The new Tenneco ACOCAR active suspension system

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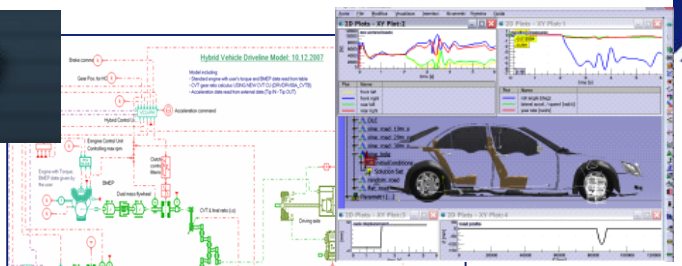
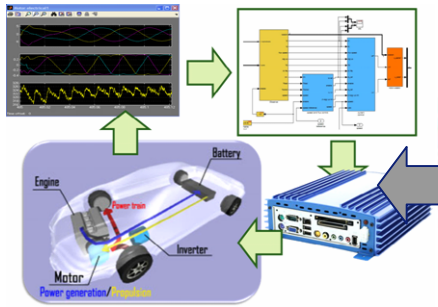
Contents

- The InAST / REVAS Flanders' Drive research project
- The ACOCAR system layout
- The ACOCAR system operation
- System simulations
- Actuator performance
- Vehicle performance
- Actuator design
- Market position of the ACOCAR technology
- Conclusion

