TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Mechanical Science and Engineering

NEW COMBINE TO HEADER CONNECTION – CONCEPT FOR VERY WIDE PLATFORMS

THE FUTURE OF COMBINES

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DRESDEN concept
Exzellenz aus Wissenschaft und Kultur

INDUSTRIAL DESIGN ENGINEERING DRESDEN

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- The Dresden Design Approach - fostering research by interdisciplinary innovation studies
- Focusing explicitly on mobile and stationary industrial goods
- From first concepts to working prototypes

VENUM I OUTLINE

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1 // Introducing crop-harvest

2 // Three innovation studies tackling major challenges

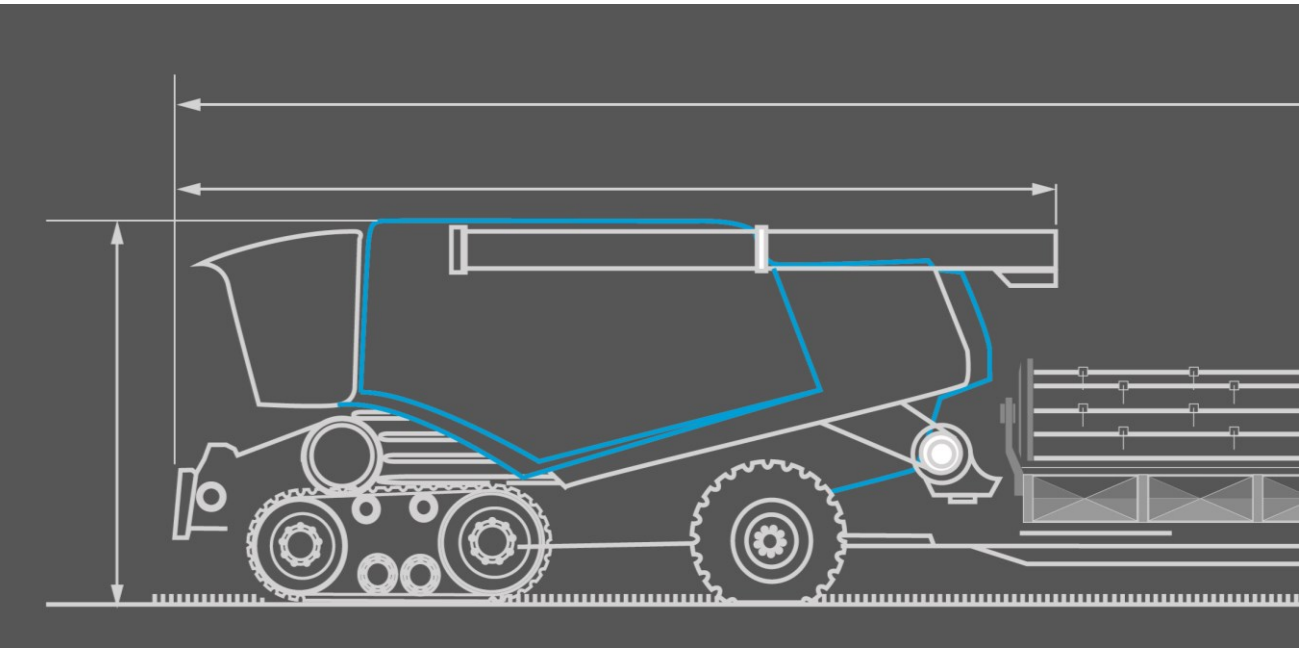
3 // The VENUM concept with foldable header

4 // Overall experience using a game engine, next research steps

VENUM I COMBINE DEVELOPMENT

- Starting with two separated processes
- Developing into small and medium self propelled systems, …

