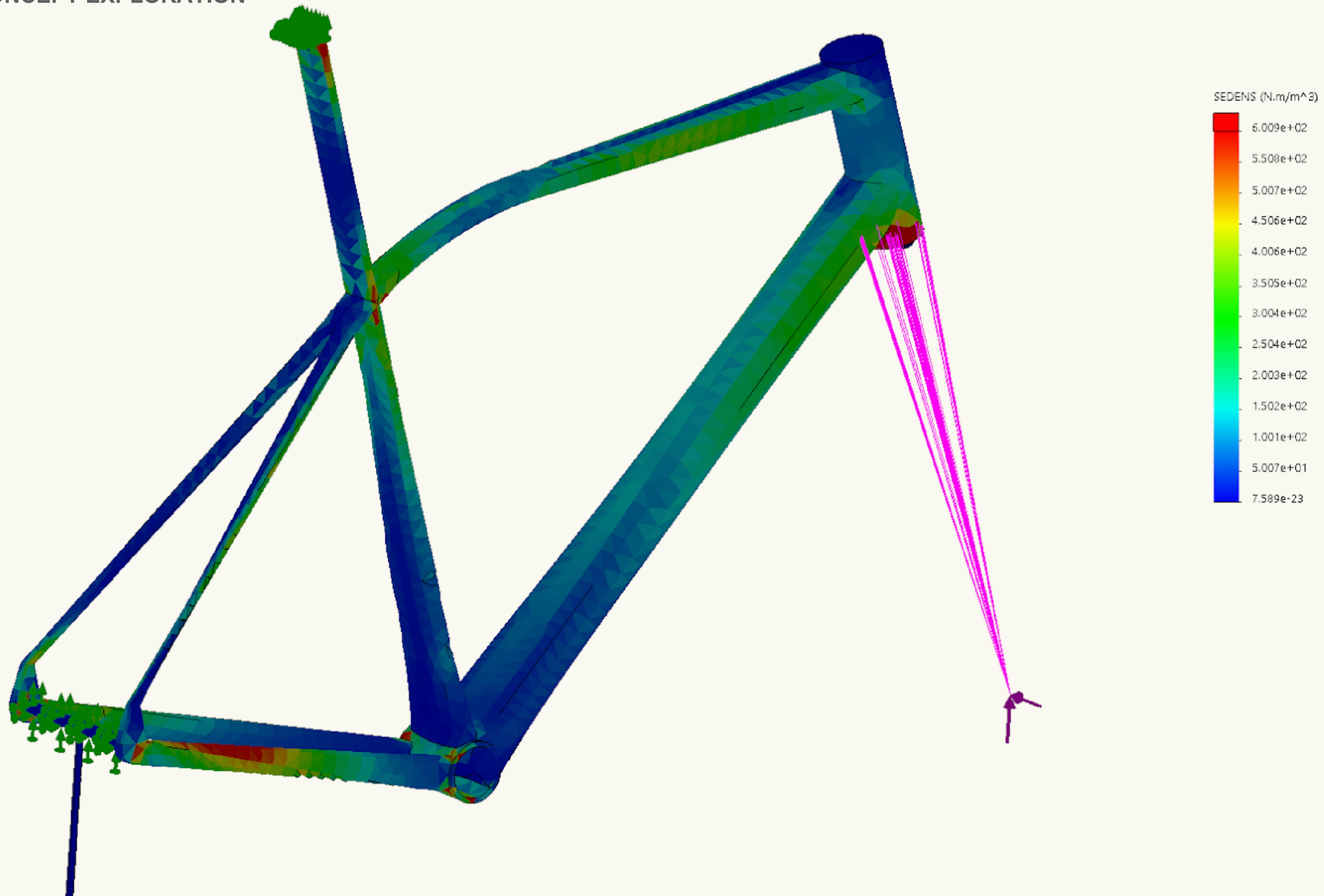
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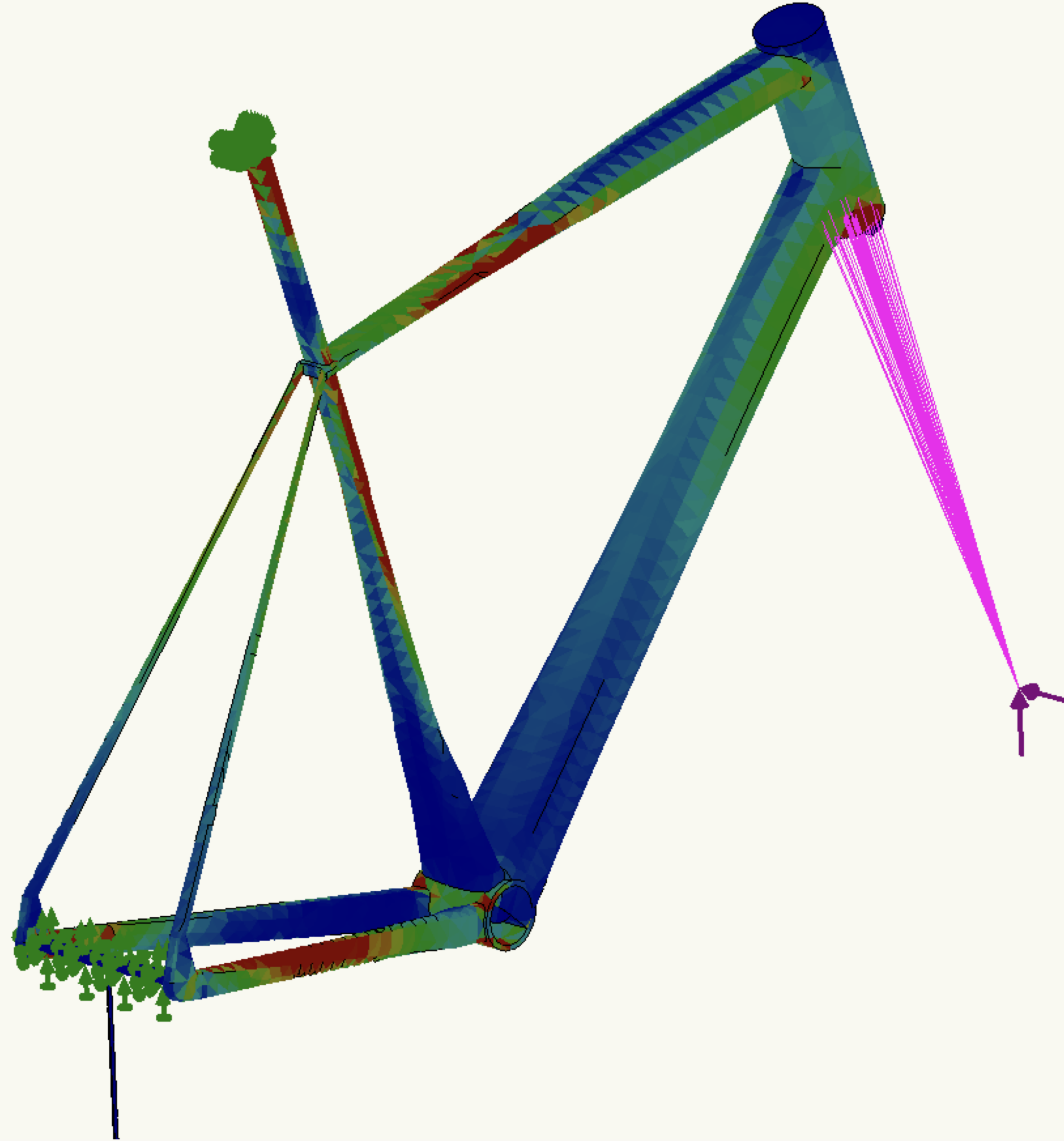
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