The InAST / REVAS Flanders Drive Project



Vehicle dynamics server: state estimator



Rapid prototyping software platform

Active safety demonstrator

Innovative sensors

With support of

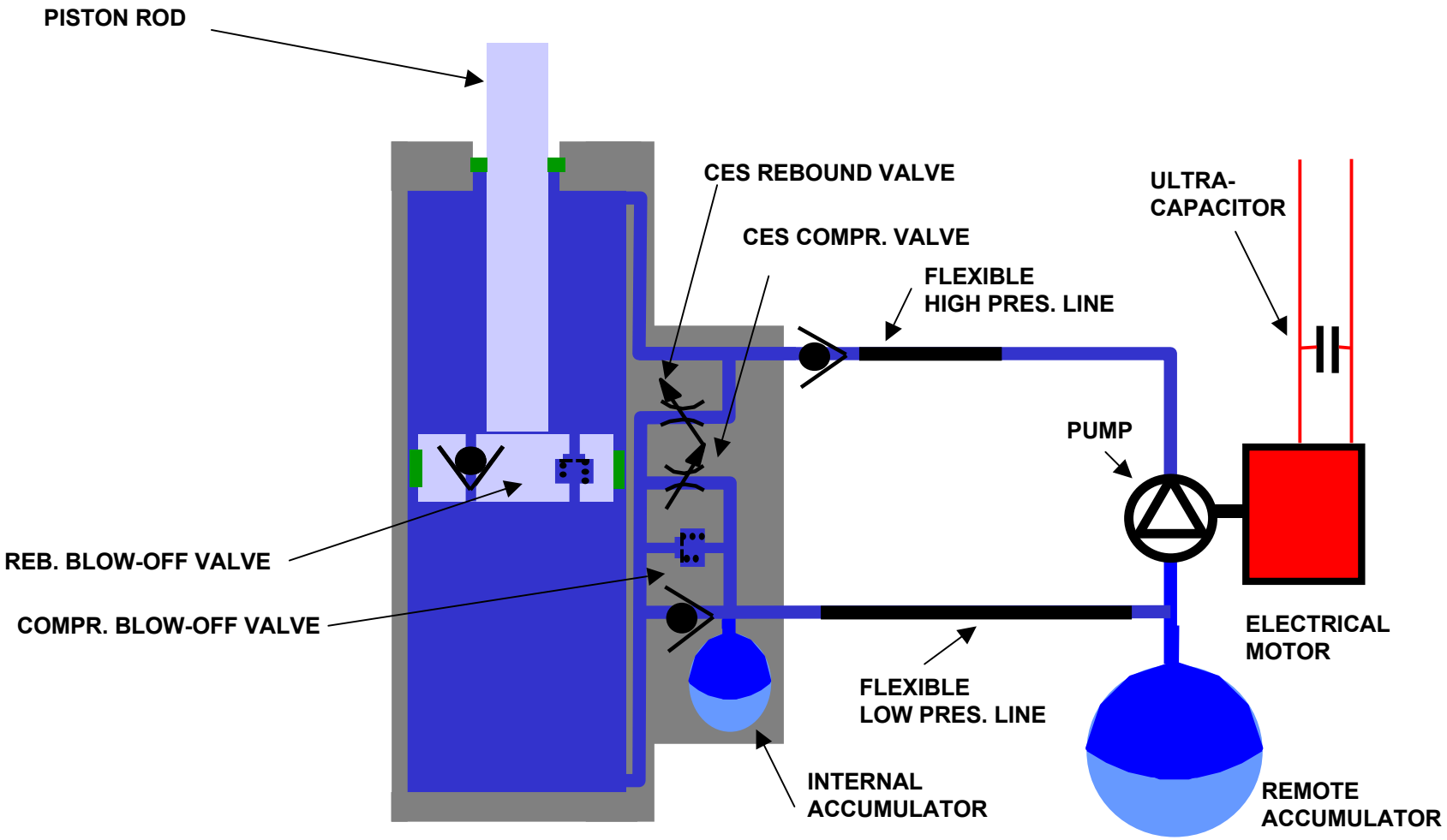
Active suspension

ON Semiconductor

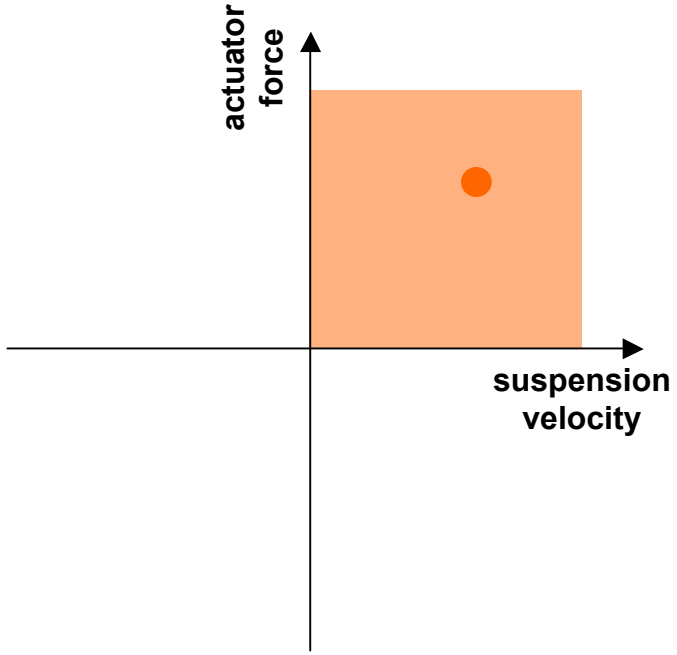
agentschap voor Innovatie door Wetenschap en Technologie

