

Simulation-Based CGI for Automotive Applications

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Benoît Deschamps



DSIN
Direction des Systèmes d'INformation

Agenda

- 1 **CGI for automotive**
- 2 Challenging the physical mockup
- 3 Simulation based on CGI
- 4 Future of CGI
- 5 Conclusion



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PSA Peugeot Citroën Group

2014

- **\$62 Billions** in revenue
- **2,94 Millions** Cars produced
- **2nd Largest** car manufacturer in **Europe**
- **194 682 Employees** in **160** countries
- **Three brands** with strong identities and differentiated



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PSA Peugeot Citroën IT Department

In charge of CGI solutions and VR solutions for all departments



Styling

This section displays two high-quality renderings of a silver Peugeot 508. The first image shows the car from a front-three-quarter view, and the second shows it from a rear-three-quarter view, both set against a dark, reflective studio background.

Perceived quality

This section features a rear view of a silver Peugeot 508 parked on a city street, illustrating the car's appearance in a real-world environment.

Marketing Images

This section shows a Peugeot 508 displayed on a digital marketing interface, which includes various navigation buttons and product information.



Class A Modeling

This section illustrates Class A surface modeling, featuring a wireframe mesh of a car body part and a close-up of a finished, polished metal component.

After Sales

This section displays a technical diagram of a car's interior layout, labeled 'Aménagement du coffre', used for after-sales support or training.

Digital Factory

This section represents the digital factory concept, showing a 3D model of a car assembly line and a photograph of a meeting where digital models are being discussed.

Computing Design

This section focuses on the computational design process, featuring several 3D models and wireframes of car components, including a side view of a car body and a detailed view of a car seat.

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Virtual Reality and driving simulation

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Augmented Reality, Projection Mapping, New Interface



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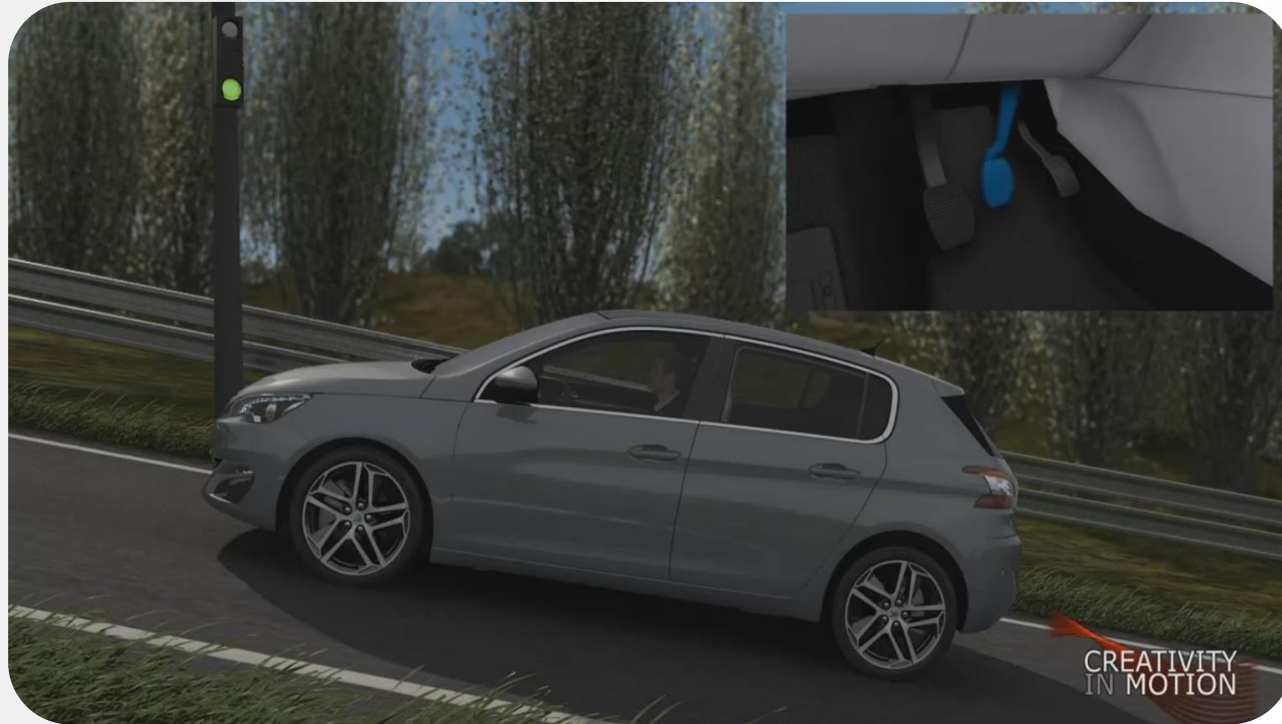
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Automatic CGI production

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CREATIVITY
IN MOTION



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Challenging the physical mockup

Design quickly, Good design And cost reduction...