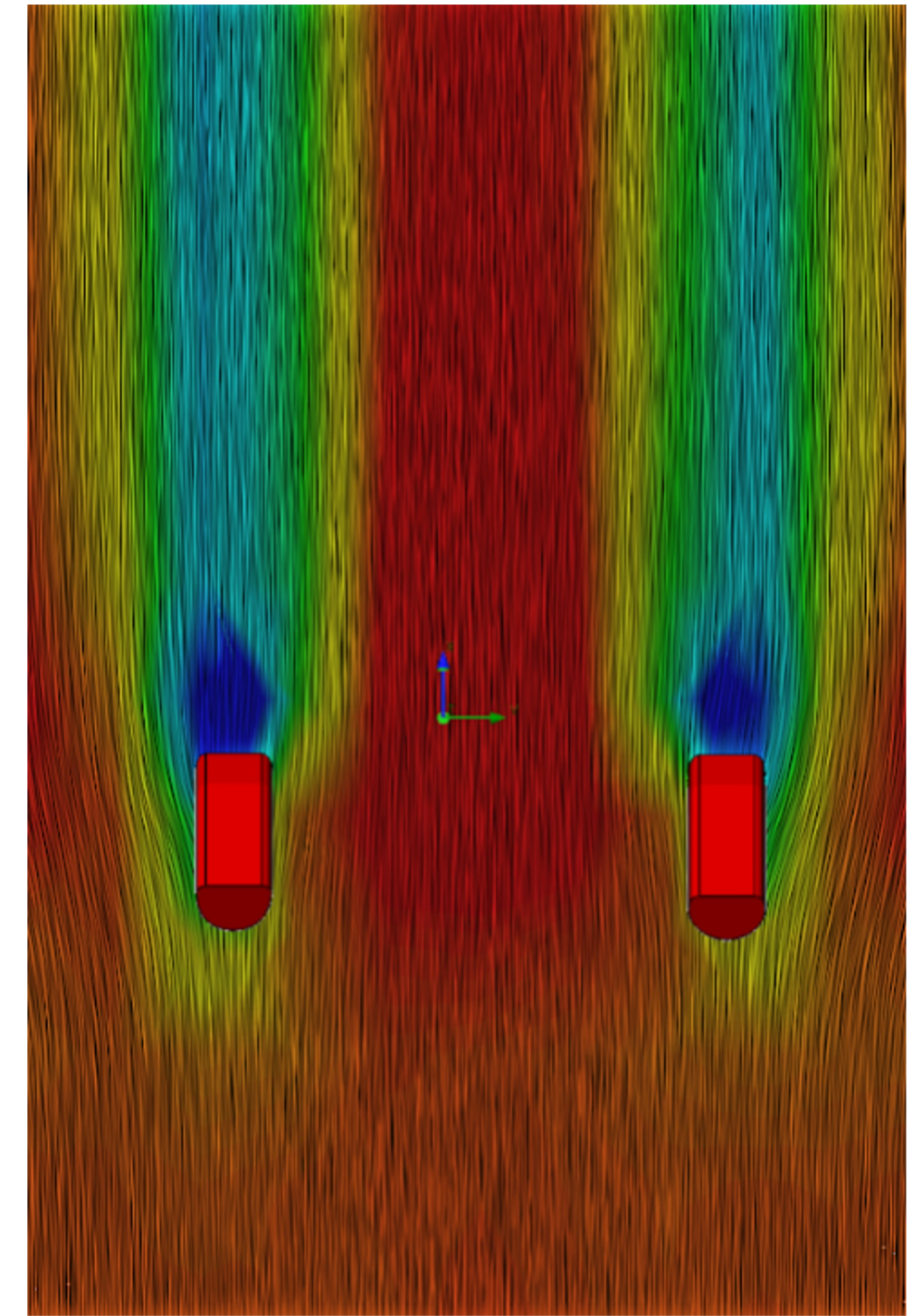
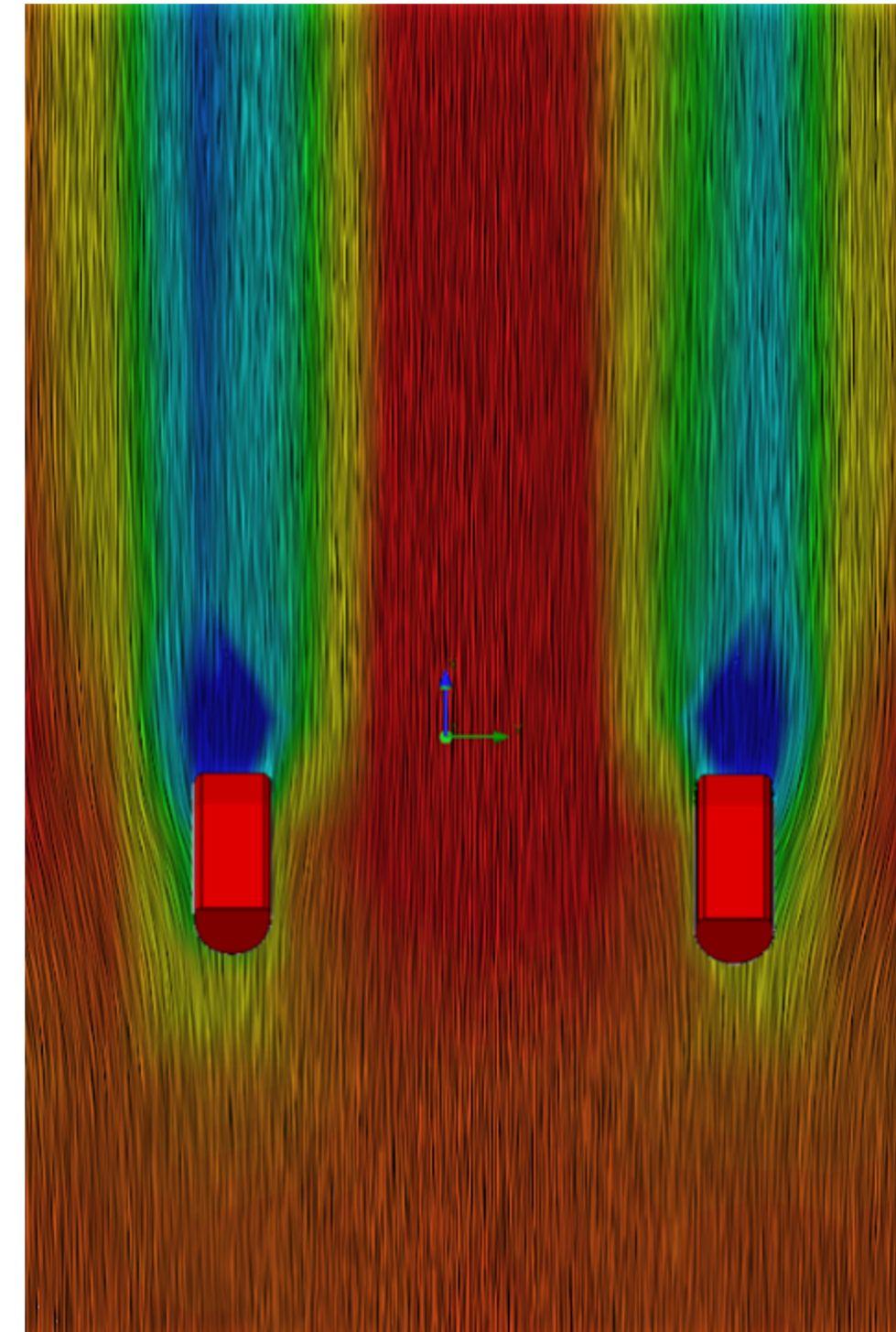
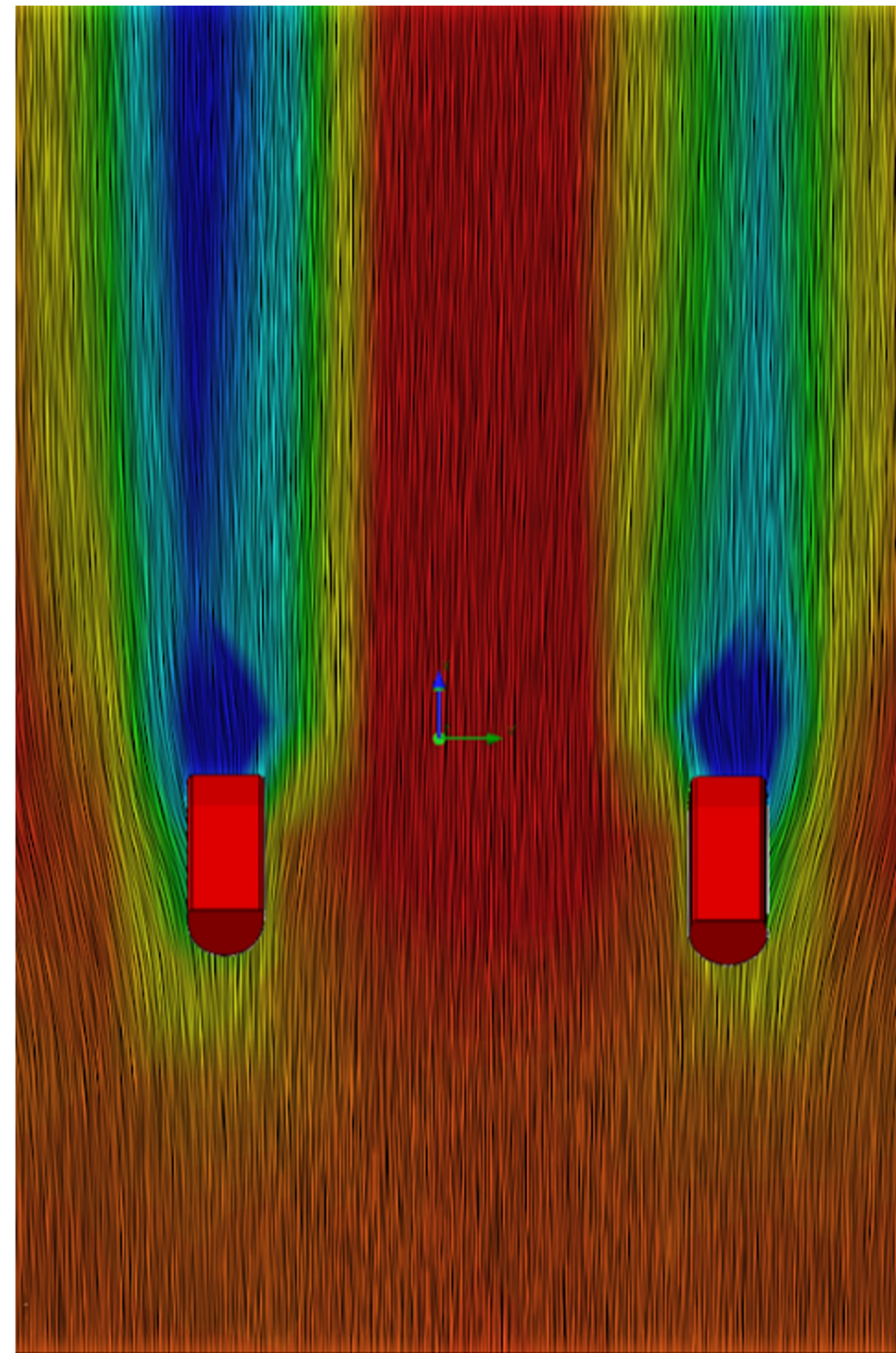
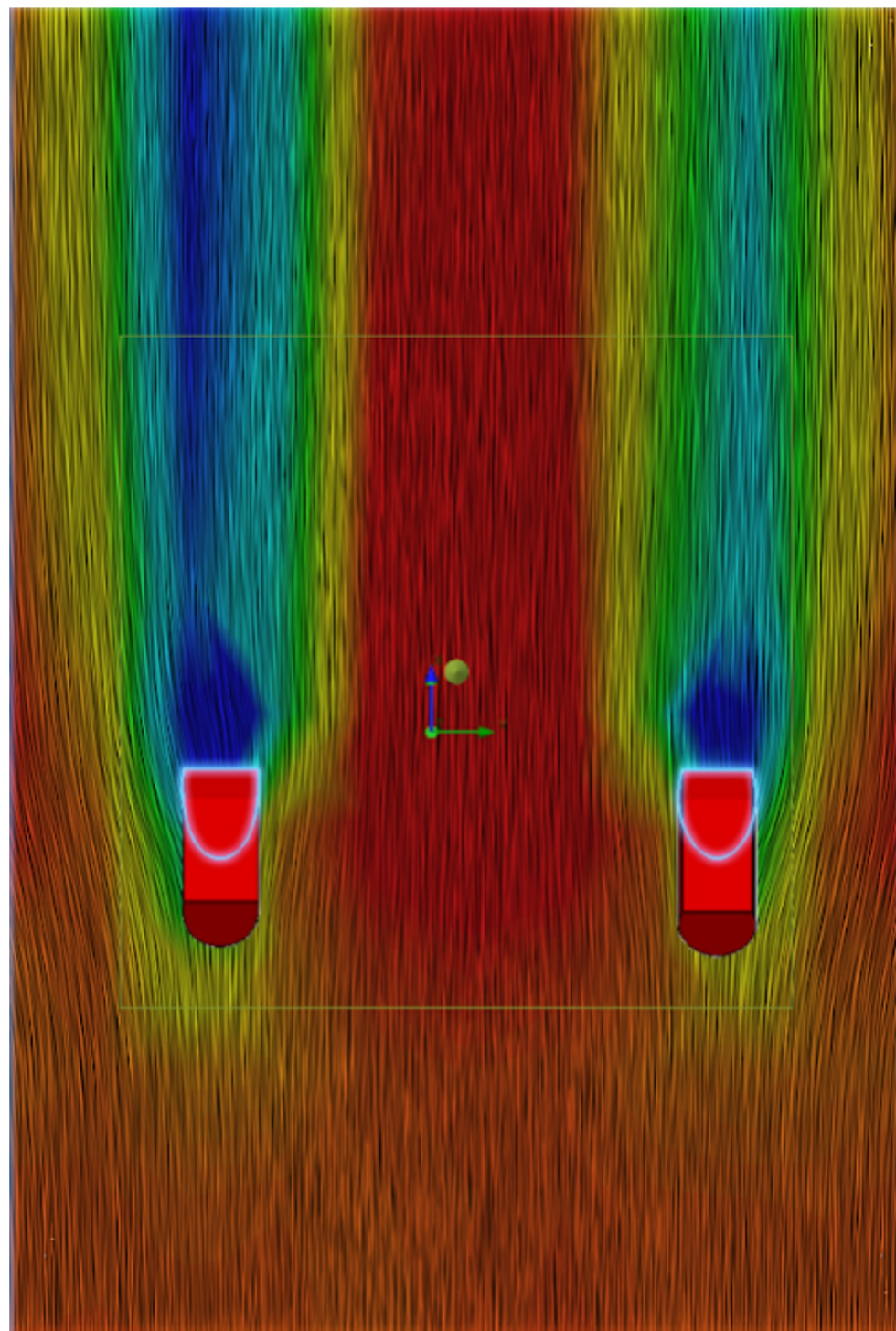
FEA FOR RAPID CONCEPT EXPLORATION