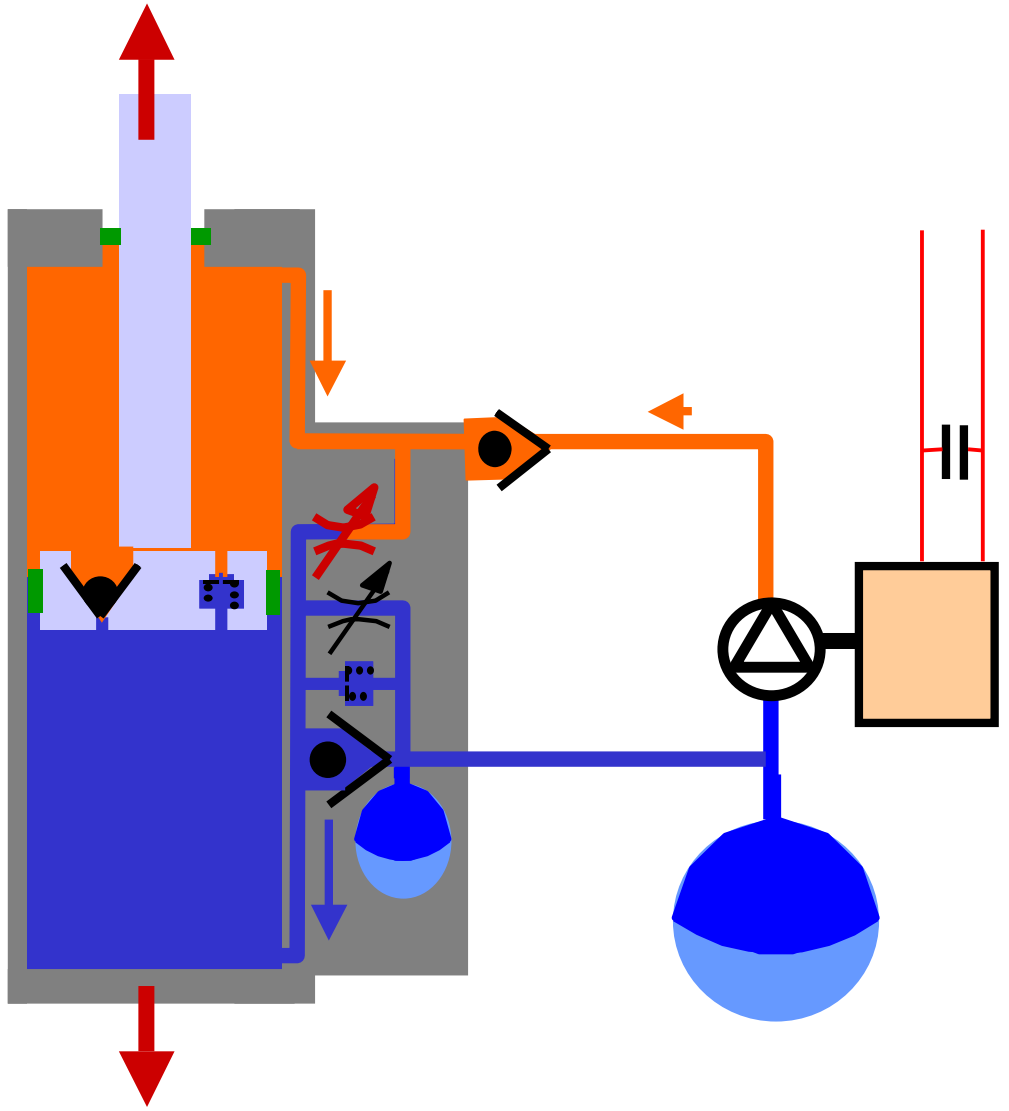
Vehicle Dynamics Expo 2010 – Stuttgart

The ACOCAR system layout

