

V O L V O

Lidar & technical constraints for oem



Paul-Henri MATHA, Exterior lighting, Technical Leader

DVN, 3rd of December 2019



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People and safety – since 1927

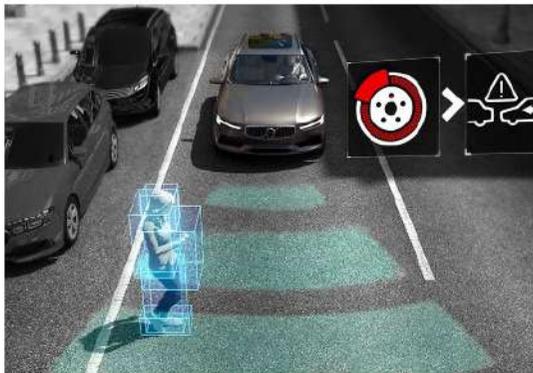
"Cars are driven by people. The guiding principle behind everything we make at Volvo, therefore is – and must remain – safety."

Assar Gabrielsson & Gustaf Larson, the founders of Volvo

VOLVO INTELLISAFE

Safety and driver assistance technology

IntelliSafe is designed to provide everyday peace of mind and convenience by helping you stay in full control.



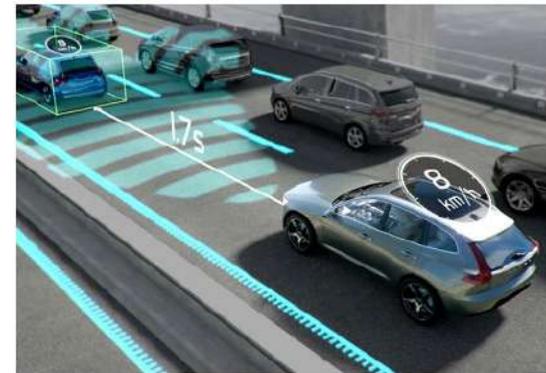
IntelliSafe Standard

Volvo Cars offers one of the most high-tech safety systems as standard equipment in your new Volvo. Every new Volvo includes a host of advanced driver assistance features, from Autobrake and Steering Support to our patented safety cage.



IntelliSafe Surround

Our optional IntelliSafe Surround pack includes BLIS (Blind Spot Information) with steer assist, Cross Traffic Alert with brake support and Rear Collision Warning, giving you all the information and support you need to know about vehicles or objects in your vicinity.



IntelliSafe Assist

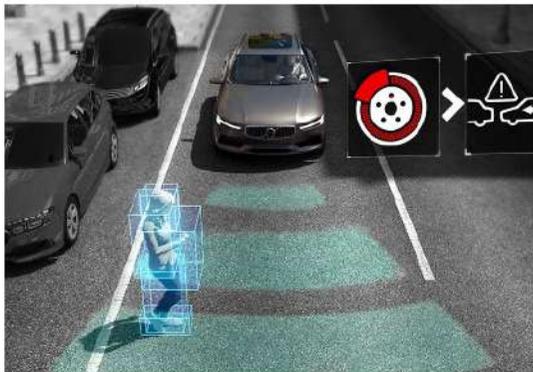
The optional IntelliSafe Assist pack includes everything you need to enable a more controlled and relaxed driving experience — especially on highways. IntelliSafe Assist includes Adaptive Cruise Control, Pilot Assist, Distance Alert (only combined with head up display).

VOLVO INTELLISAFE

Safety and driver assistance technology

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- Level 2 available on all Volvo cars
- <https://www.volvocars.com/intl/why-volvo/human-innovation/future-of-driving/safety>