THE ENGINEERING AND DESIGN TOOLKIT

CUTTING EDGE CLOUD BASED CFD

- Recent advances in cloud-based computing had altered the landscape in shocking ways, democratizing access to previously unavailable tools
- The ability to converge multiple uncertain variables has allowed us to include multiple velocities as well as yaw angles in our design process
- Below is a NACA0030 vs an EP864 section shown at various velocities

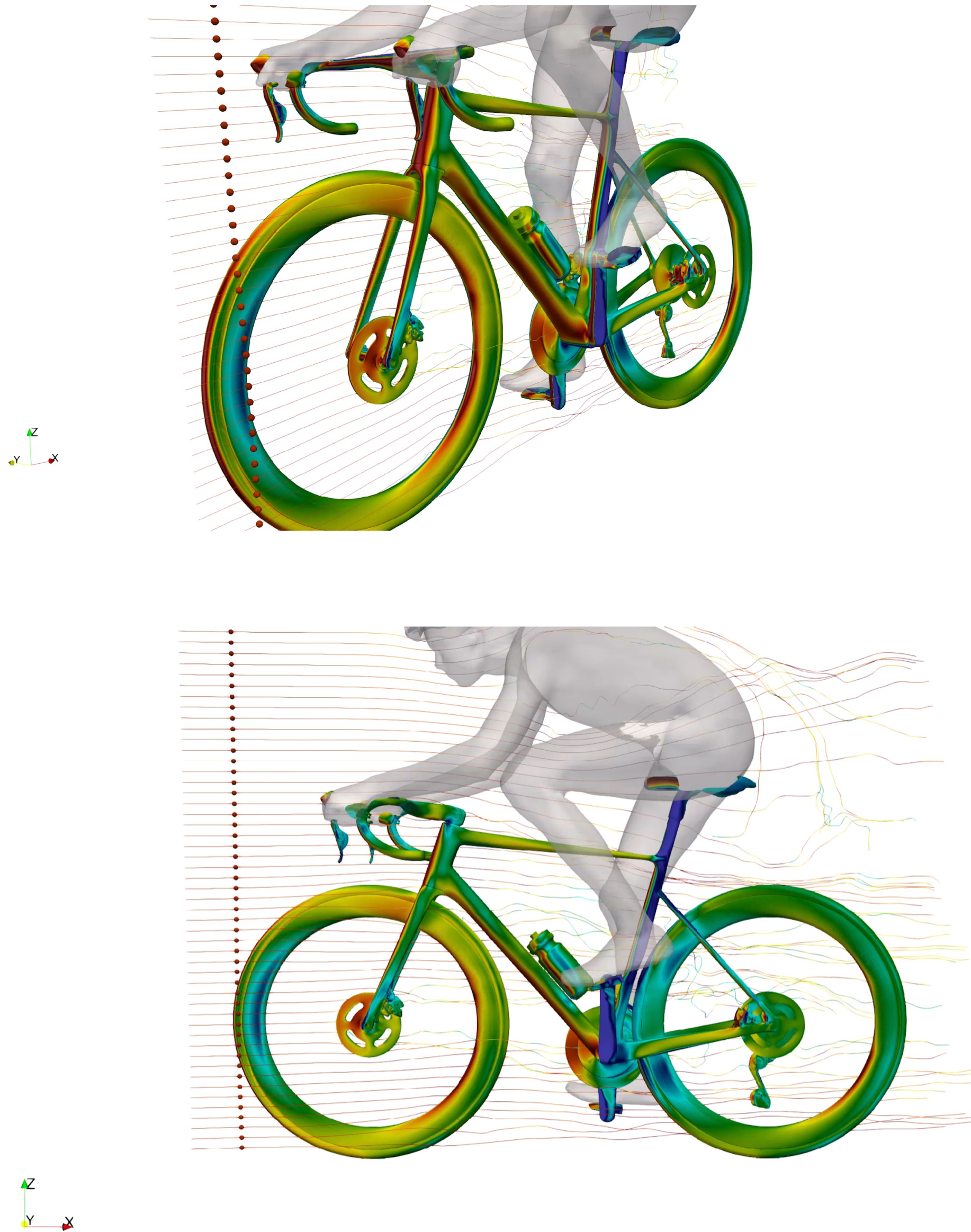
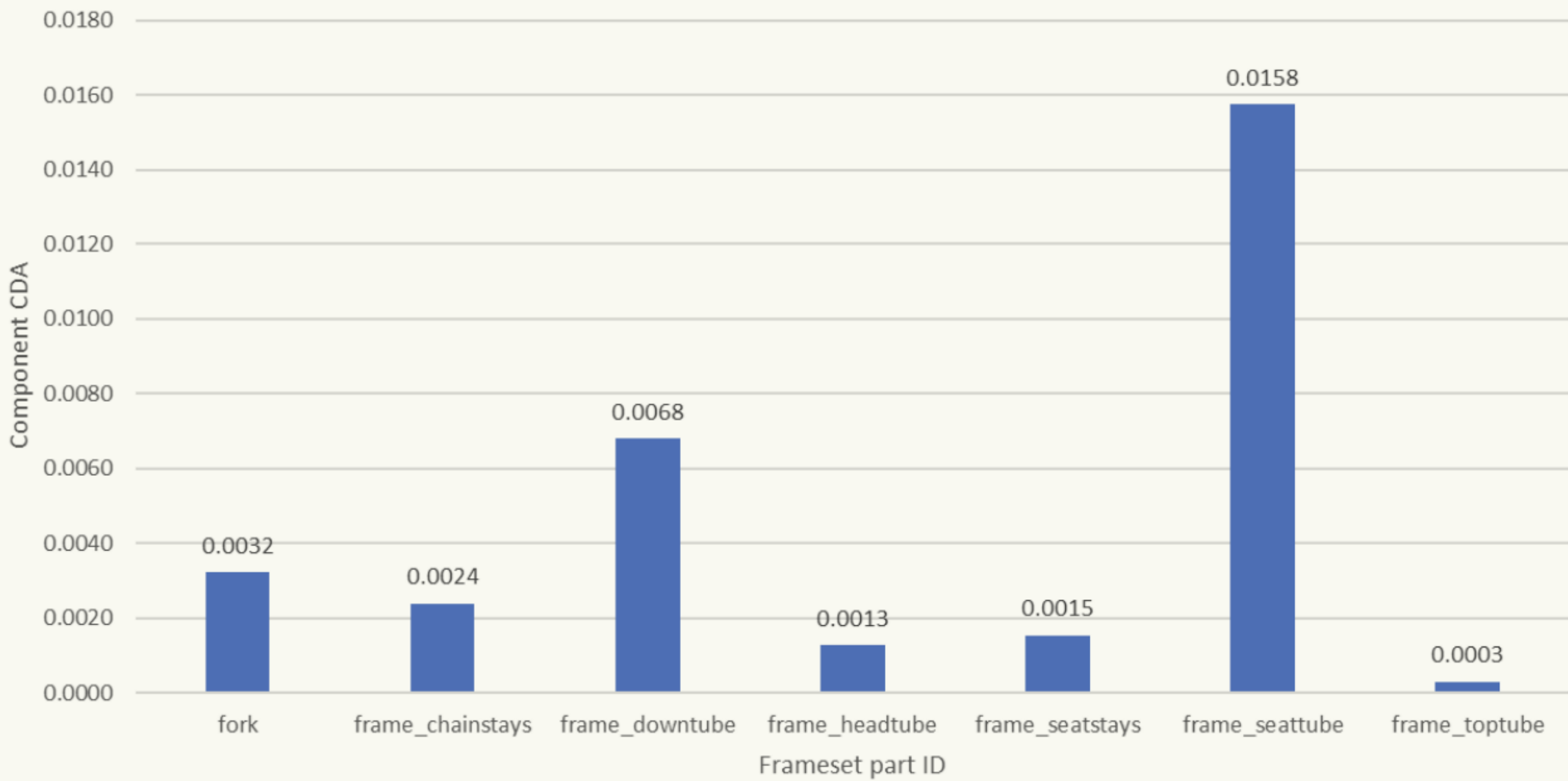


THE ENGINEERING AND DESIGN TOOLKIT

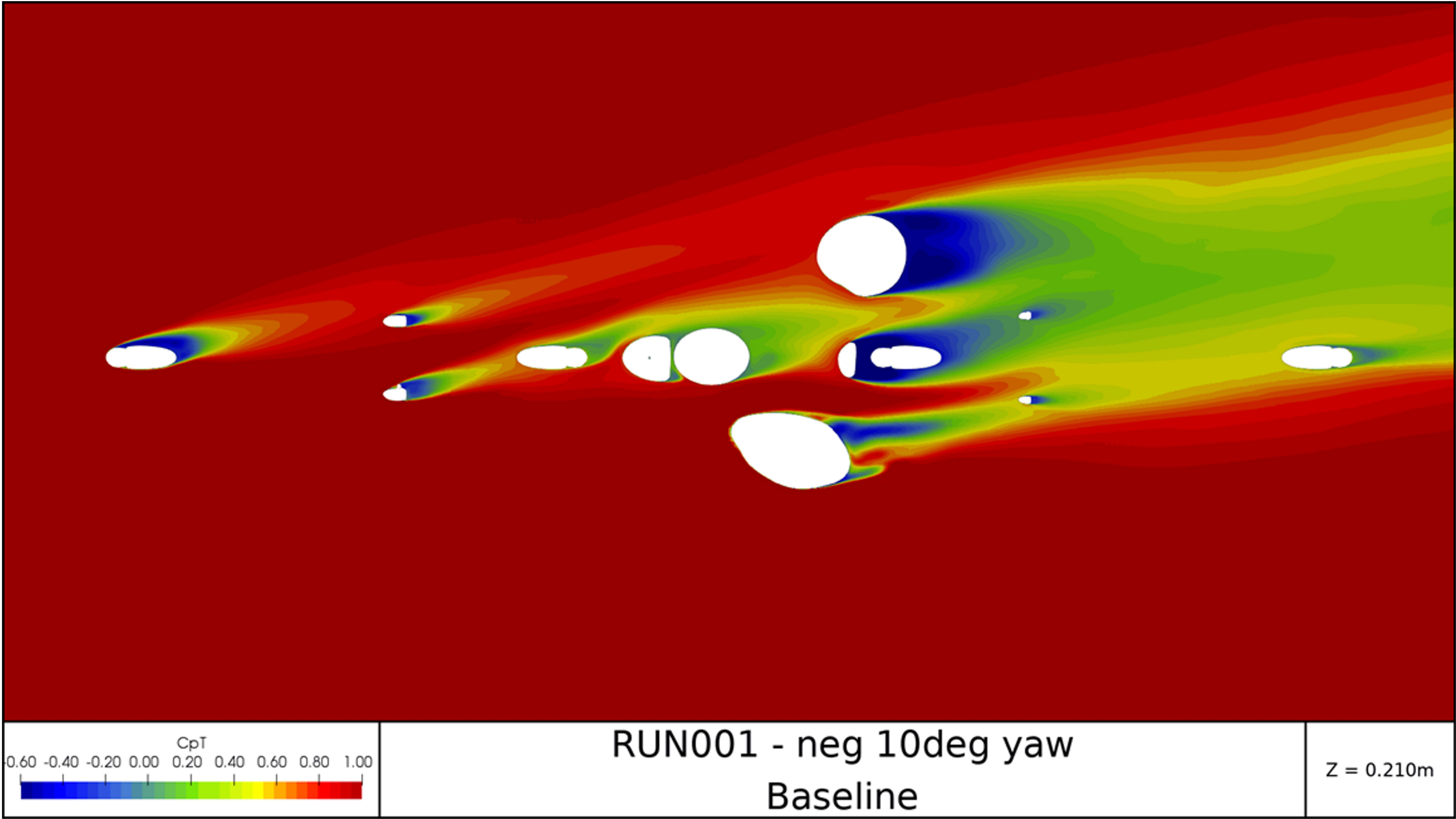
CUTTING EDGE CLOUD BASED CFD

- Rider on CFD allows us to visualize the airflow, and make meaningful changes to the design to influence this
- Adds the capacity to design for interaction effects
- Streamlines and pressure distribution contribute to this understanding
- Discretized frame analysis allows us to isolate tubes and components and focus our design efforts for maximum effect