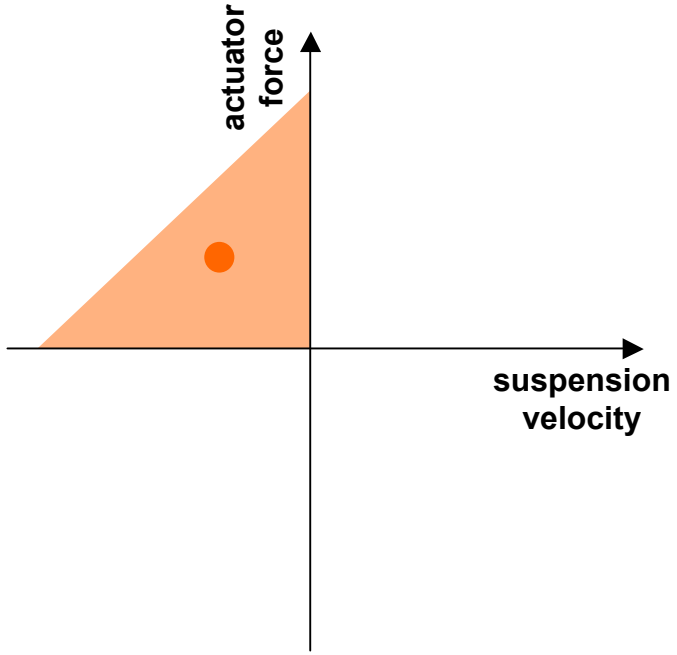


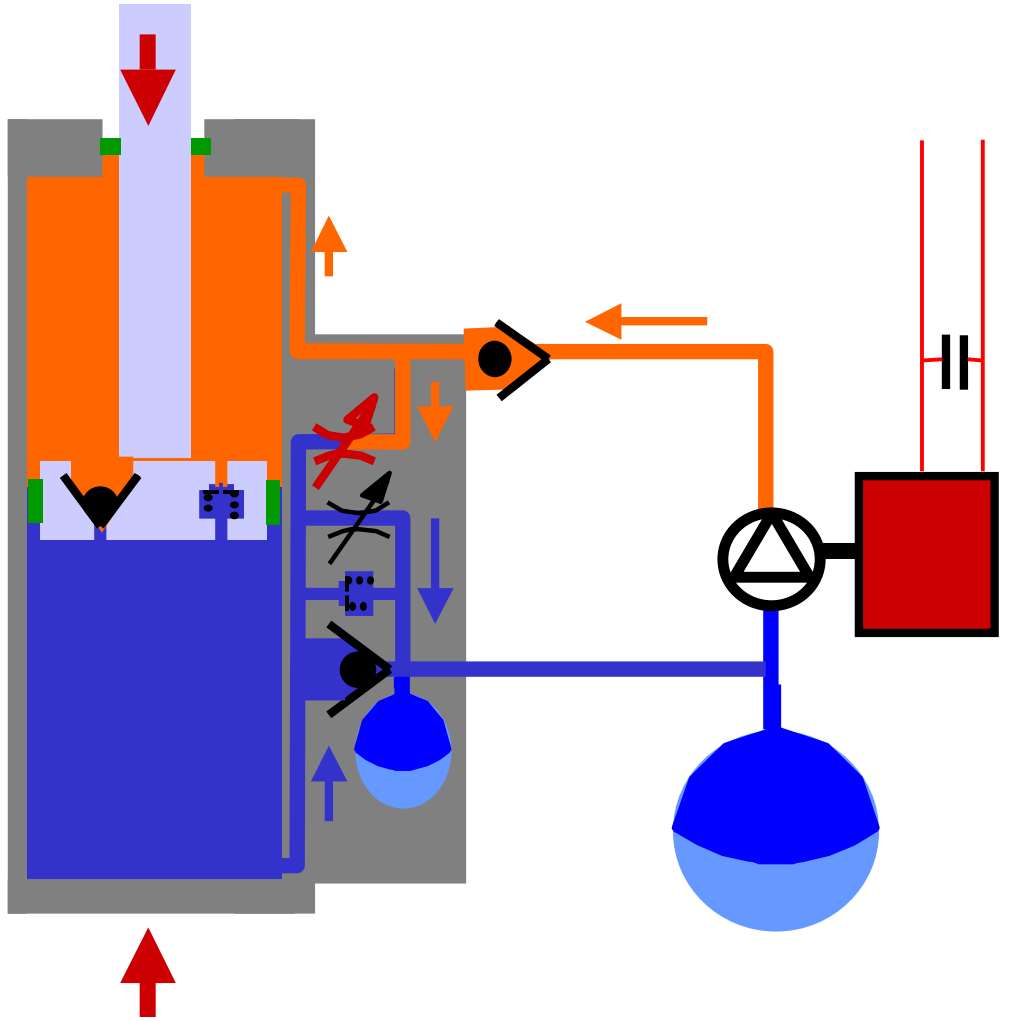
ACOCAR system – semi-active operation in rebound