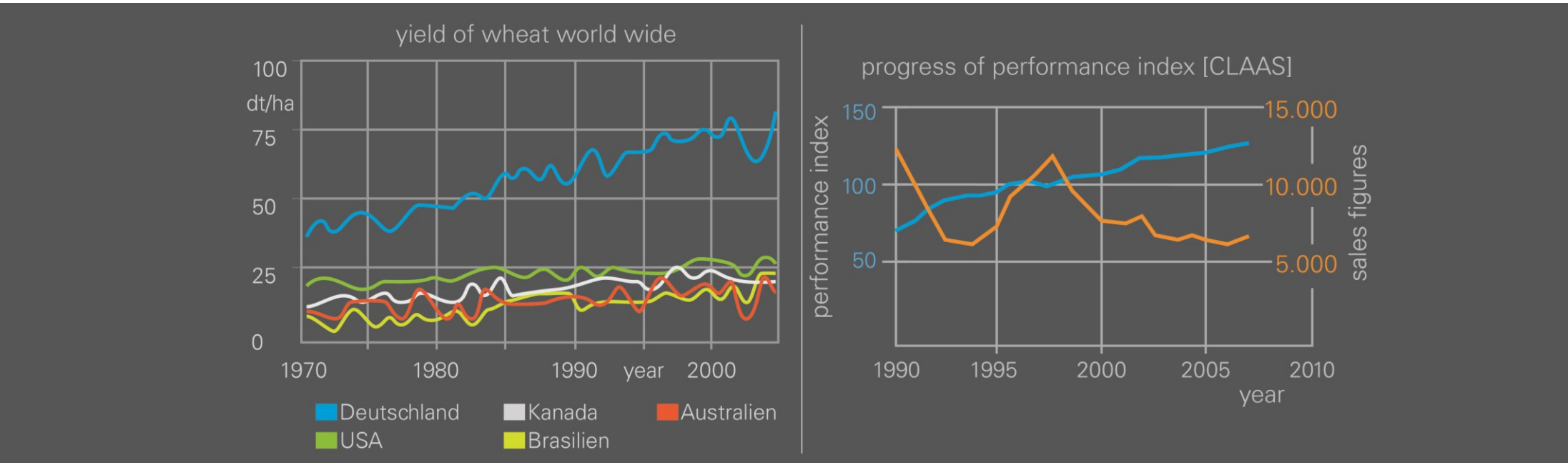
VENUM I STATUS QUO - VERTEX



Quelle: Claas

- Max. 15 m / 18 m (with draper) headers with more than 20 m length over all
- Grain feed rate between 50 t/h – 100 t/h, 14,000 l grain tank
- More then 440 kW and up to 600,000 € invest

VENUM I PROBLEMS



- Machines are at it's limits

-> increasing capacity by up scaling isn't the prior option anymore

- Efficiency problems especially with low yield fields
- Growing investment and time to ROI is necessary

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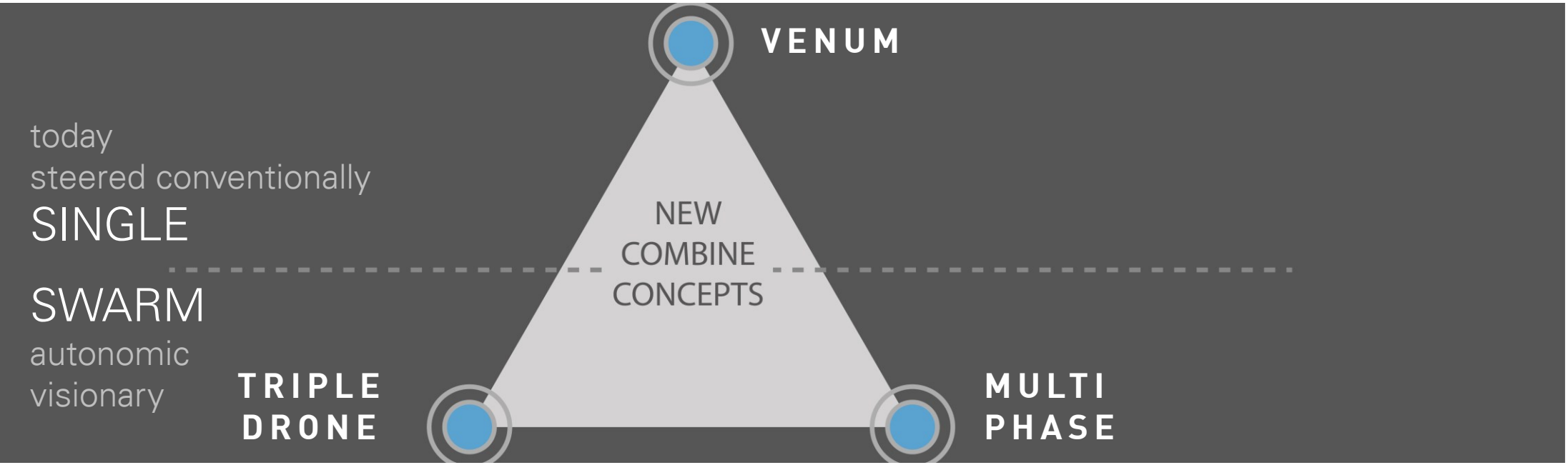
INCREASING PERFORMANCE AND COST EFFICIENCY.