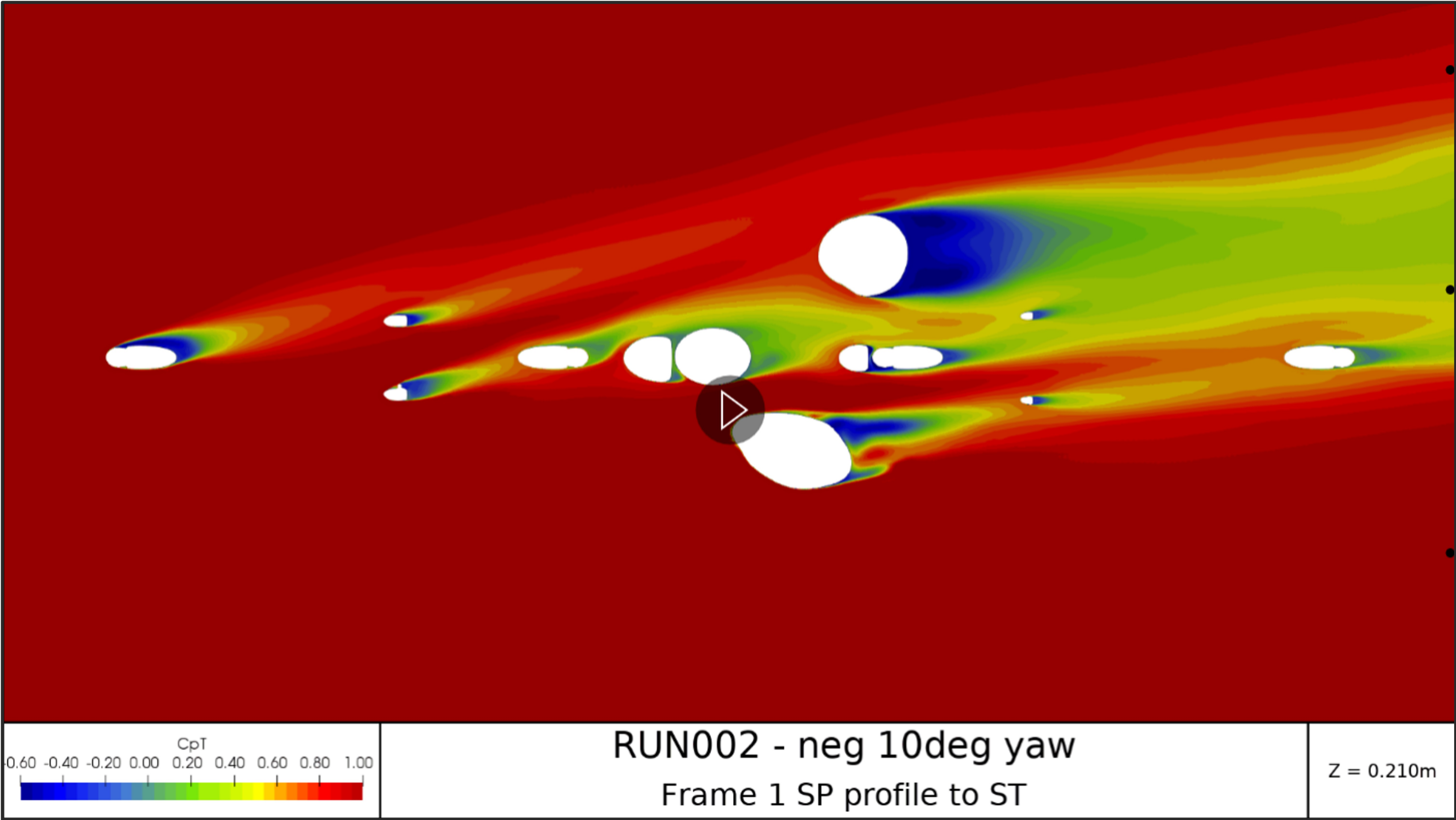
Drag breakdown
FO2 frame and fork



CUTTING EDGE CLOUD BASED CFD

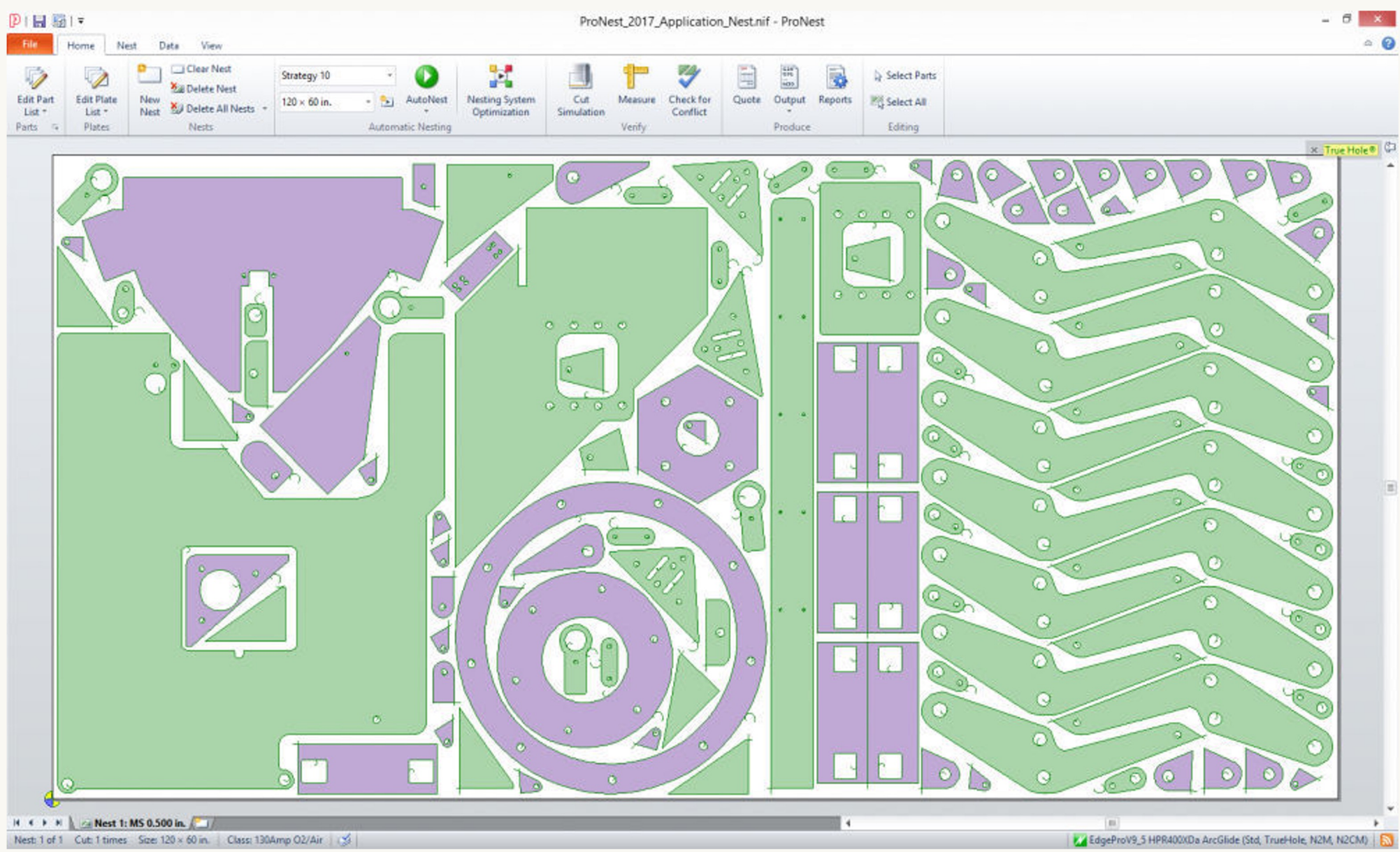


CUTTING EDGE CLOUD BASED CFD



THE ENGINEERING AND DESIGN TOOLKIT

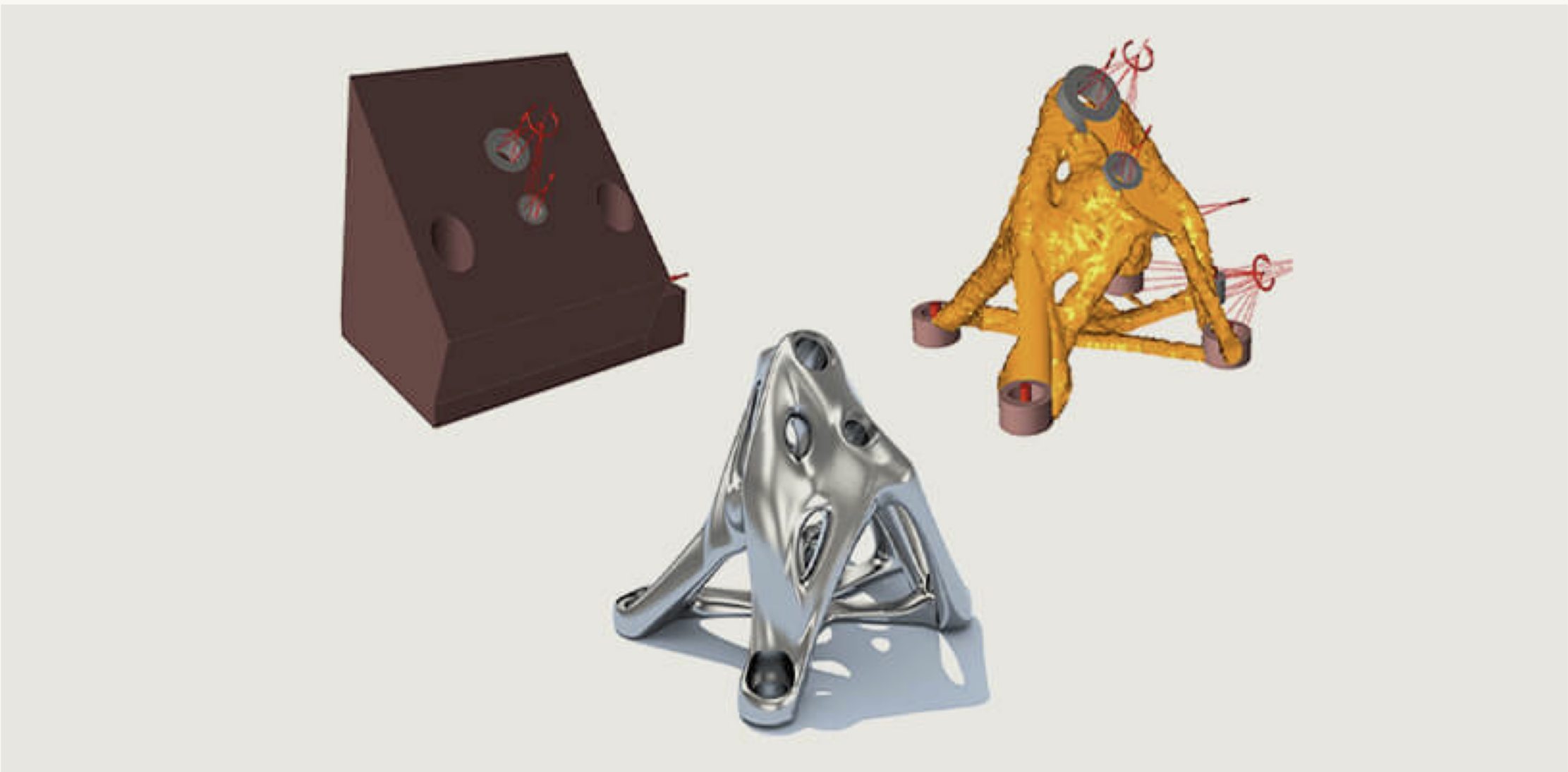
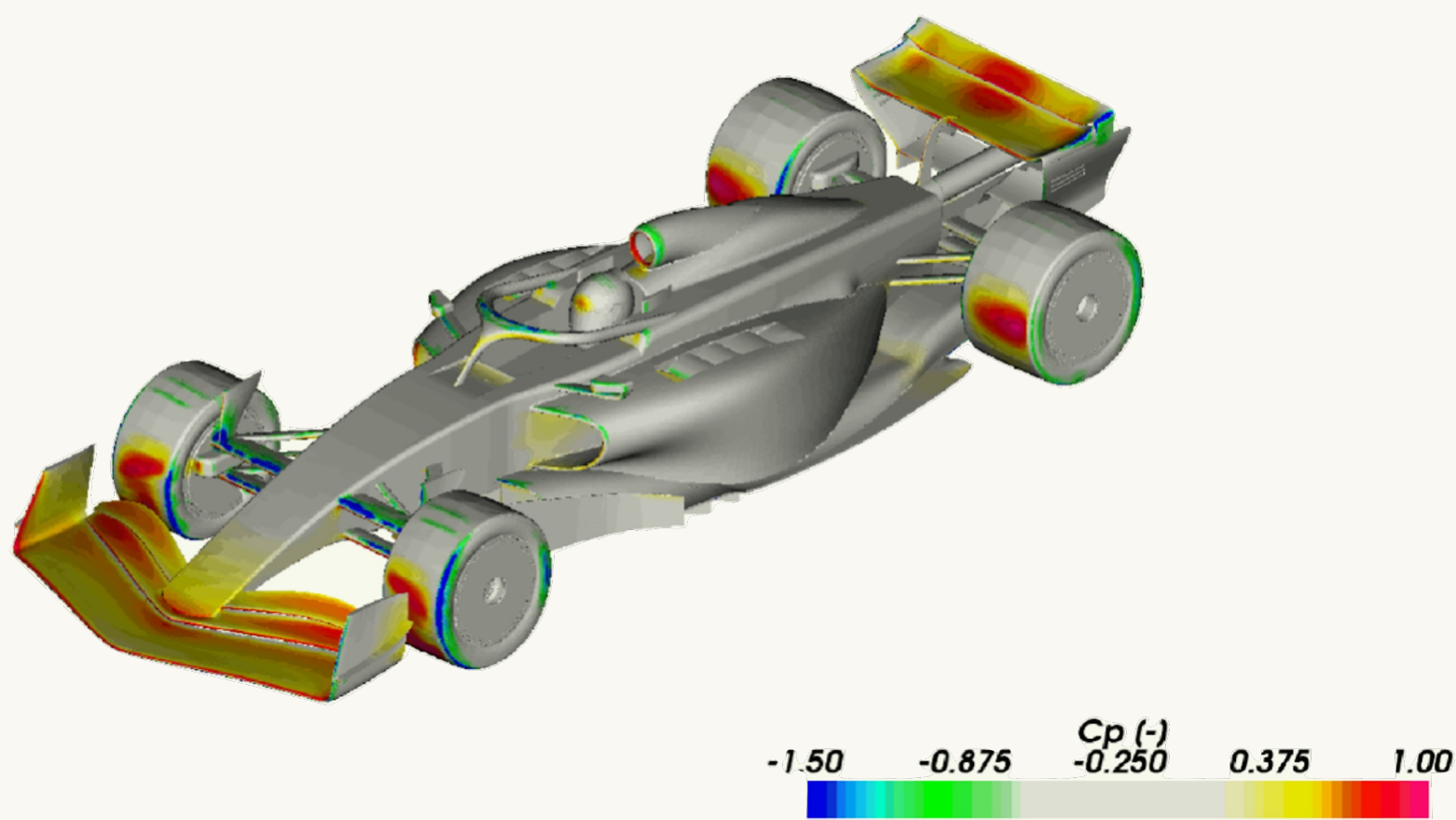
OPTIMIZATION: BRINGING AERO AND STRUCTURAL TOGETHER



MVRC_2022_COTA_CAEdevice_01

OPTIMIZATION TYPES:

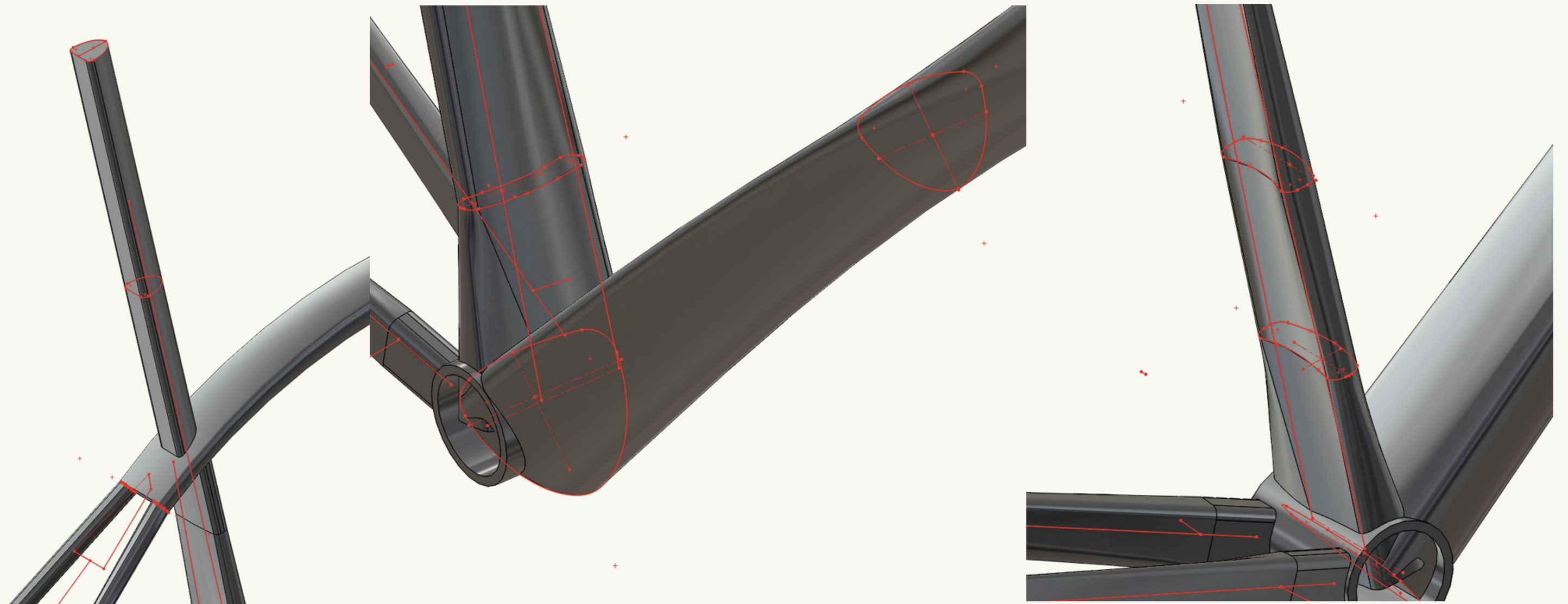