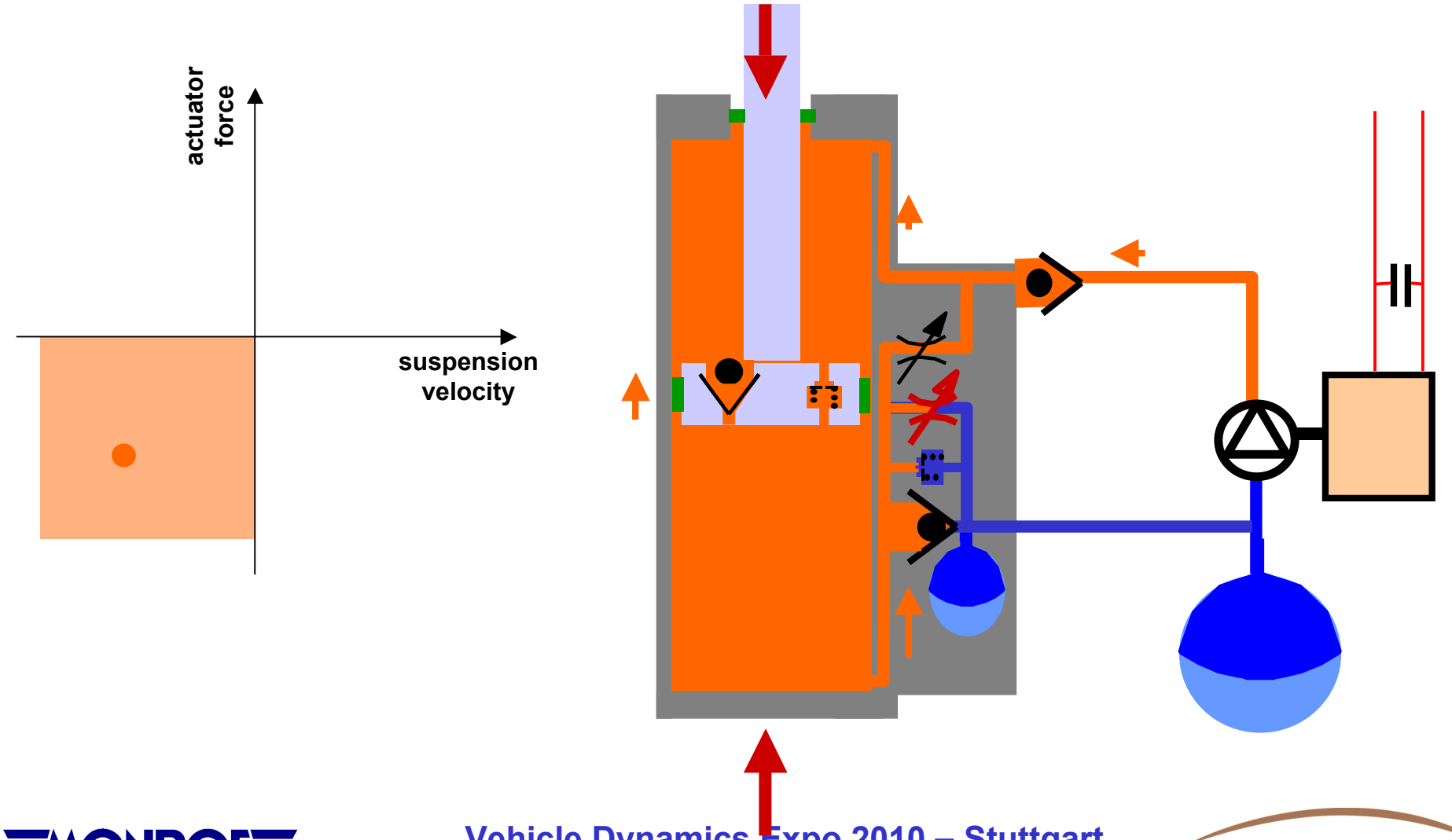


ACOCAR system – active operation in rebound

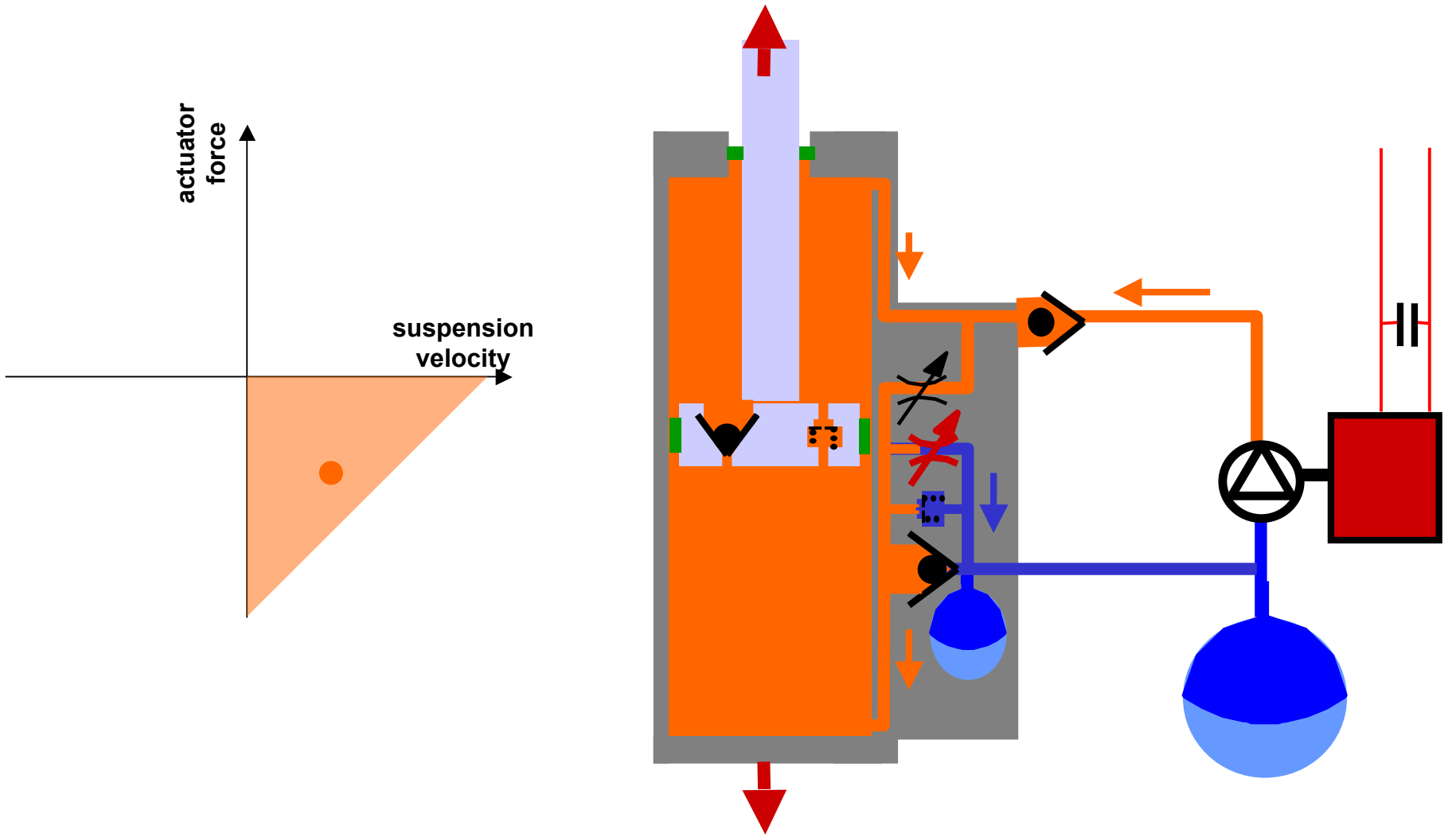