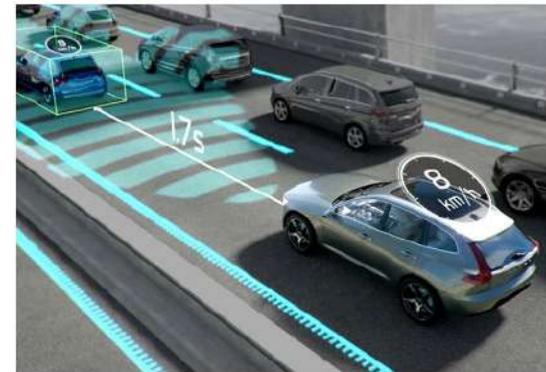
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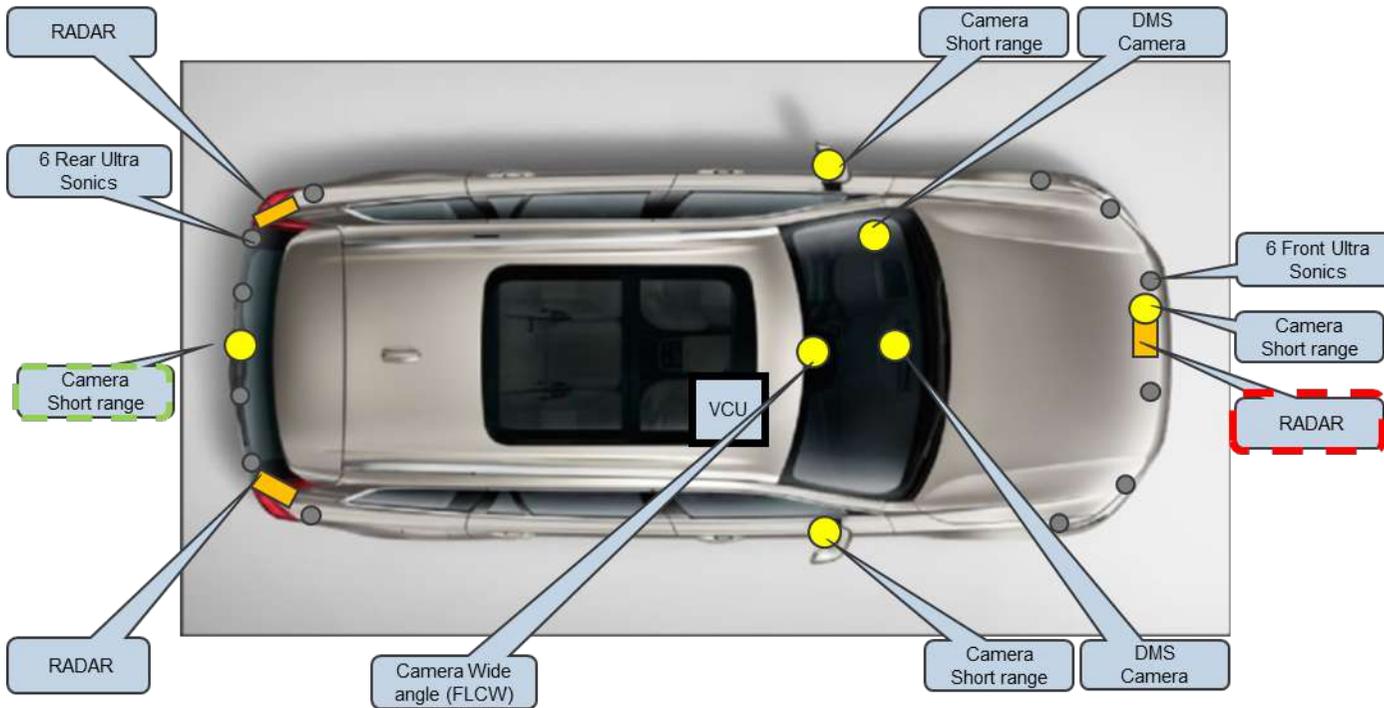
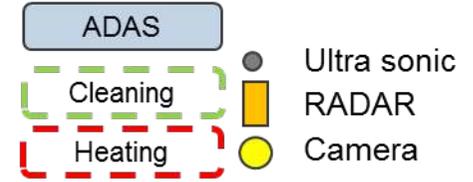


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Our current ADAS in volvo



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Current limitations

- Packaging & design
- Availability of the sensors

VOLVO

Packaging

- Camera and Radar in Grill



Packaging



- Camera and Radar in Grill

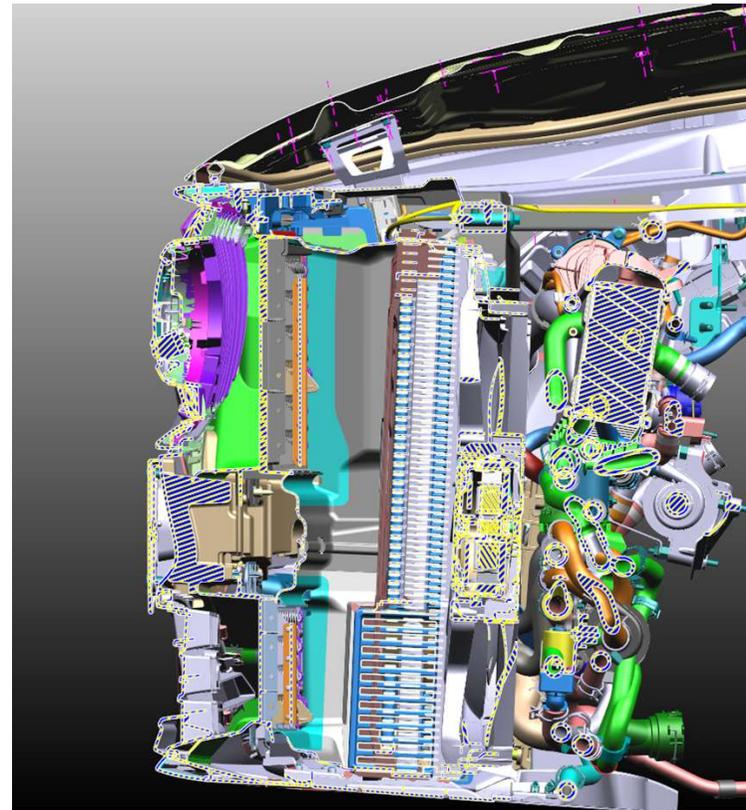
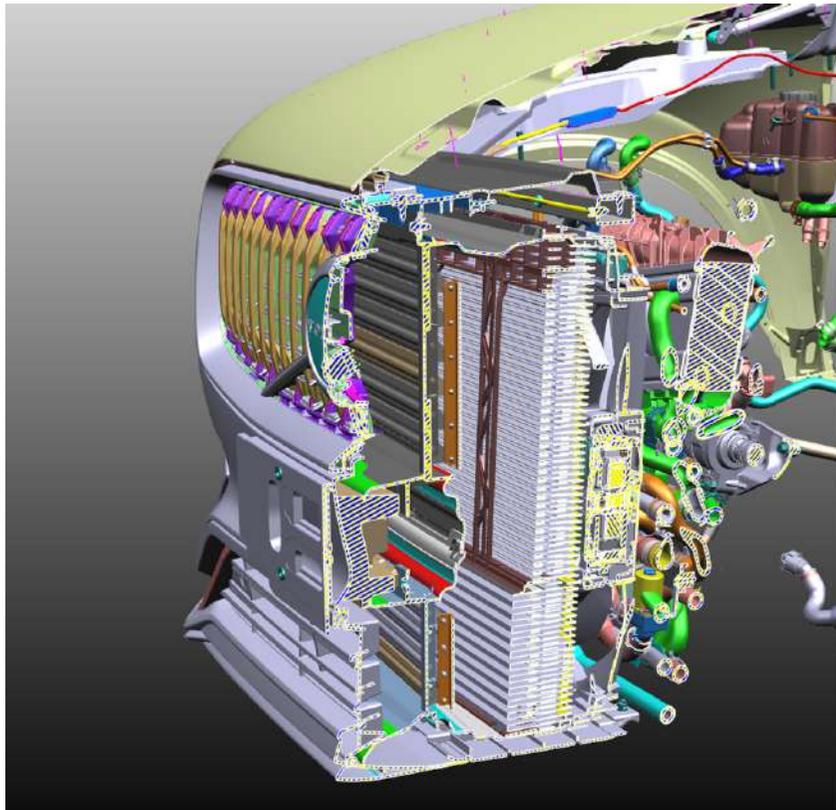
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Paul-Henri MATHA, Exterior Lighting, Technical Leader