- Patterning/waste reduction
- Multiple aerodynamic elements
- Mass reduction
- Strength improvement



THE ENGINEERING AND DESIGN TOOLKIT

OPTIMIZATION: BRINGING AERO AND STRUCTURAL TOGETHER

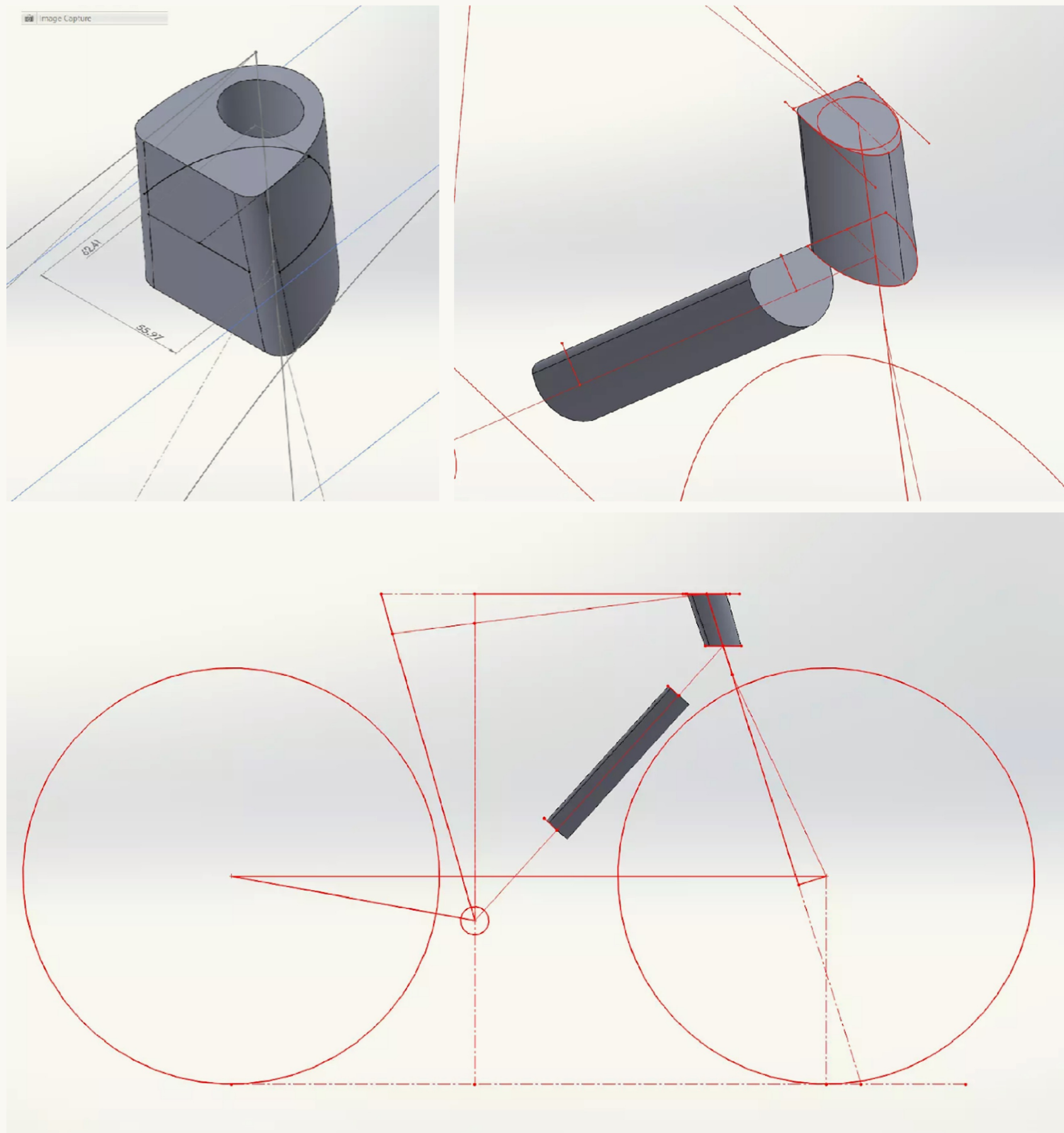
- CFD and FEA generated results were blended where possible to maximize the “best of” properties of both
- ST was targeted for high stiffness with aero performance
- External SP was changed to aero profile
- HT shape was redesigned