INCLUDING INVESTMENT AND RUNNING COST DESPITE GROWING PRICES FOR ENERGY, LABOUR, ...

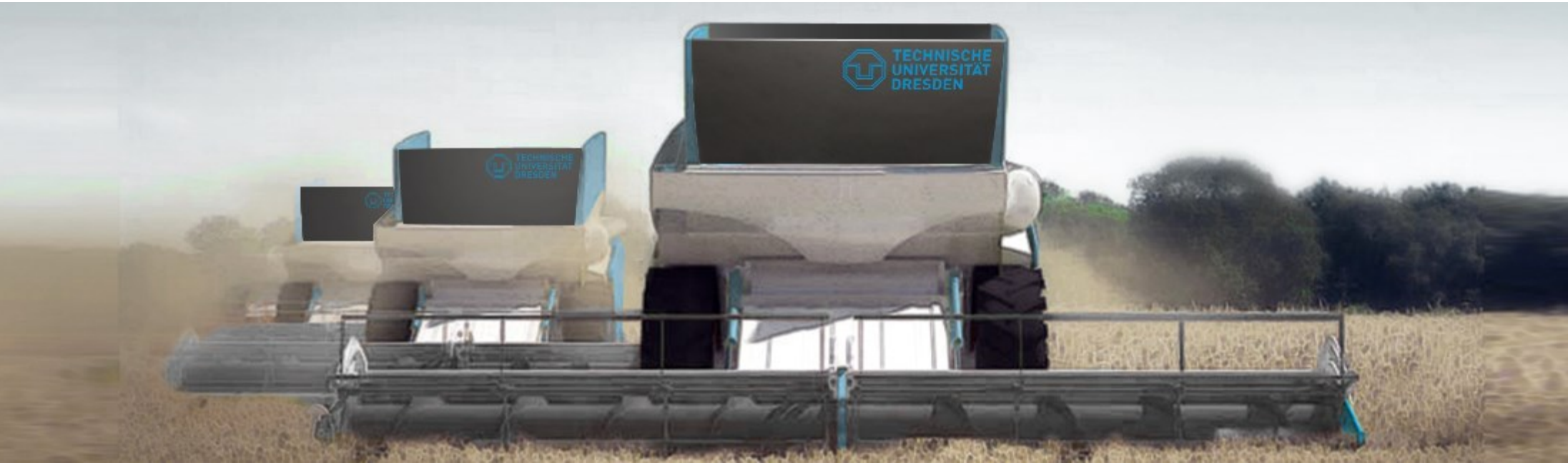
(1) Reducing soil compaction
(2) Handle low yield fields
(3) Match the European (and worldwide) traffic regulations

VENUM I THREE POSSIBLE ANSWERS



- Three different approaches to tackle the enormous challenges
- Combining deep agricultural and engineering knowhow with industrial design tools and methods