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Packaging



V O L V O

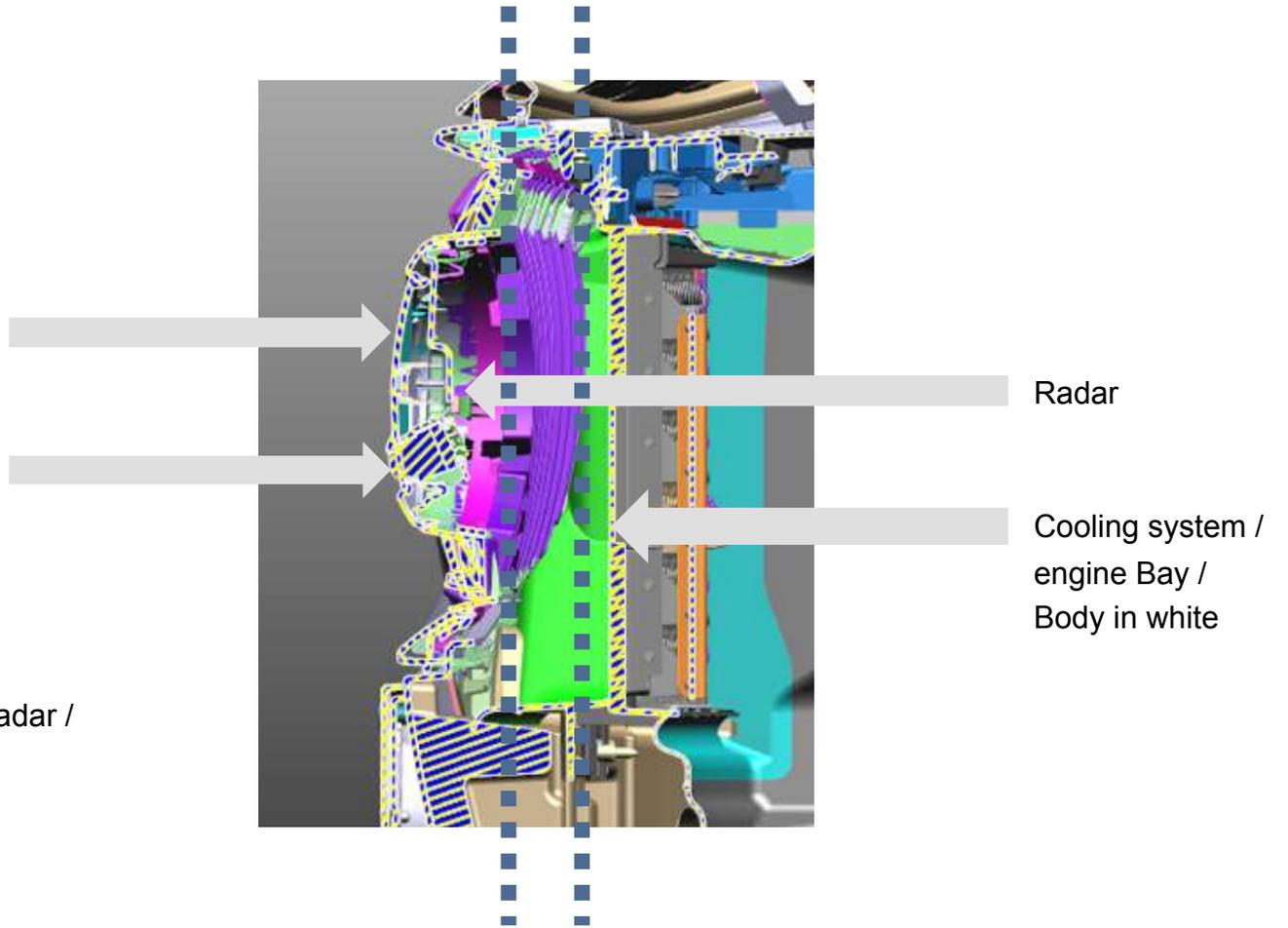
Packaging

- Camera and Radar in Grill

Emblem

Camera – depth ~ 20mm

- Difficulty to integrate more than a Radar / camera



Radar

Cooling system /
engine Bay /
Body in white

~~50mm for shock absorbance

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Sensor Packaging

Radar : depth ~ 10mm

Lidar : depth ~ 100mm



Radar 77 Ghz – picture from Google (Continental)