THE ENGINEERING AND DESIGN TOOLKIT

INDUSTRIAL DESIGN PHASE

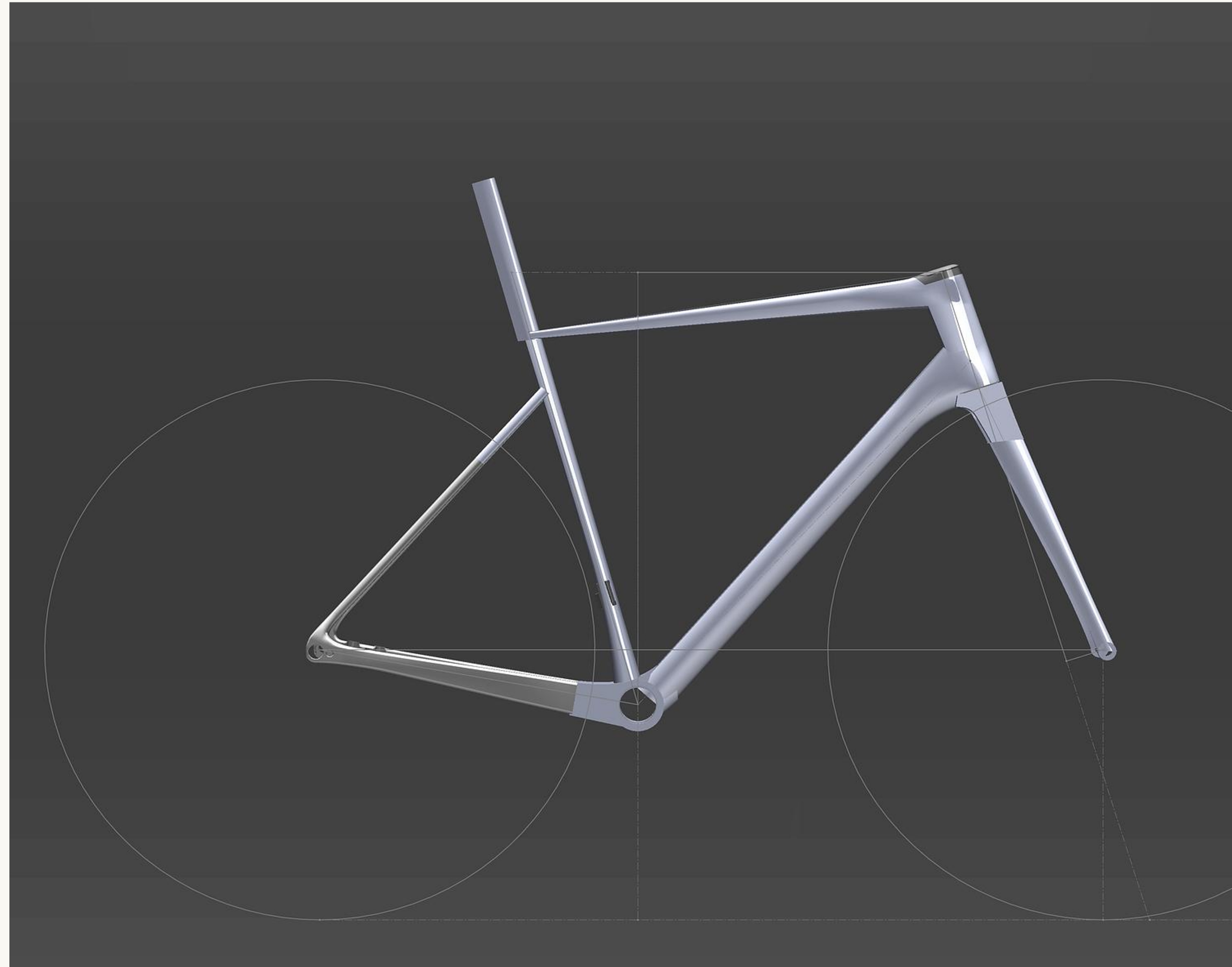
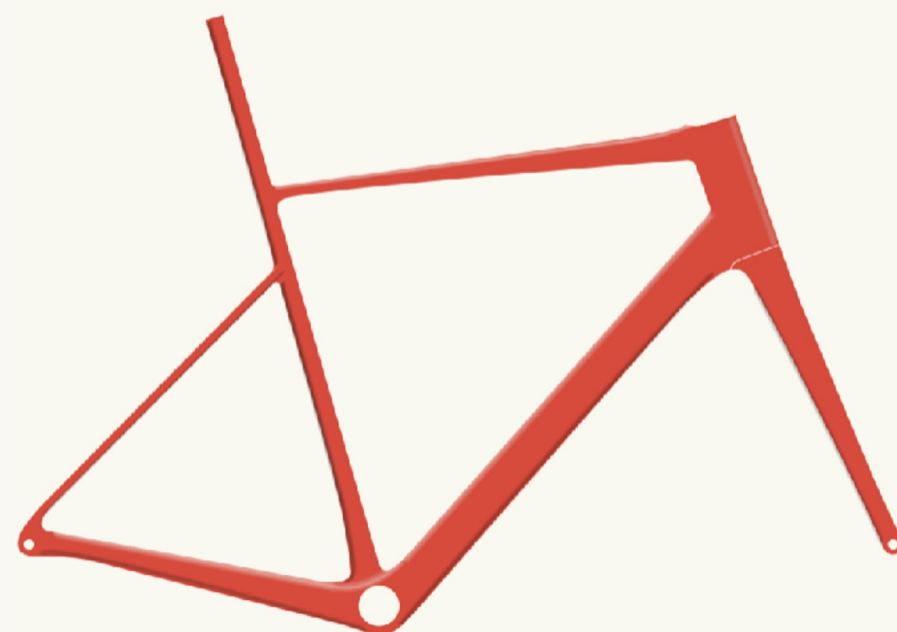
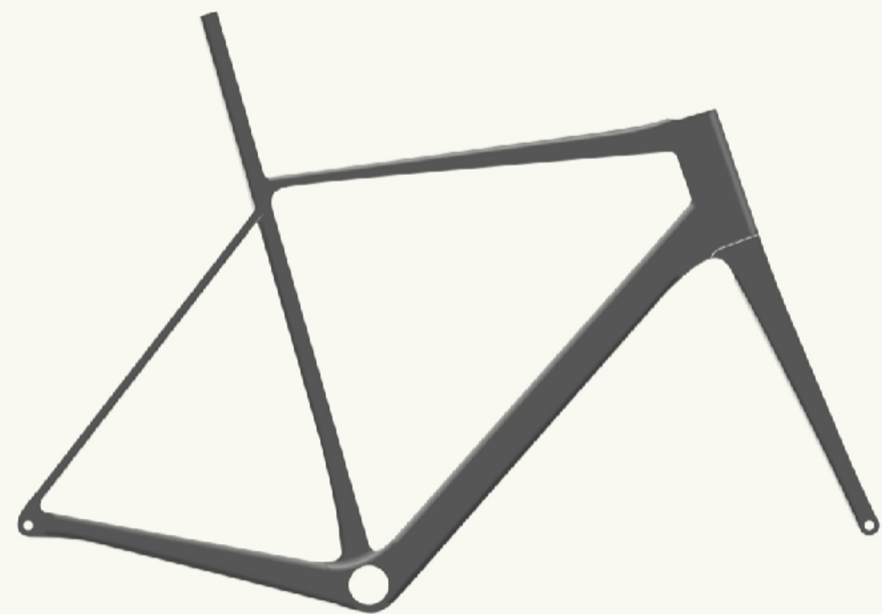
- Handoff point from engineering to industrial design
- Basic frame tube profiles are defined
- Most typical features are determined
- Geometry is fixed



THE ENGINEERING AND DESIGN TOOLKIT

INDUSTRIAL DESIGN PHASE

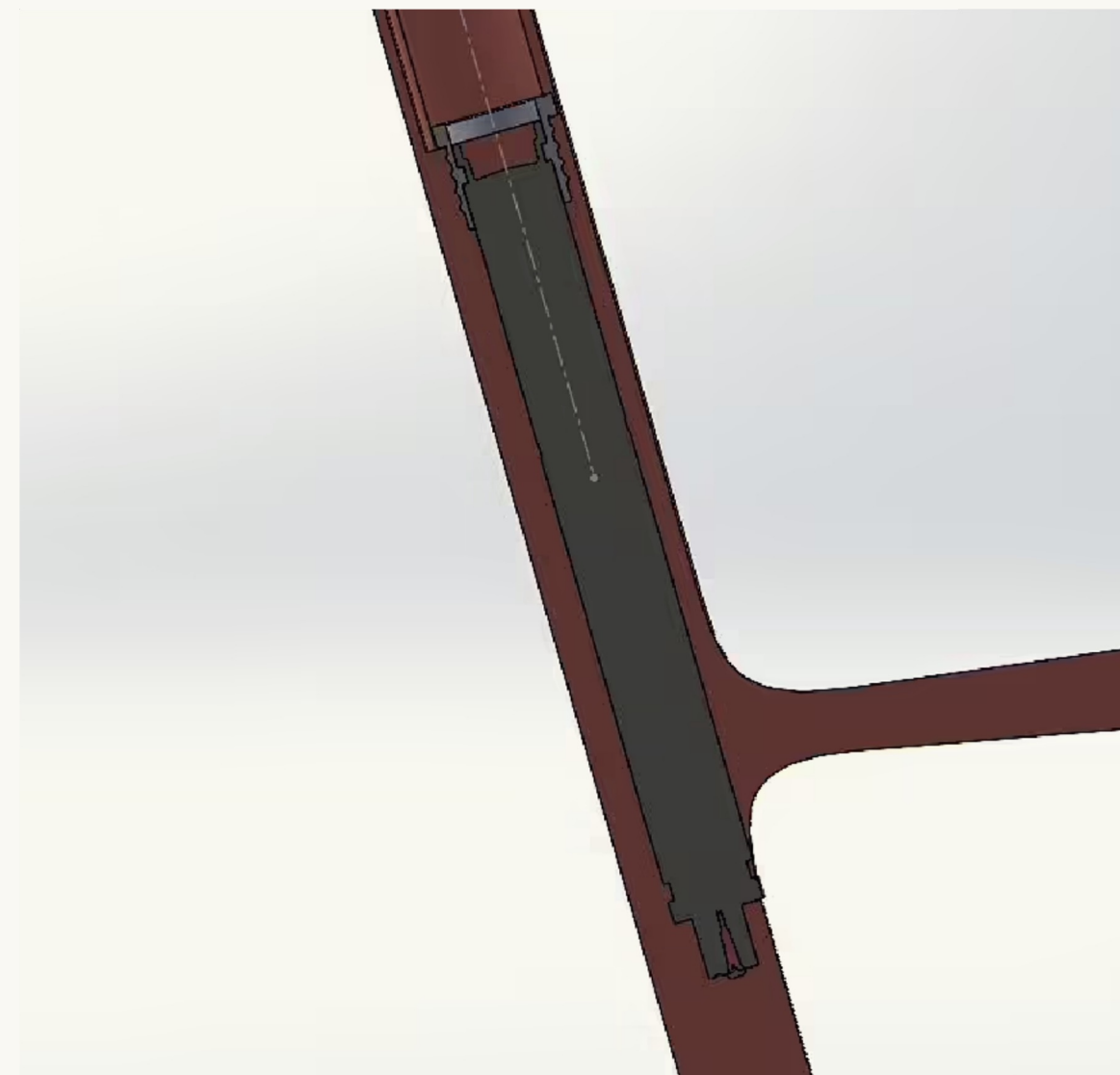
- Decision making in this phase takes in the look and feel of the product, as well as how it relates to the brands identity.
- Subjective or performance neutral decisions are finalized in this phase.
- Main focus is the aesthetically pleasing blending of the various tube shapes
- Clearances and compatibilities are fixed