- The physical mockup is necessary but
 - It is difficult to update the mockup with the CAO production
 - Color and Trim are limited
- The cost is important if we need to illustrate all possibilities
 - Variant
 - Interior / exterior
- Driving on the road is limited...



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Challenging the physical mockup

Design quickly, Good design And cost reduction...

- Virtual mockup and CGI can help us :
 - If we add tools to understand what we see and evaluate properly the default.
 - If we can automatically provide solution from a numerical simulation.
 - If we provide solution to evaluate the virtual mockup with the same simplicity and quality than the physical mockup.



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Simulation based on CGI

How to analyse that we see on CGI...



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Simulation based on CGI

The solution: Combine physical based rendering and false color analysis



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Simulation based on CGI

The solution: Combine physical based rendering and false color analysis



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Simulate with a virtual mockup a problem, it's a best practice...



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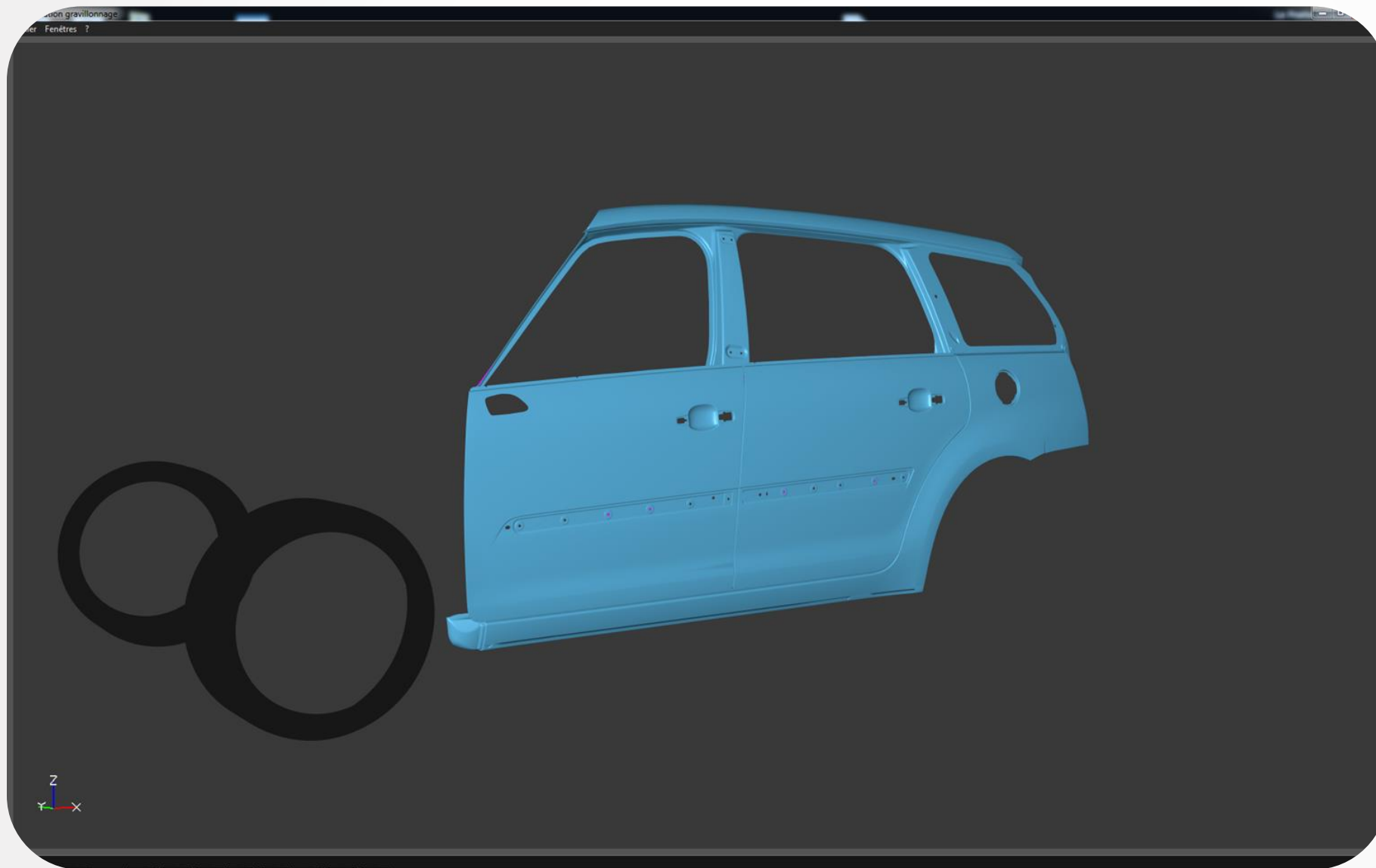
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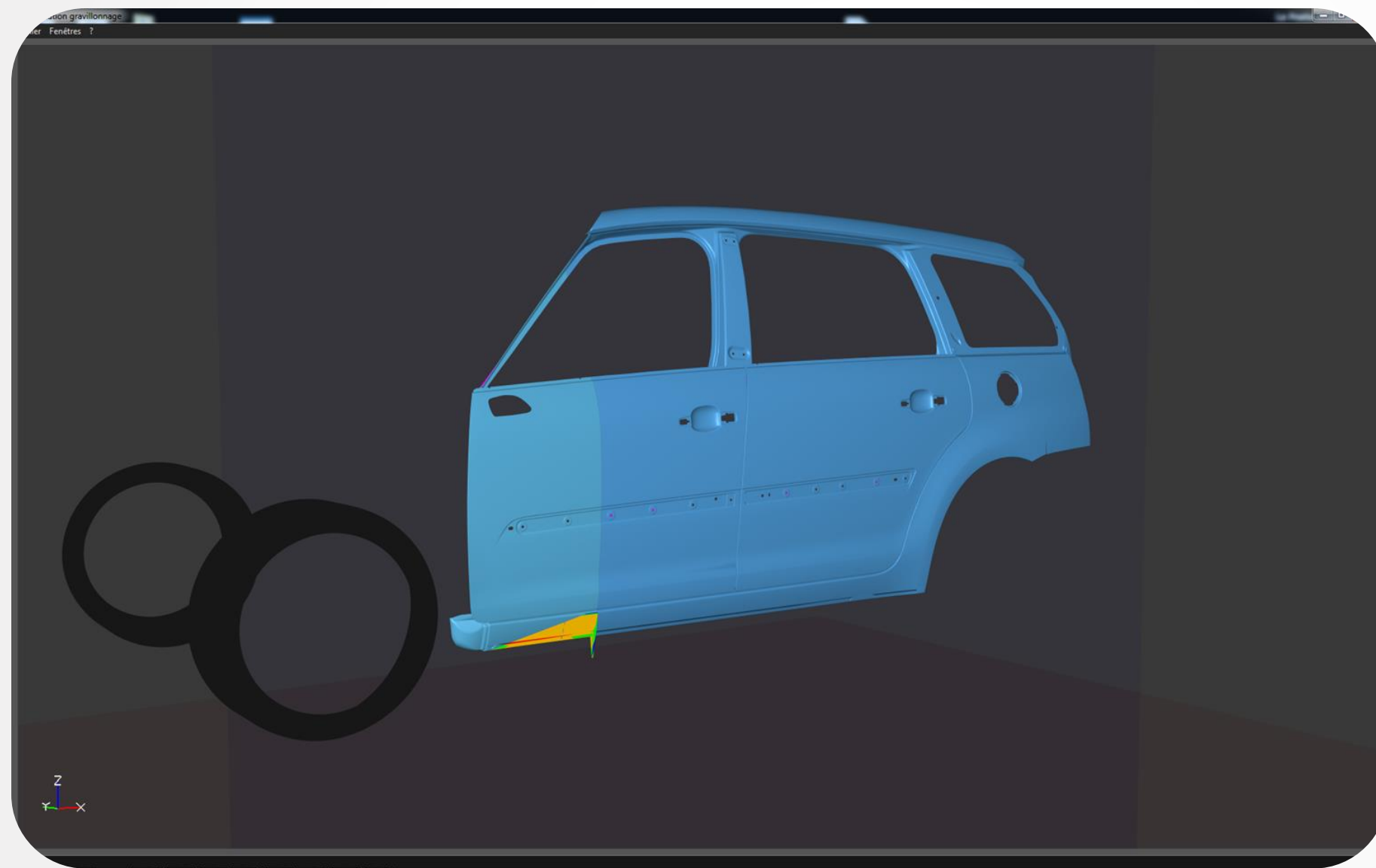
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But help the designer to find the best solution to solve this problem, it is better