VENUM I TRIPLE DRONE

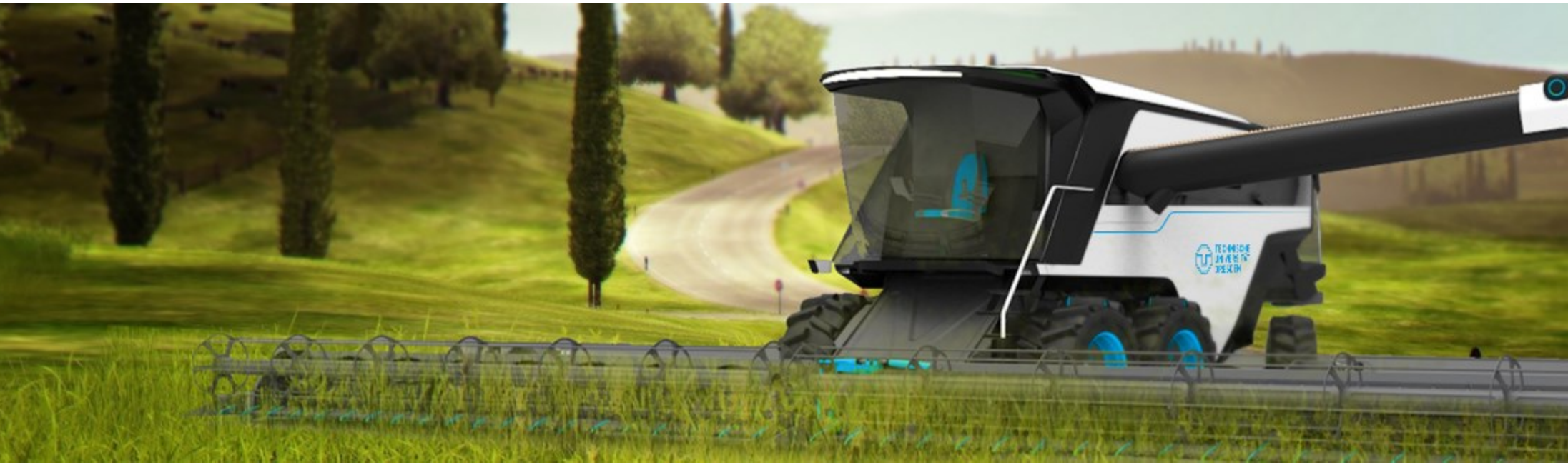


- Three joined drones sum up to a cutting width of 18 m reducing soil compaction by more than 50 % simultaneously
- Grain feed rate between 50 t/h - 100 t/h, more then 20,000 l grain tank in total
- more then three times 200 kW with less then 7.5 t per single drone

VENUM I MULTI PHASE HARVESTING

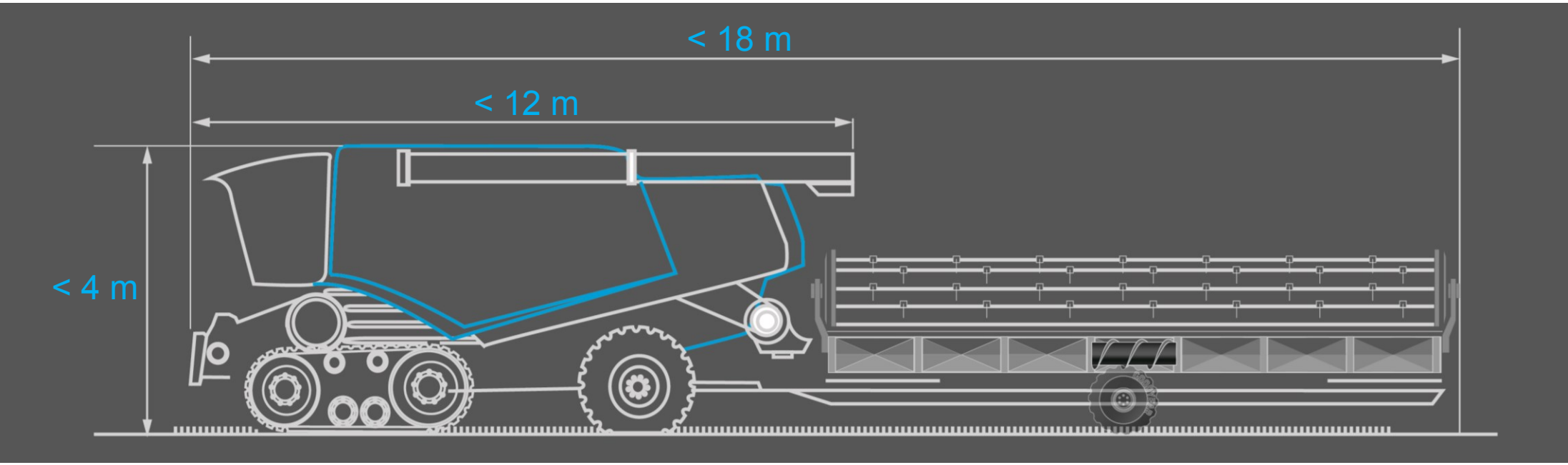
- Three separated mobile units for cutting, one stationary threshing unit
- 36 m cutting width for 100% more volume and mass, leading to a grain feed rate between 50 t/h – 100 t/h even on low yield fields
- 30% more efficiency through continuously threshing by reduced grain loss