THE ENGINEERING AND DESIGN TOOLKIT

DETAILED DESIGN PHASE

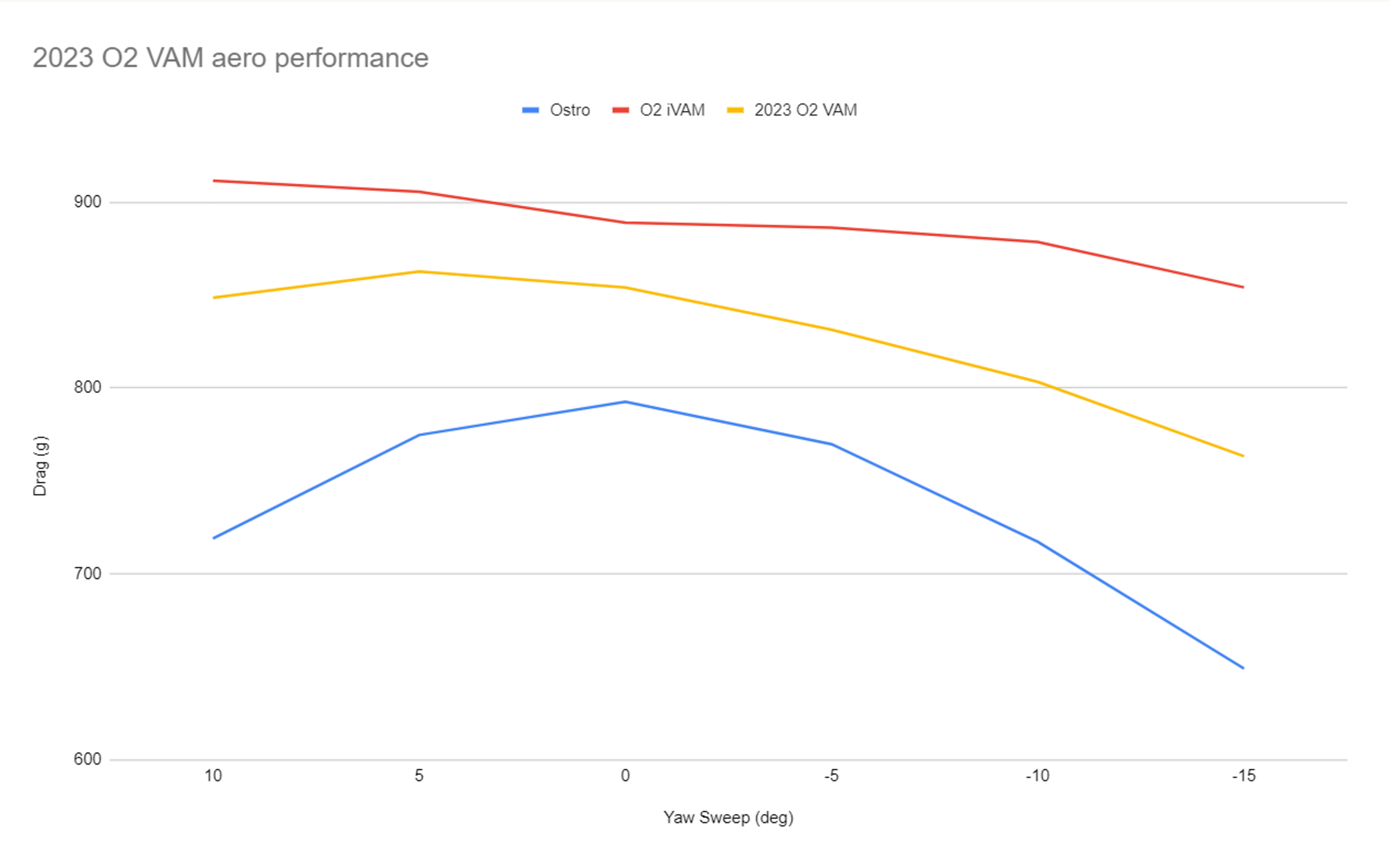
- All shapes and surfaces are being finalized
- DFM exercises are continuously being performed to evaluate ease of bladder molding, tool design, and bonding
- External SP concept relates directly to this phase. Minimum tube sections, and wall thicknesses determined.



THE ENGINEERING AND DESIGN TOOLKIT

THE WIND TUNNEL HAS THE FINAL WORD

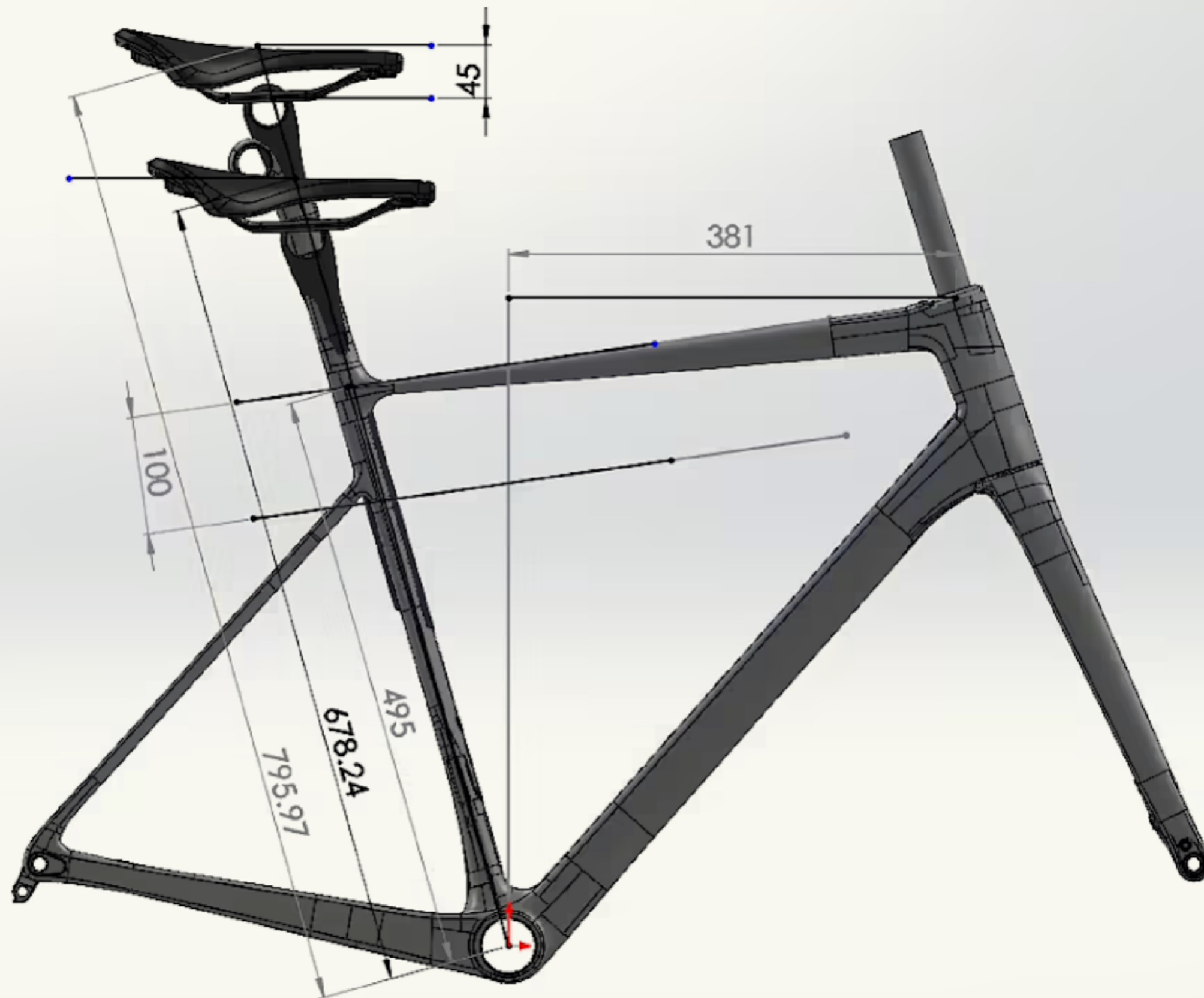
- The new O2 VAM performs as expected
- Improves on current O2 VAM by 63g of drag
- Roughly halves the difference to OSTRO VAM from current O2 VAM



Yaw	OSTRO VAM	Current O2 VAM	New O2 VAM
15	645	882	807
10	719	911	849
5	775	906	863
0	793	889	854
-5	770	886	831
-10	717	879	803
-15	649	854	763
Avg	724	887	824
		163	100

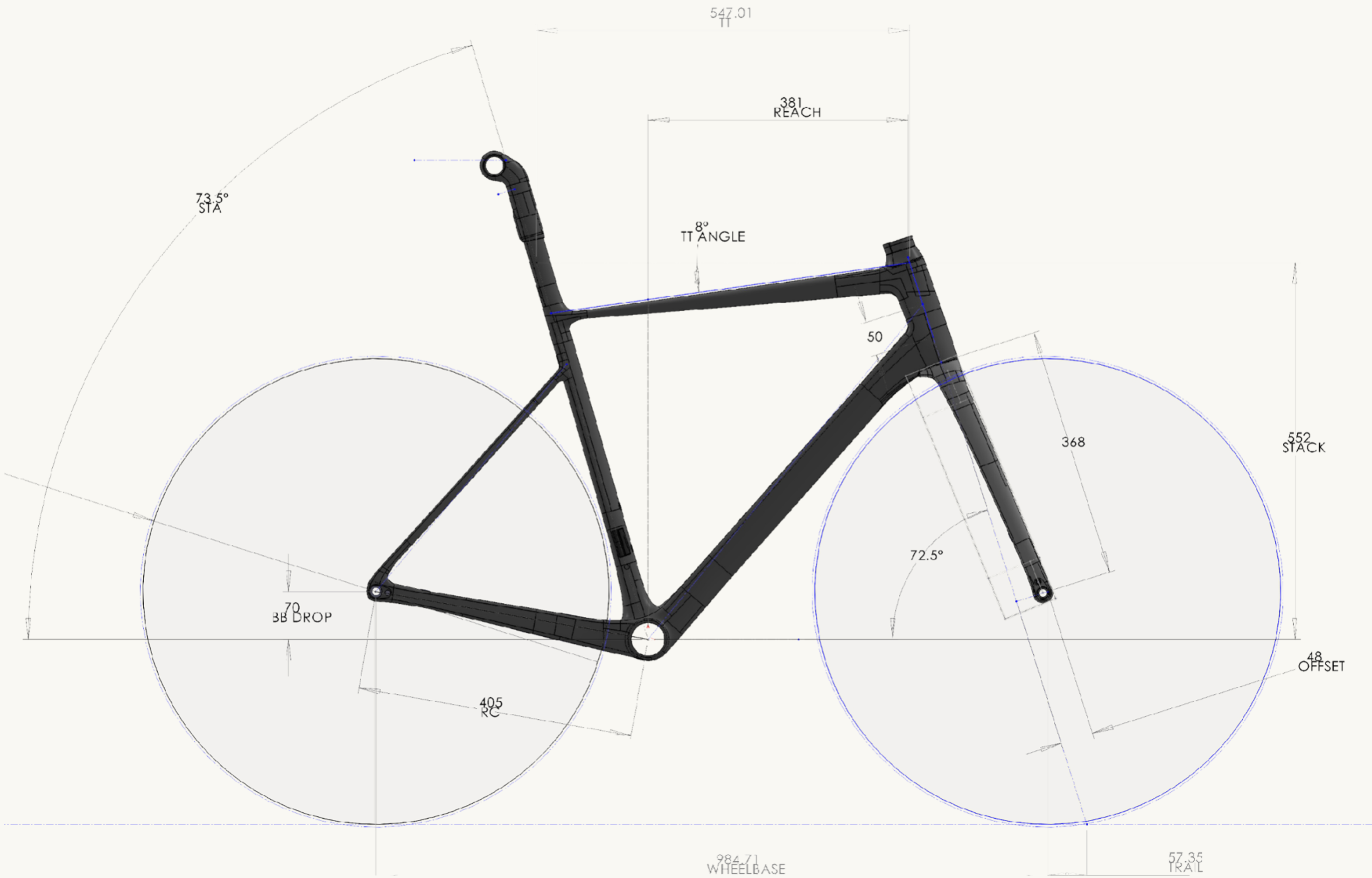
GEOMETRY

- Slightly higher stack
- Four fork offsets
- Size 45 (49 short)
- Common trail across all sizes