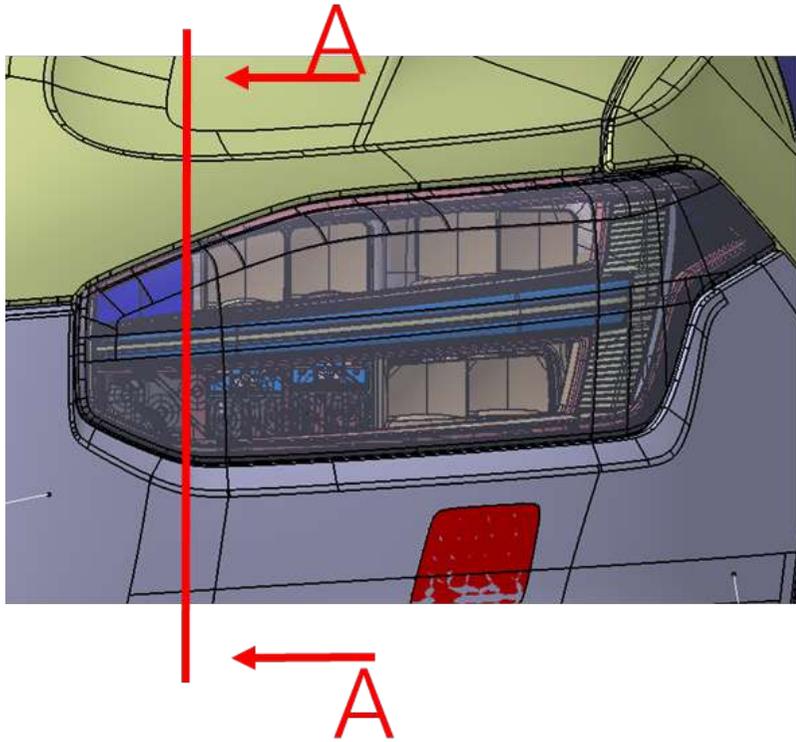
Lidar – picture from Google (Valeo)

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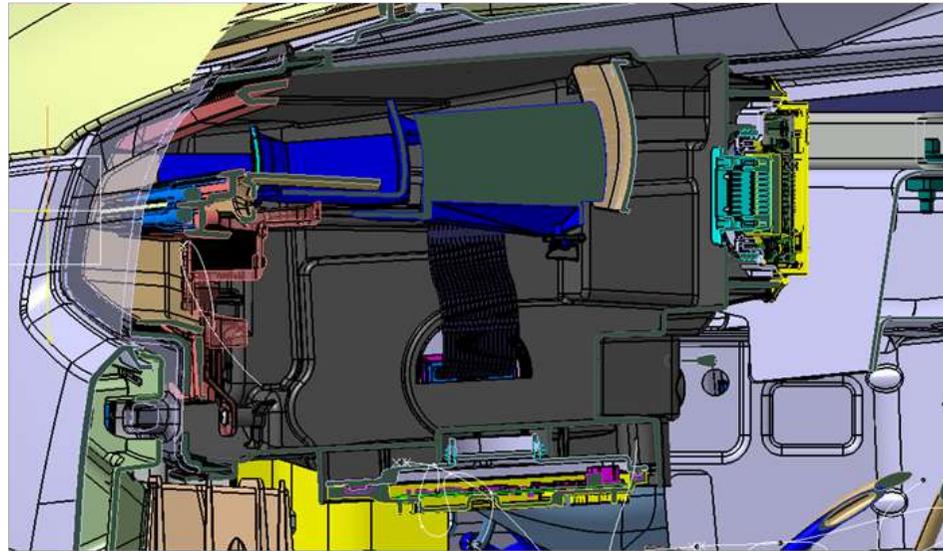
Headlamp Packaging