VENUM I HIGH END BUT FULLY FEASIBLE



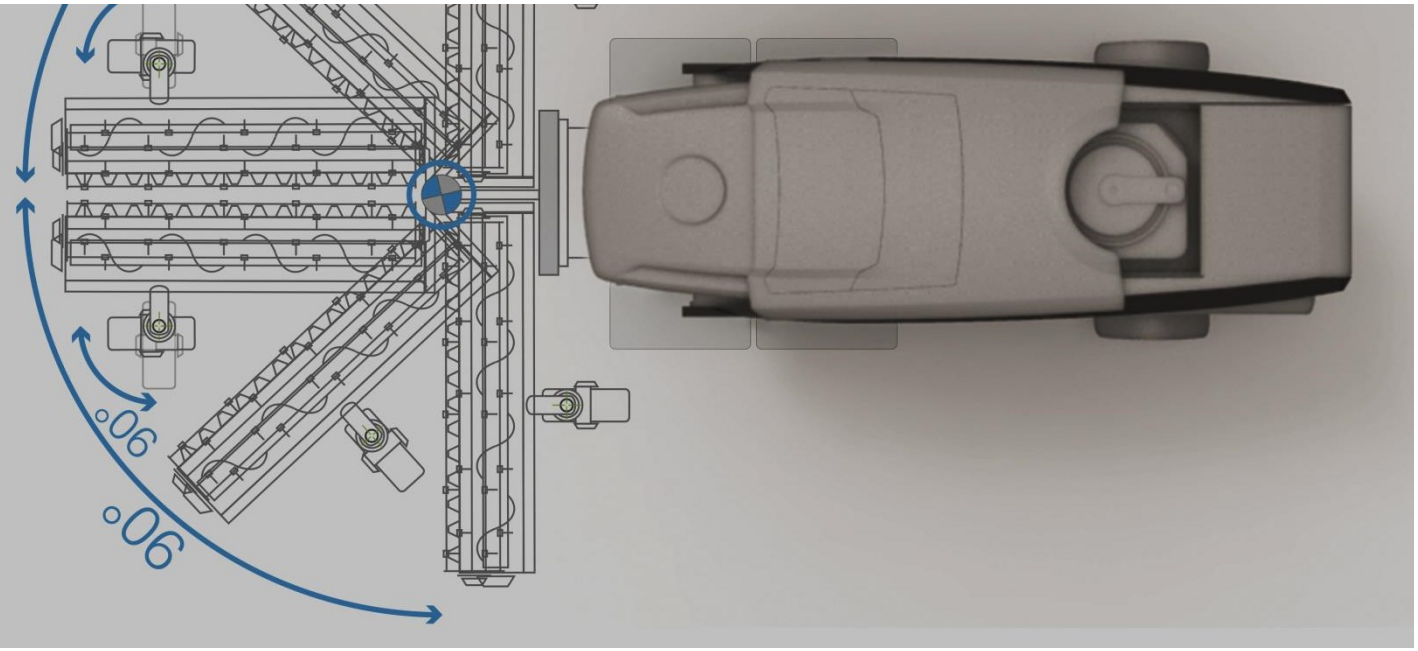
- Inside world wide regulations on field and! road
- Grain feed rate between 50 t/h – 100 t/h with a 14,000 l grain tank
- Efficiency fostered by extra 10% through speeding set up times by the integrated header trailer and the two cabin layout