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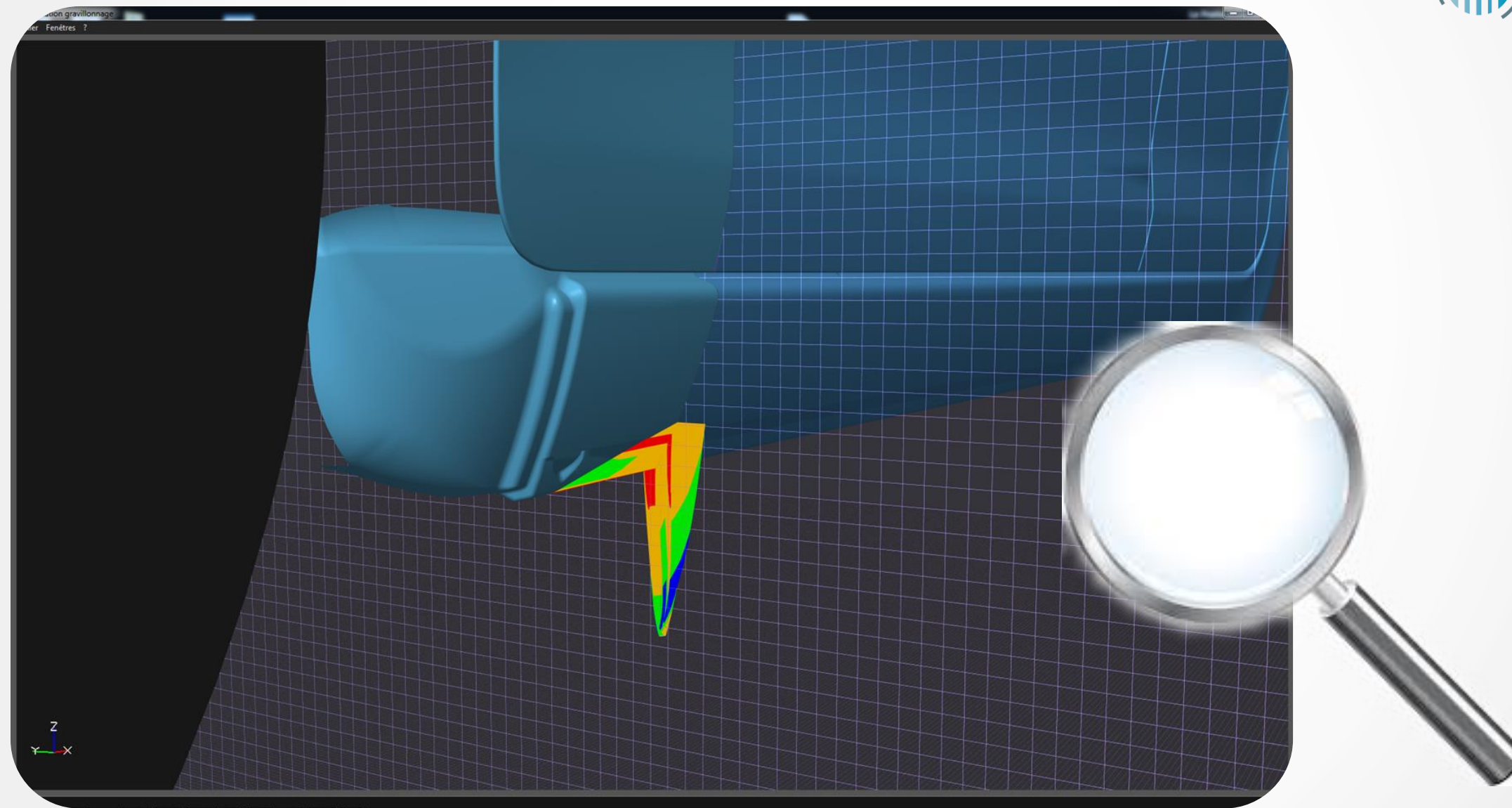
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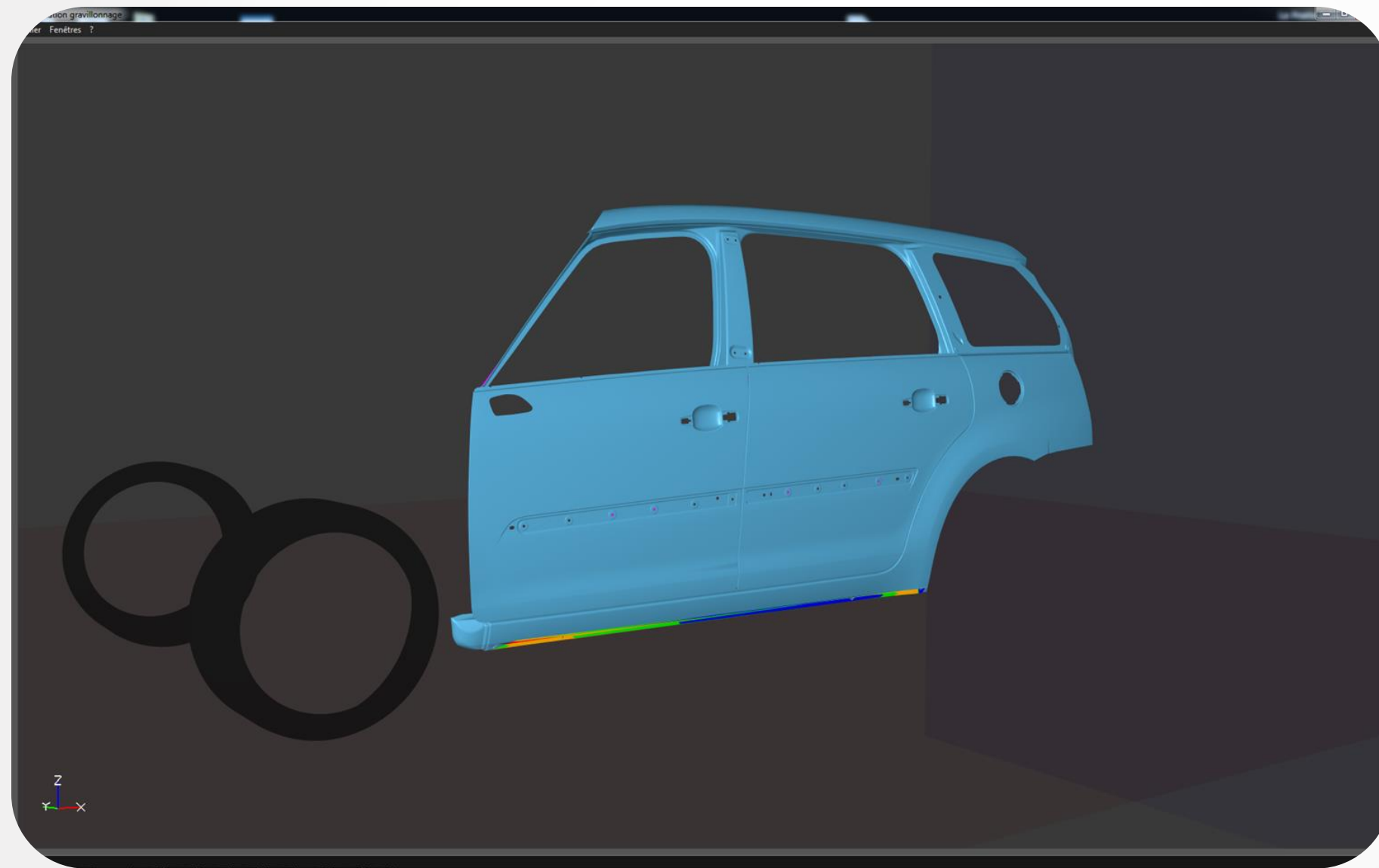
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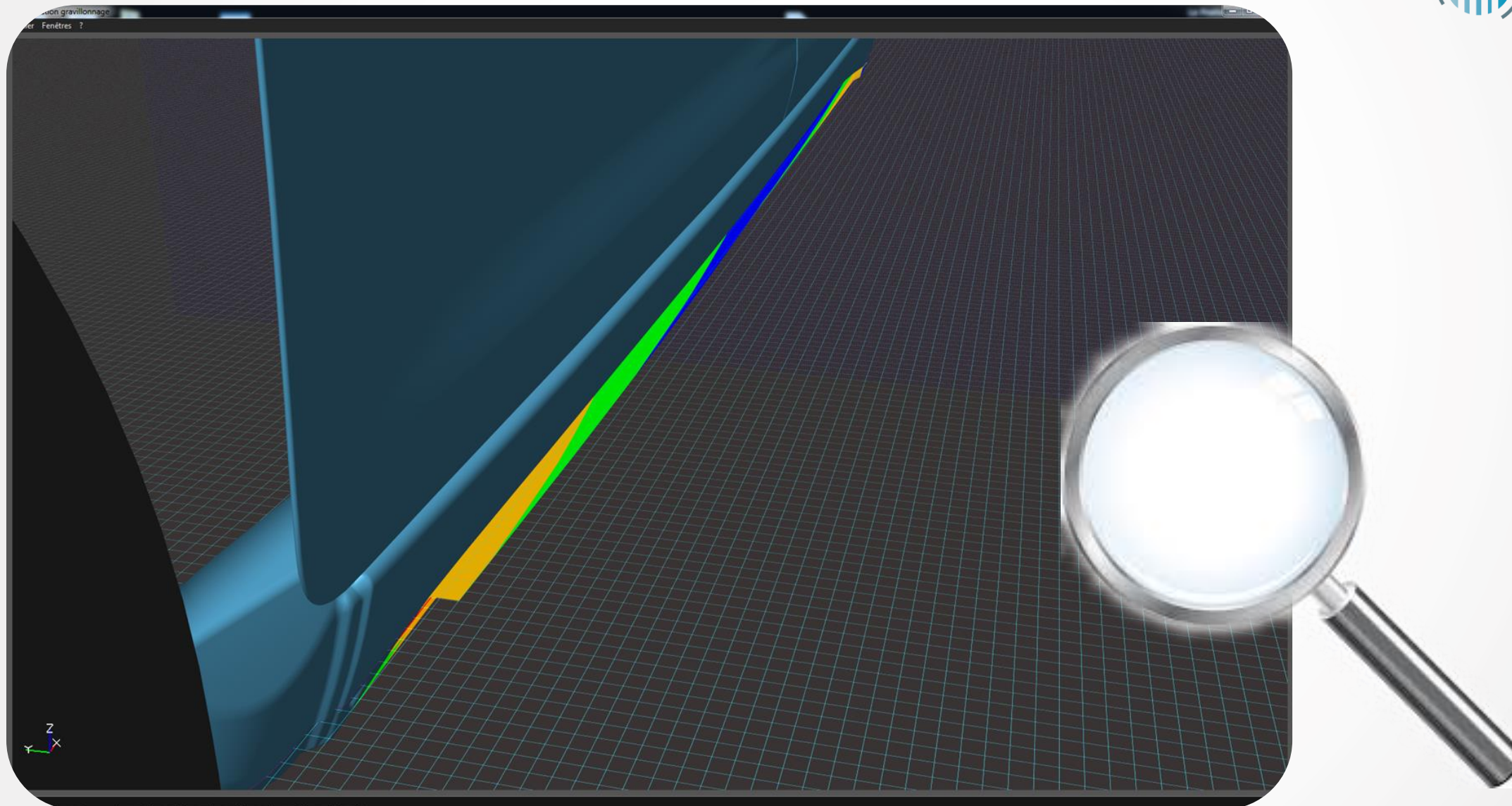
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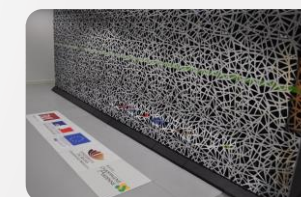
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Full Quality In realtime : 4K resolution, Global Illumination, ...



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Future of CGI

I had a dream ... and the dream becomes reality

○ Realtime rendering for all people

- User friendly interface.
- Available for all platforms : computer, tablet, smartphone, ...

○ Realistic rendering

- Based on material and light measurement.
- Global Illumination.

○ Power on Demand:

- CPU, GPU, MultiGPU, HPC, Grid computing, ...



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Conclusion

We don't work alone ...

○ Thanks to

- Nvidia Team.
- GTC Team.
- 3DExcite R&D Team.
- University of Reims URCA
- Romeo Team
- ...

○ Special thanks to

- My team.
- My end users.
- Stéphane Wolf and Chen XU
- ...