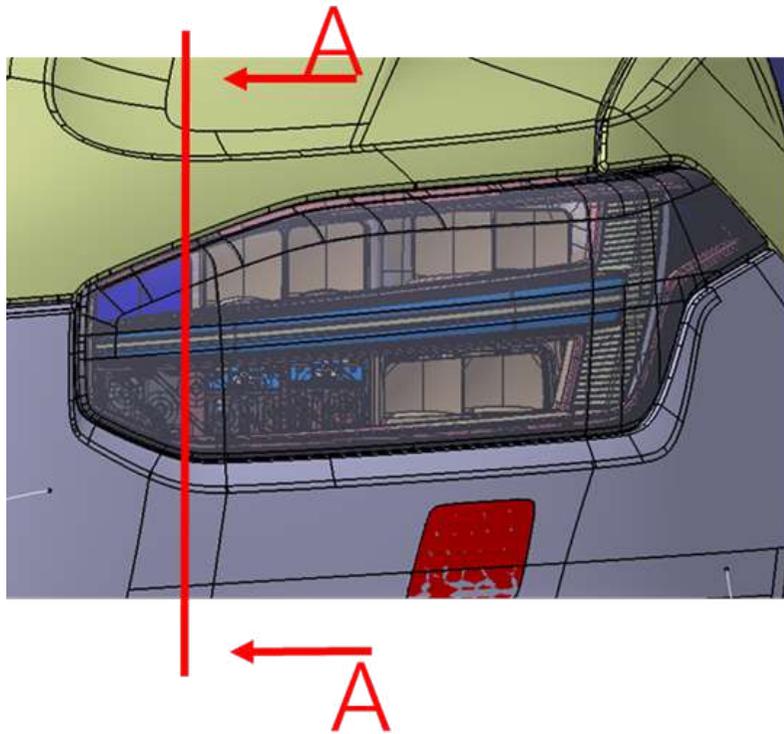
Headlamp Packaging



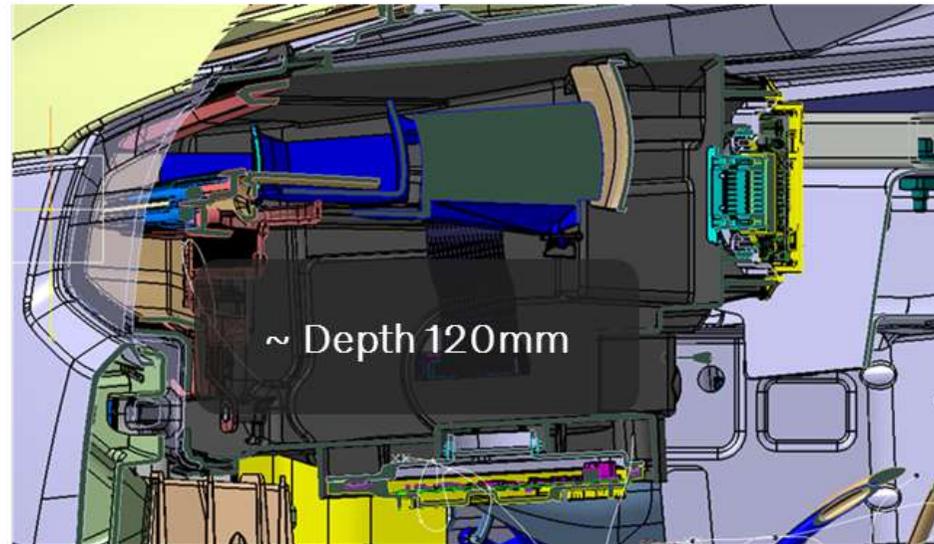
A-A



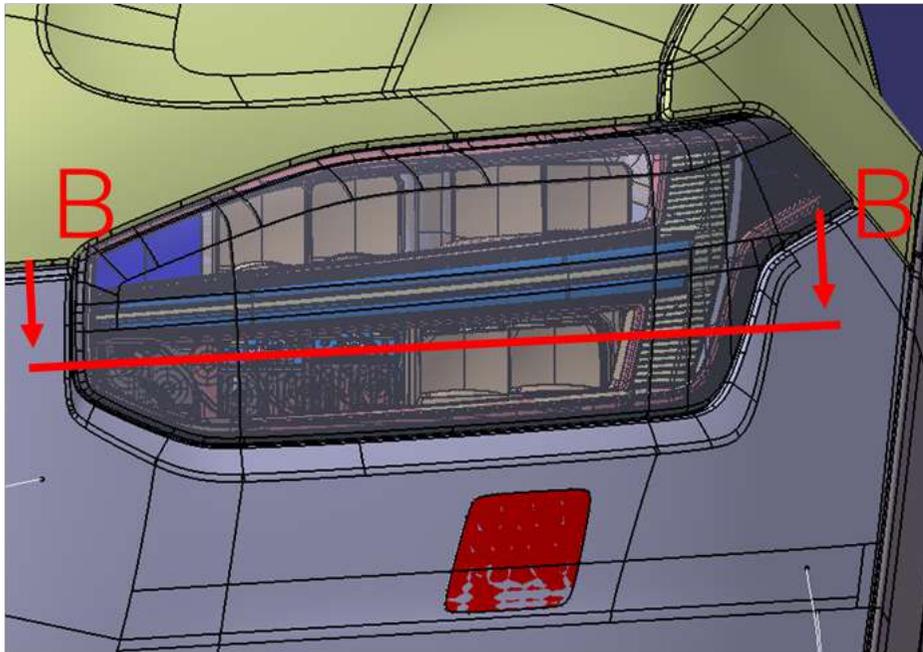
Headlamp Packaging



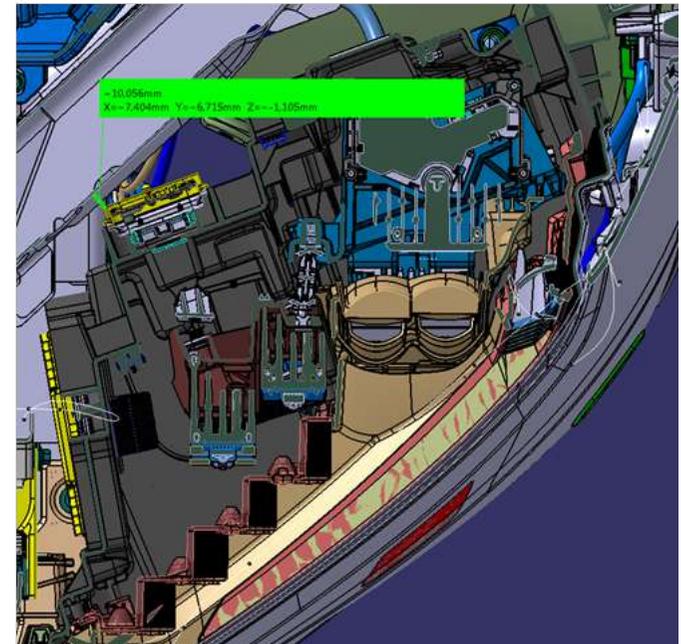
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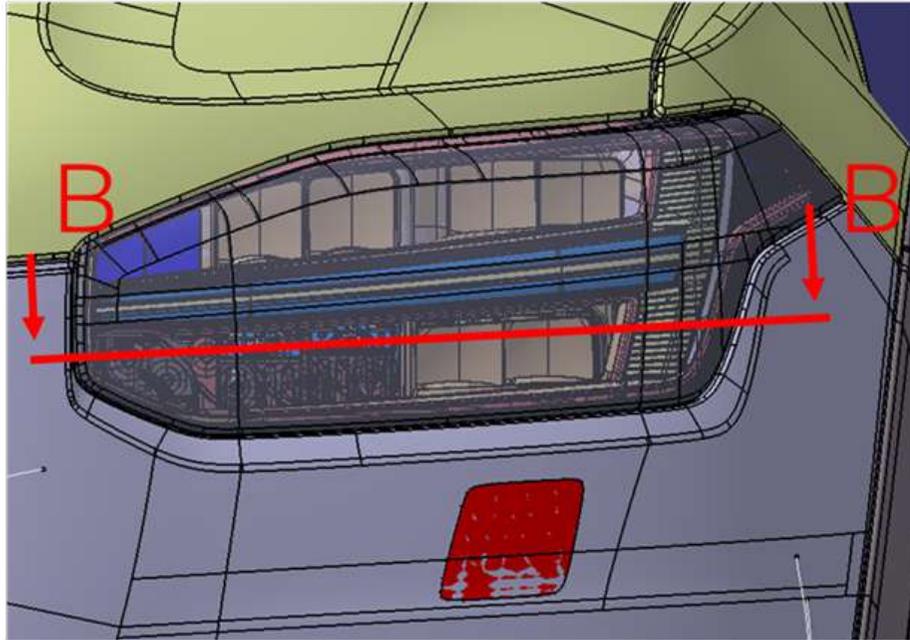
Headlamp Packaging