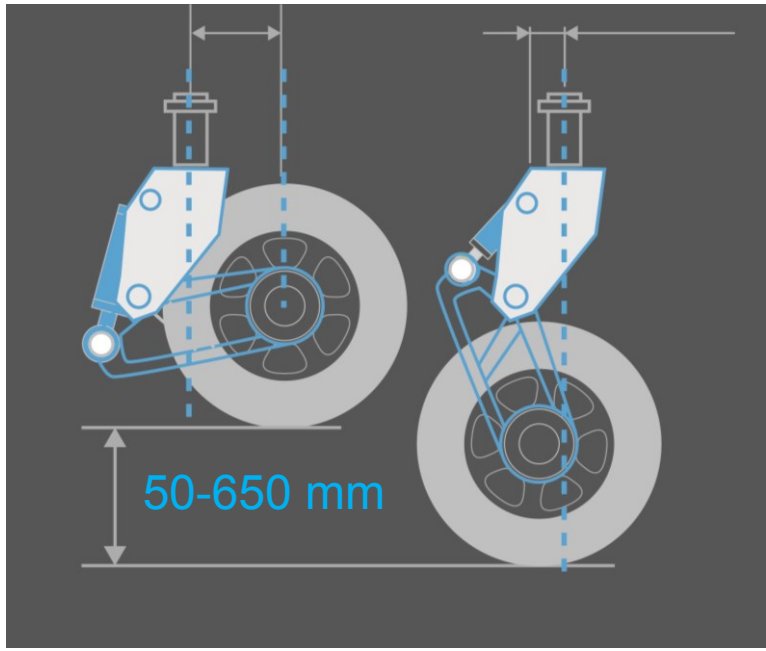
VENUM I TIGHT REQUIREMENTS



- Even so it’s the most feasible one it’s by far the most difficult concept
- Small zone for innovation and a quite complex system of components
- Requires a sophisticated and fully integrated design

VENUM I FOLDABLE HEADER



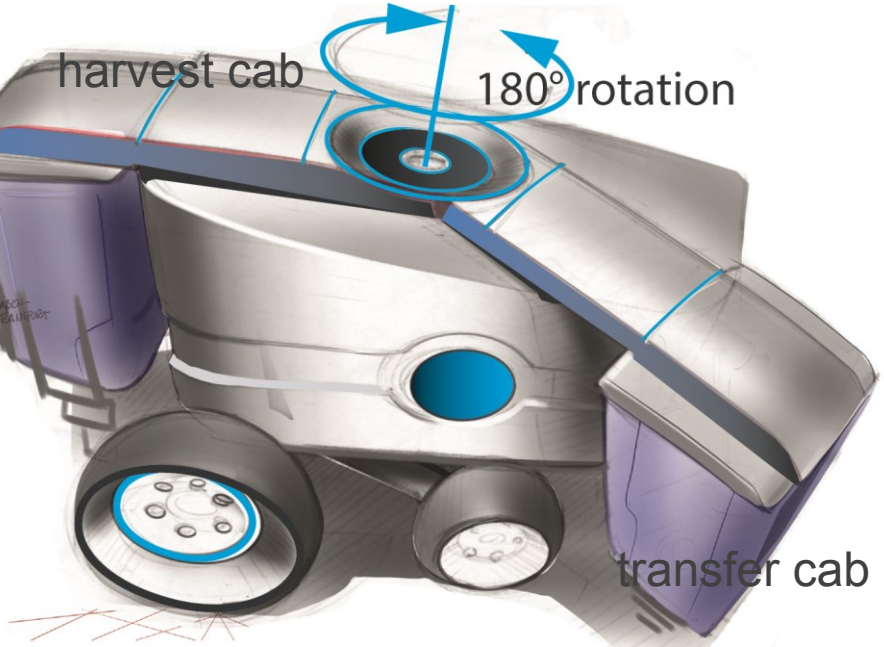


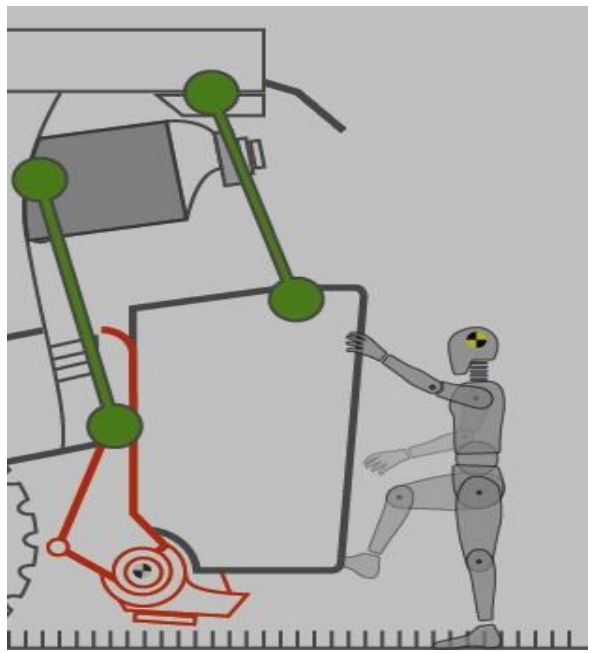
- 17.6 m wide foldable header
- Integrated header trailer leading to only 9.2 m transport length
- Separate height adjustable chassis overcompensate the extra weight

VENUM I GROUND CONTOURING SYSTEM

- Suitable for rough grounds
- Closer to intended cutting height
- Contour system leads to reduced crop loss