ACOCAR system – semi-active operation in compression

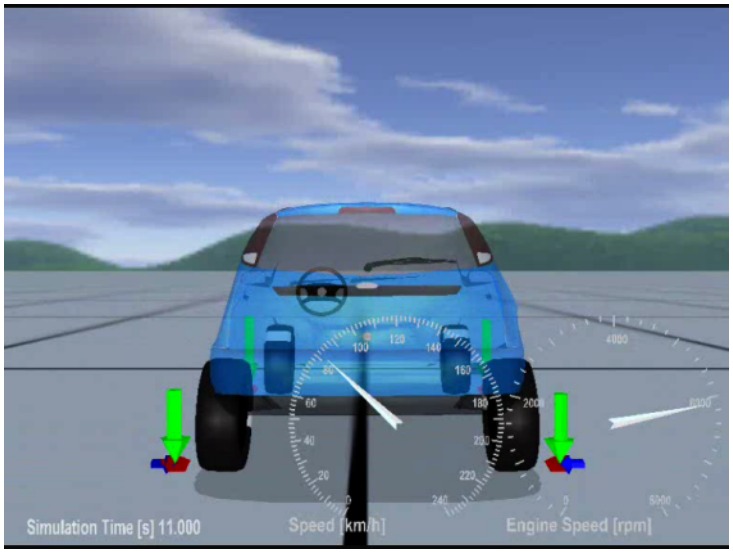


ACOCAR system – active operation in compression