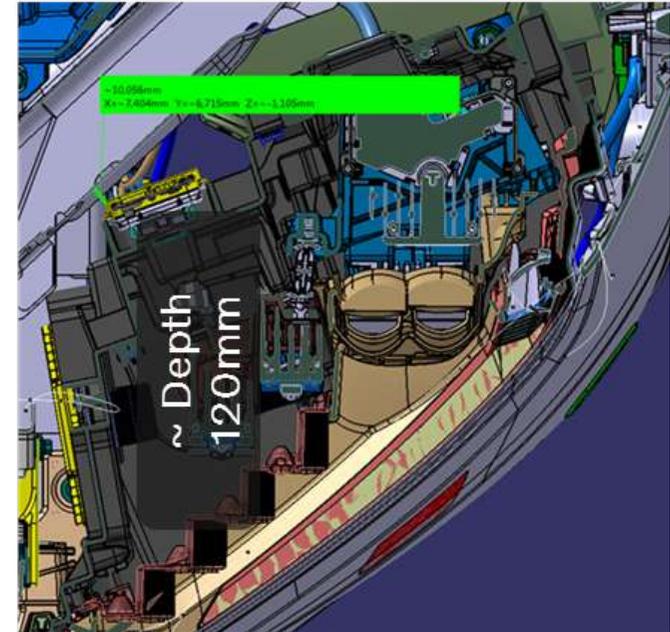
B-B



Headlamp Packaging

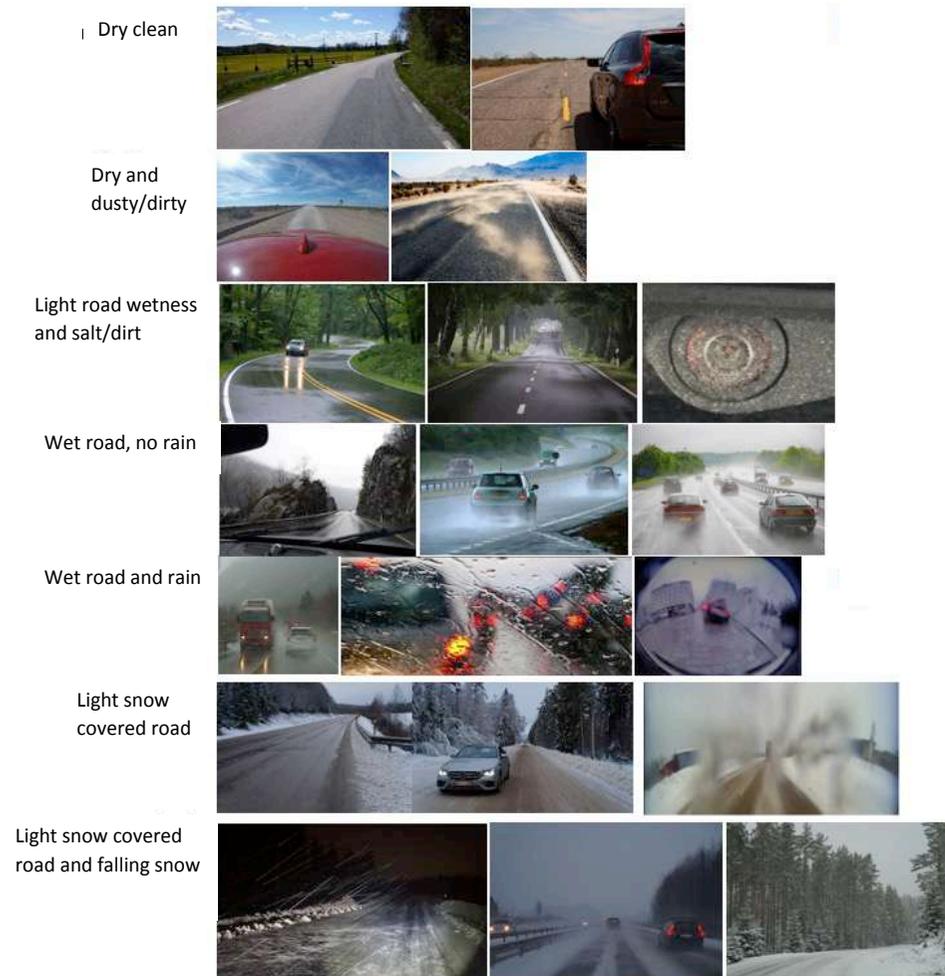


B-B



Availability of sensors

In all conditions



Availability of sensors

For all sensors

Availability of sensors

For all sensors

- Camera



Availability of sensors

For all sensors :