VENUM I EARLY CAB CONCEPTS





- Moving the cabin instead of moving the header
- Many possible options were sketched and proofed
- The result: two separate cabins instead of one moving cabin

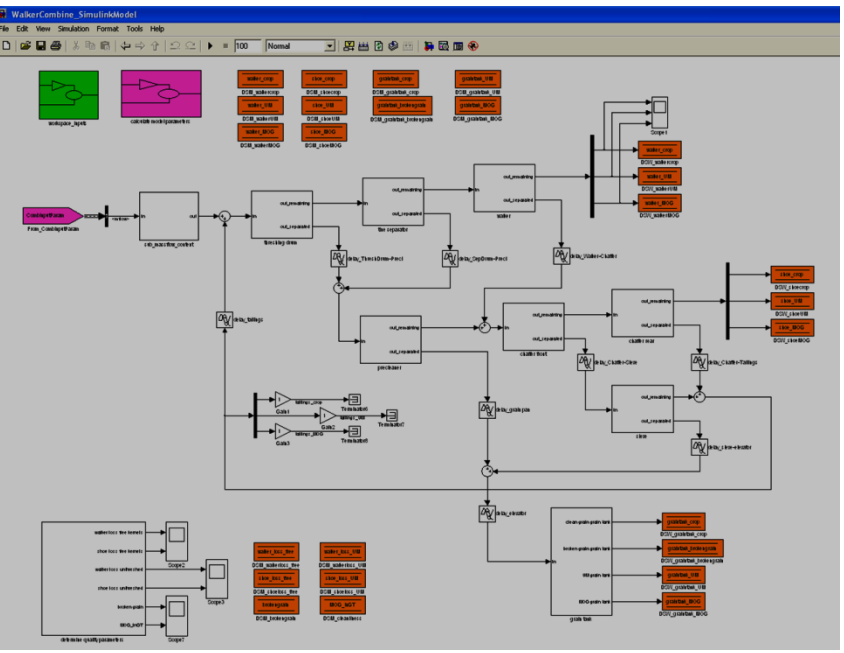
VENUM I TWO DIFFERENT CABS

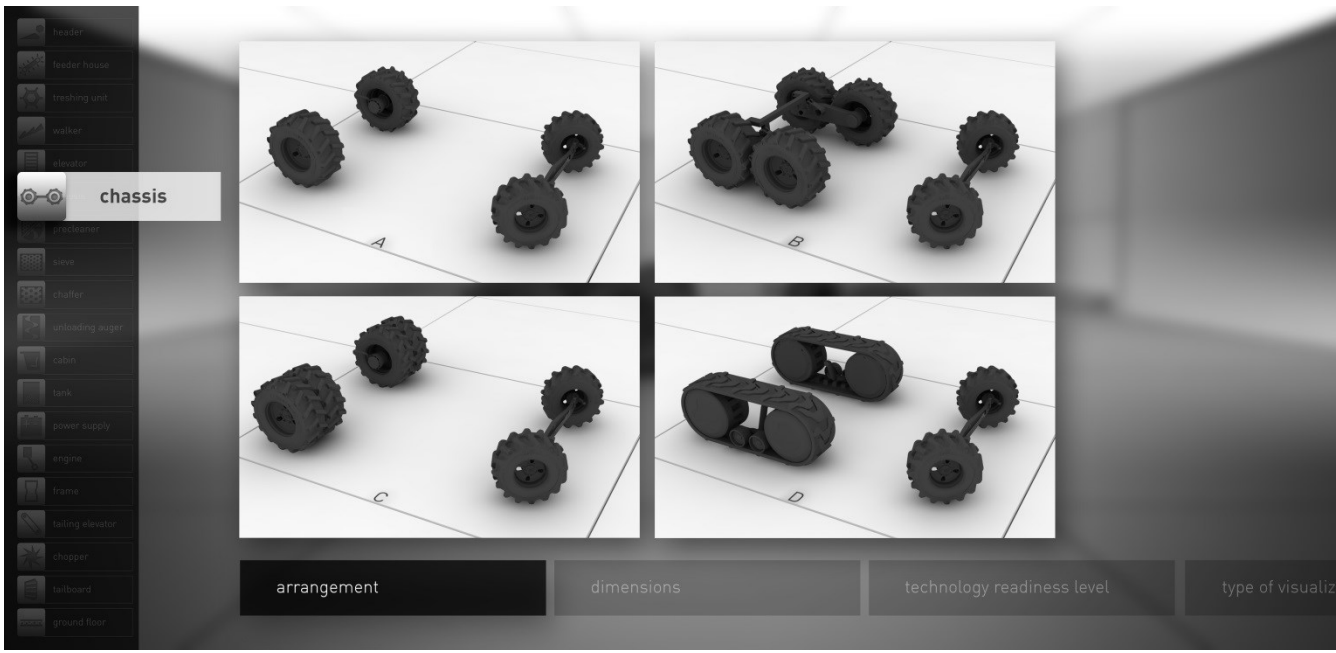
- Two perfectly equipped cabins for two different purposes
- Transfer cab fulfils the StVZO steering requirement with wheel on the road
- Steering by joystick while harvesting on the field