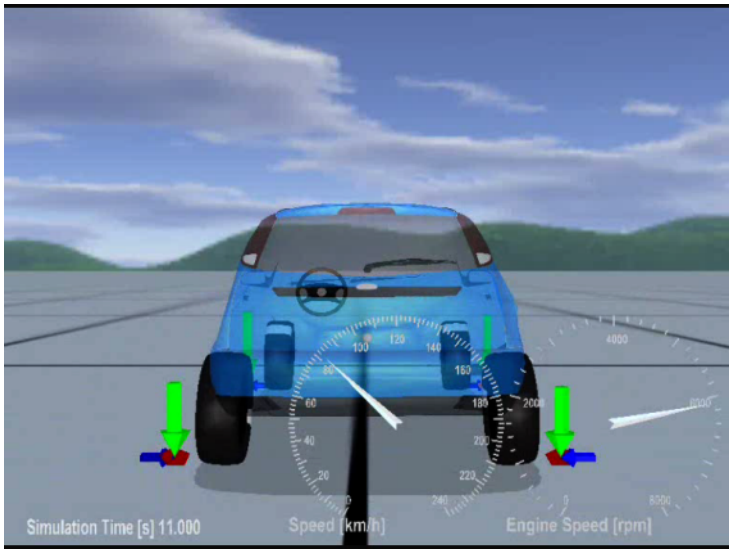


Simulations to generate force-velocity working points

Current situation (e.g. primary ride on road ISO 8608 Class D)