- Camera
- Radar



Availability of sensors

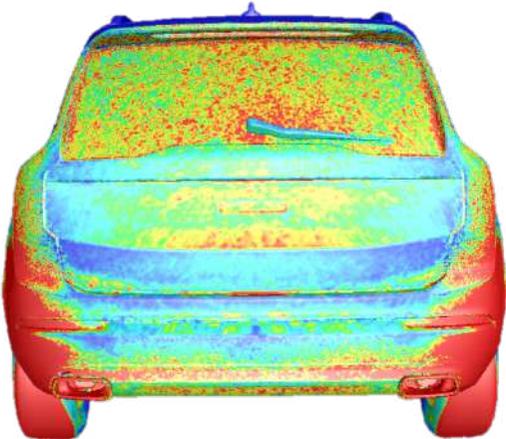
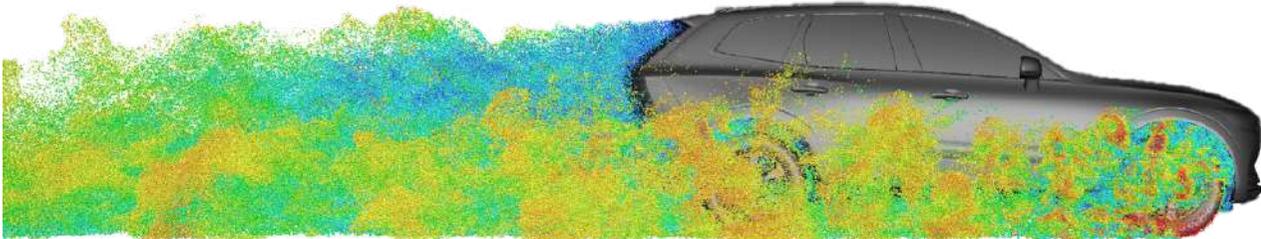
For all sensors :