VENUM I VENUM SYSTEM IN MOTION

- Using the FARMING SIMULATOR 2013 for dynamic real time animation
- A chance to evaluate the interaction with combine and environment through the help of more then 1 Mio. possible test drivers
- Support official mod download is planed for early 2014

VENUM I NEXT RESEARCH STEPS





- Complex simulation of different system configurations to clarify the over all performance and costs
- Visualization and configuration tool for different machine concepts to support platform strategies and reduce uncertainty in early development stages

MEET THEN VENUM AT HALL 02 STAND B16

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Thank you for your attention.

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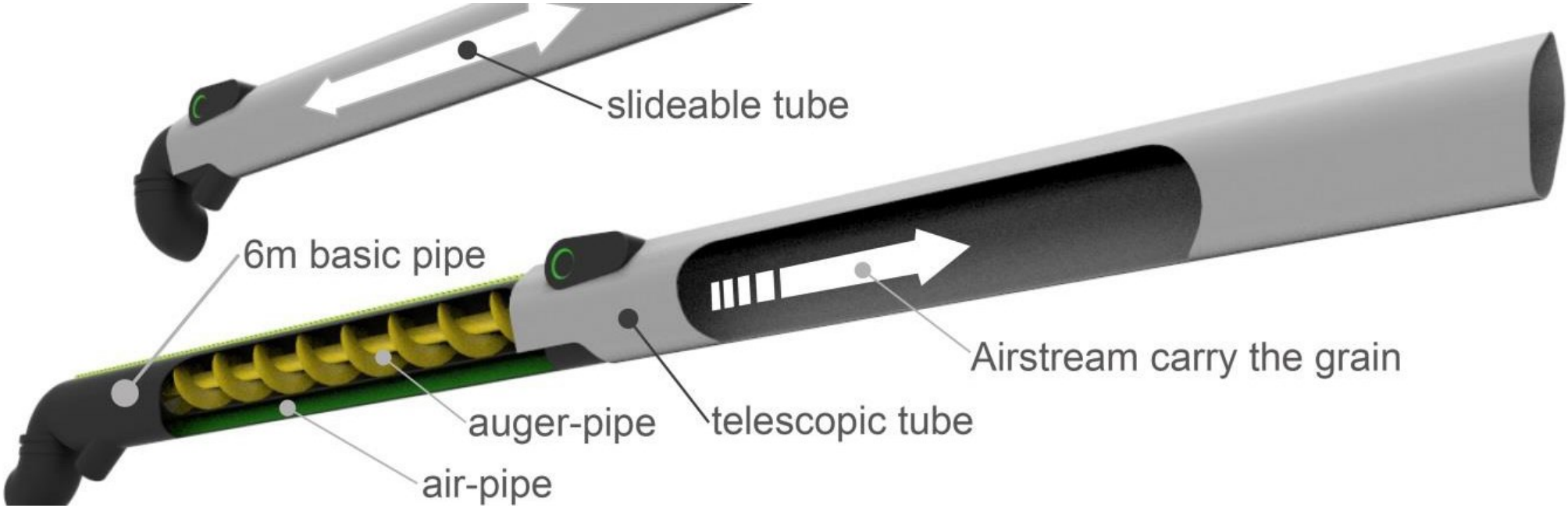
www.facebook.com/technischesdesign I www.vimeo.com/technischesdesign

VENUM I EXPANDABLE UNLOADING AUGER



- 11 m length on the field without additional length during transport on the road
- 6 m moved with auger, the last 5 m supported by compressed air and auger generated pressure