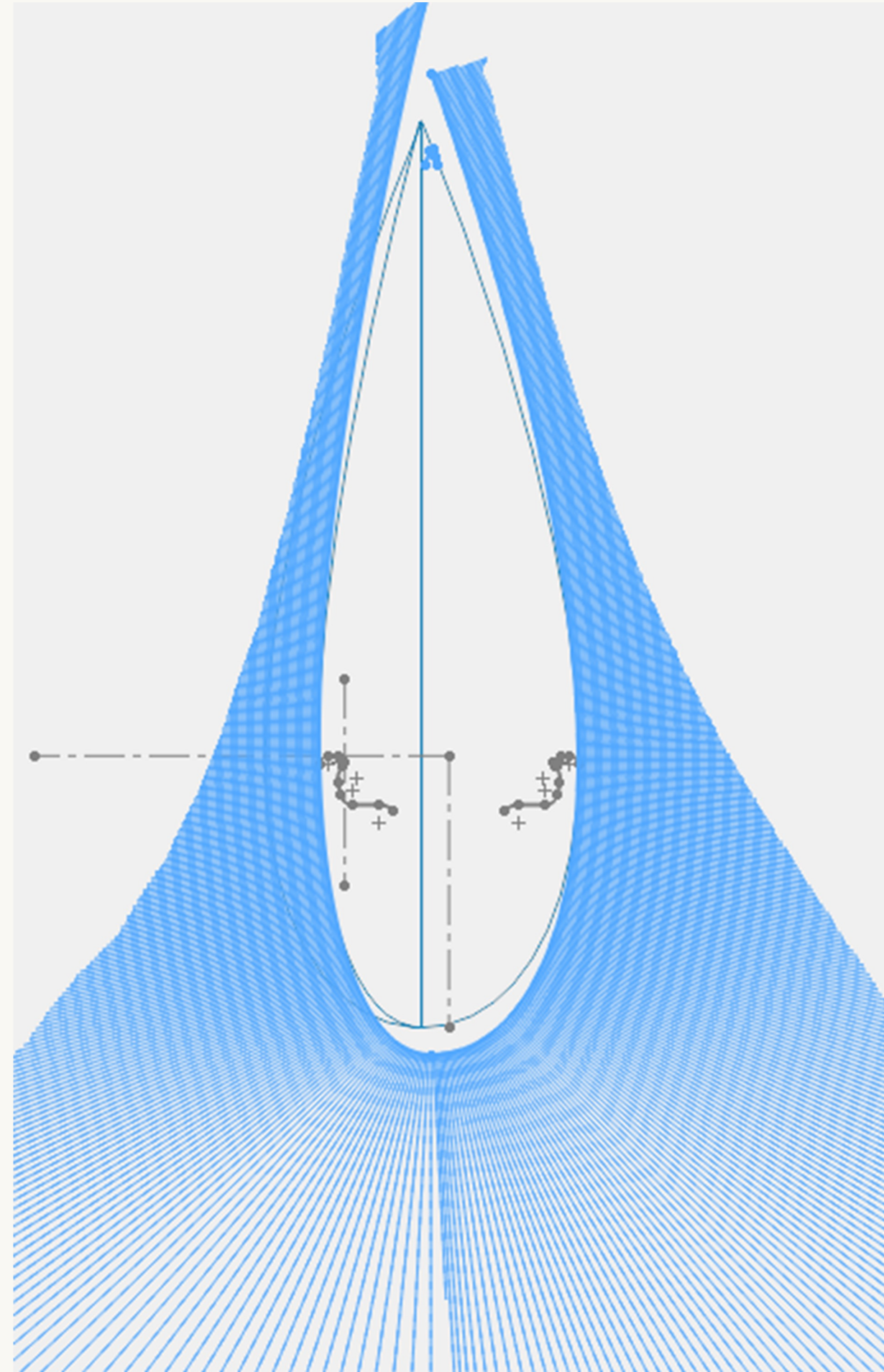
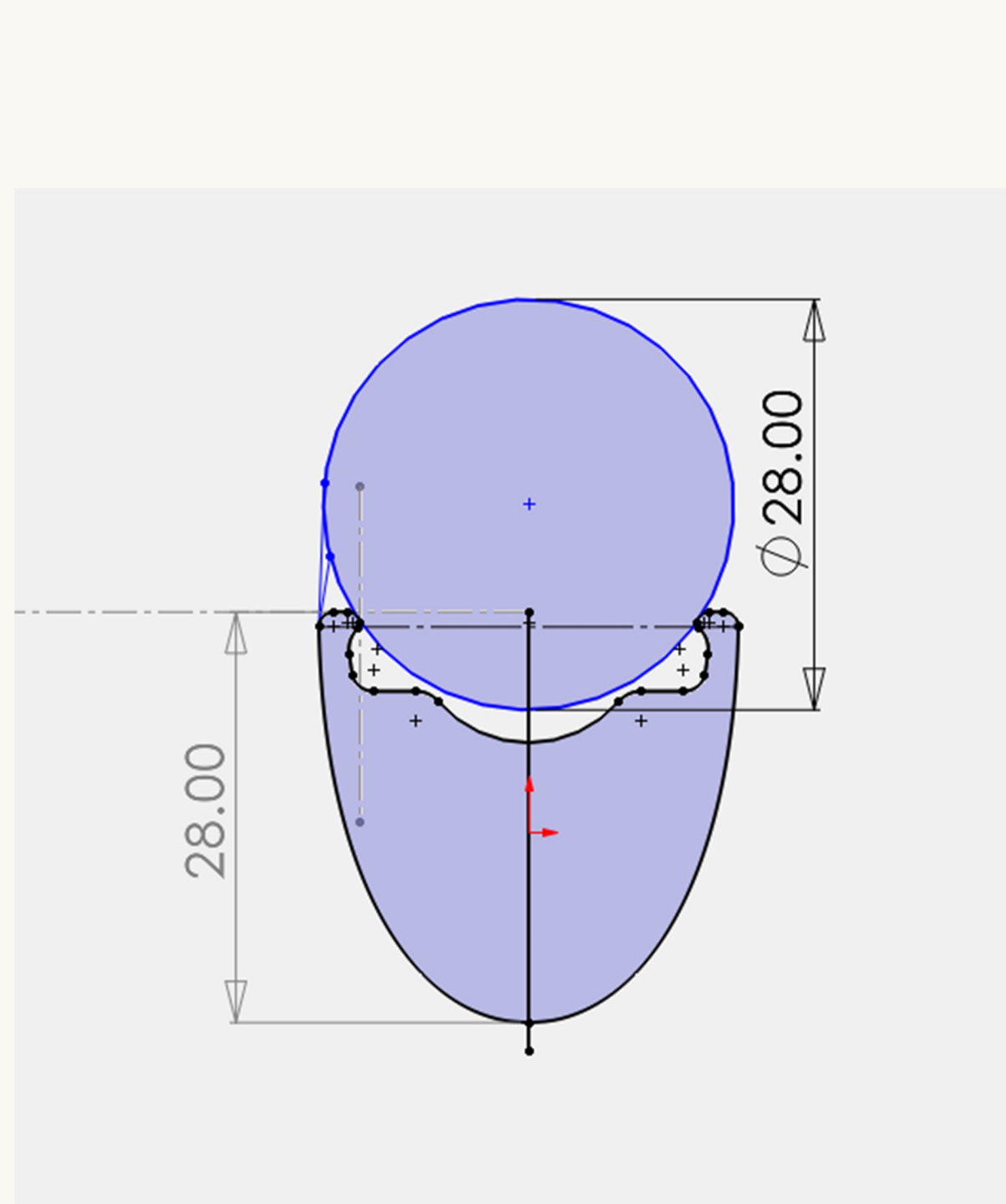
GEOMETRY

THE NEW 02 V · ^ · M



	45	49	52	54	56	58	61
Stack	502	514	535	552	574	597	611
Reach	360	367	373	381	389	401	410
BB drop	72	72	72	70	70	70	70
Rear Center	405	405	405	405	405	408	412
Front Center	574	573	573	587	587	608	621
Wheelbase	970	969	971	985	982	1006	1022
ST angle	75.5	74.5	74	74	73.5	73.5	73.5
HT angle	71.1	71.7	72.5	72.5	73.3	73.3	73.3
TT (effective)	493	510	527	539	557	578	591
ST	405	425	465	495	525	545	570
Wheel size	700c						
Fork length	368						
Fork Offset	57	53	48	48	43	43	43
Trail (@6900D)	57	57	57	57	57	57	57

Geometry notes:
Maximum tire size - 32mm (same as OSTRO VAM)
Usual set-up - 25-28mm



- Max wheelset weight 1,146g
- Modernized tire/rim interface, retaining bead hook
- Maintain recent gains in rim strength while keeping rim weight ~300g
- Offset spoke bed to balance spoke tension for a stronger wheel
- Differential front and rear rims to optimize aero performance
- Designed from the ground up for modern tubeless 28mm tires

NEW FACTORY AND CONSTRUCTION



- Brand new production facility adjacent to Factor's R&D offices to shorten rate of prototype iteration from three weeks to 24 hours
- New compaction techniques that can create complex aero shapes without the usual weight penalty
- Revised UCI rules lowered minimum tube thickness to 10mm (e.g. new O2 VAM top tube), which can be achieved with new proprietary production processes

NEW O2 VAM LAUNCH COLORS

FACTOR



STORM GREY



RED VELVET



CHROME RAW CARBON

Full custom paint also available via Prisma Studio

PRICING AND AVAILABILITY

- On sale globally via authorized Factor dealers and factorbikes.com
- In stock and available on July 10, 2023

	US \$ (+ tax)	EUR € (+ VAT)	GBP £ (incl. VAT)	CAD \$ (+ VAT)	AUS \$ (incl. GST)
Premium Package Frameset	\$6,299	€6,049	£6,300	\$8,499	\$9,990
Premium Package + Black Inc 28//33 wheels	\$8,899	€8,599	£8,900	\$11,999	\$14,390
Premium Complete, Shimano Dura-Ace 9200 Di2	\$11,799	€11,299	£11,800	\$15,999	\$18,990
Premium Complete, Shimano Ultegra 8100 Di2	\$9,899	€9,499	£9,900	\$13,299	\$15,990
Premium Complete, SRAM Red eTap AXS + Quarq PM	\$12,199	€11,699	£12,200	\$16,399	\$19,690
Premium Complete, SRAM Red eTap AXS	\$11,799	€11,349	£11,800	\$15,999	\$18,990
Premium Complete, SRAM Force eTap AXS + Quarq PM	\$10,099	€9,699	£10,100	\$13,599	\$16,290
Premium Complete, SRAM Force eTap AXS	\$9,899	€9,499	£9,900	\$13,299	\$15,990



QUESTIONS



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Thank you!





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