- Camera
- Radar
- Ultra sonic sensors



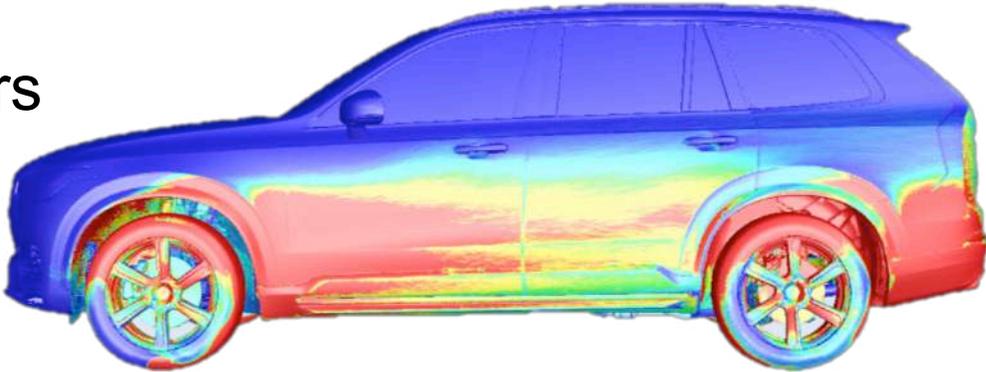
Availability of sensors

Soil simulation – self contamination



Availability of sensors

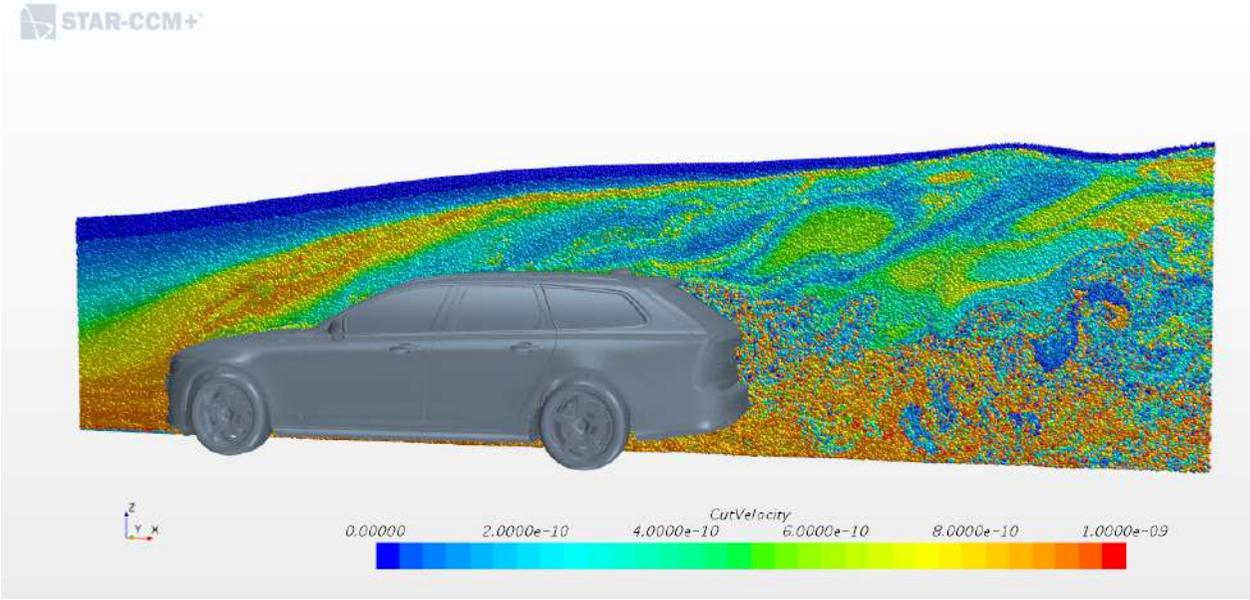
Soil simulation – self contamination



Soiling on the vehicle side from prediction in CFD and tests on gravel roads

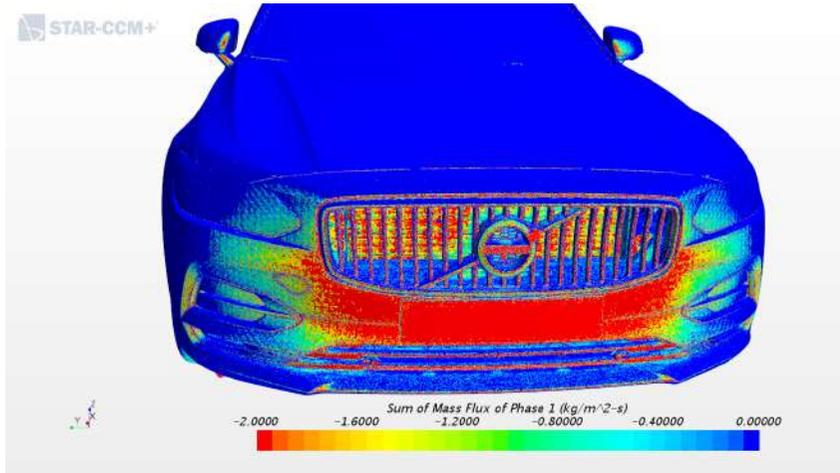
Availability of sensors

Soil simulation – foreign contamination

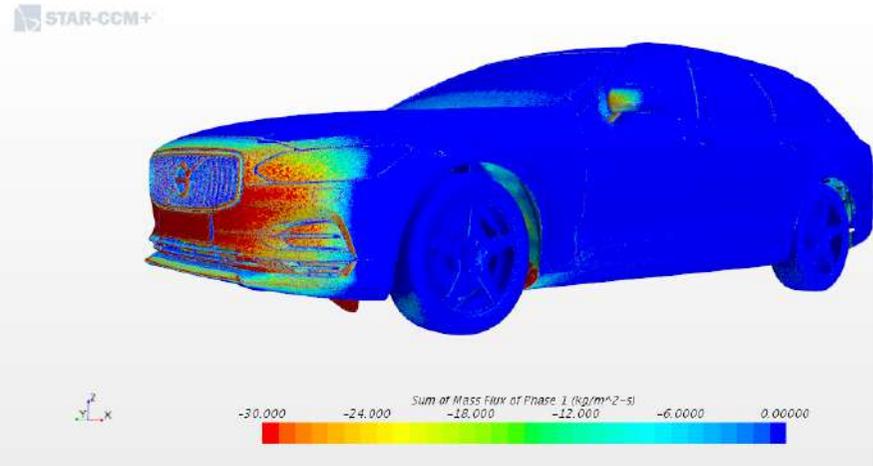


Availability of sensors

Soil simulation



Sticking snow



Global contamination

Less contamination in headlamp than in grill area

Availability of sensors

Efficiency of cleaning systems

For Headlamp, Regulation in UNECE R45 with speed 0 km/h



Speed 0 km/h

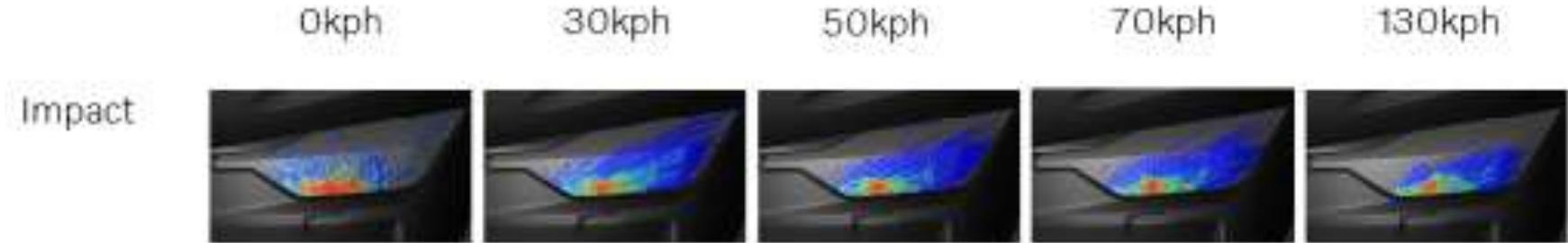


Speed 130 km/h

Availability of sensors

Efficiency of cleaning systems

Results of simulations



To sum up

Difficulty to integrate our current sensors in our current cars : radar, cameras, ultra sonic sensors

- New Sensors have to be as small as possible

AD requests a full time availability of sensors

- New cleaning systems are required
- Simulation is very important to support the sensor integration

Headlamp is not a bad location for sensors

- More available depth vs. grill
- Less contamination
- But need a very good HLC (headlamp cleaning system)

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Today solution developed between Volvo and Uber

<https://www.media.volvocars.com/global/en-gb/media/pressreleases/254697/volvo-cars-and-uber-present-production-vehicle-ready-for-self-driving>

June 12, 2019



2019.12.03

Paul-Henri MATHA, Exterior Lighting, Technical Leader



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Thank you !