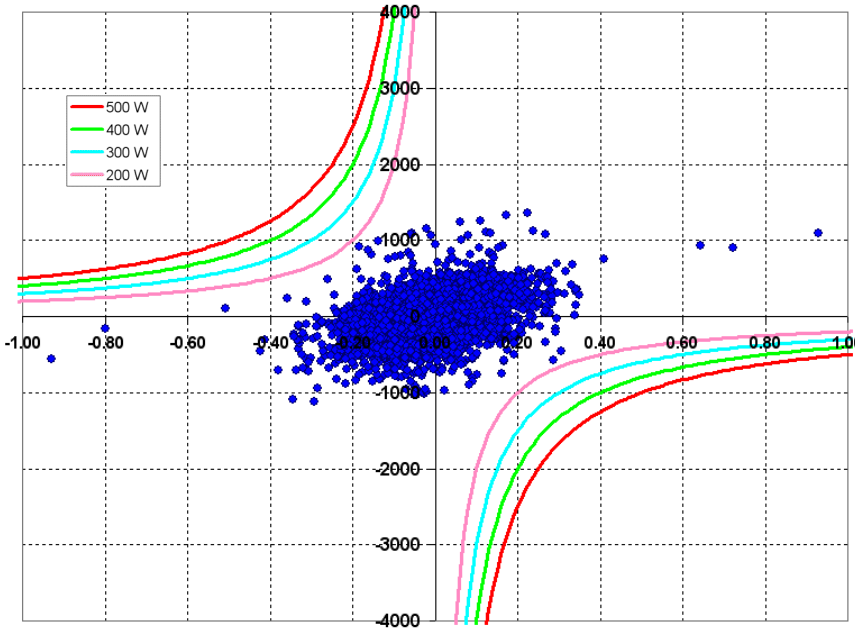
Defined heave, pitch and roll targets for primary ride



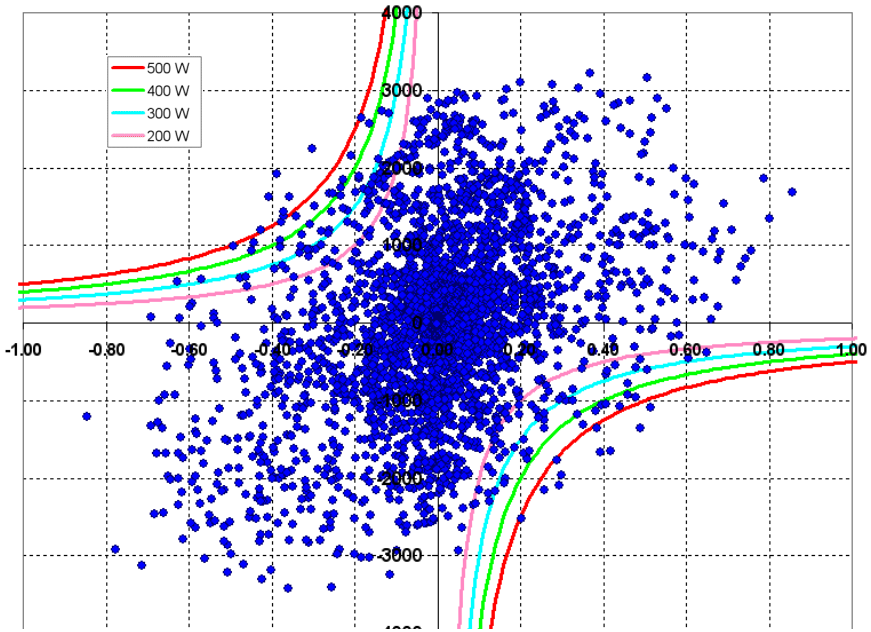
Also targets defined for secondary and NVH

Active suspension working points & Iso-Power curves on different road profiles

Normal Road



Rough Road



Vehicle performance

- Roll control
  - Roll control is very good for normal and sporty street use: ‘flat vehicle behavior’
- Body control
  - Excellent (sky hook) body control
  - 5 l/min pump flow peaks are sufficient on the worst road profiles, less on other road profiles
  - See next slide with video

Vehicle Performance
Passive vs. ACOCAR active suspension

Passive

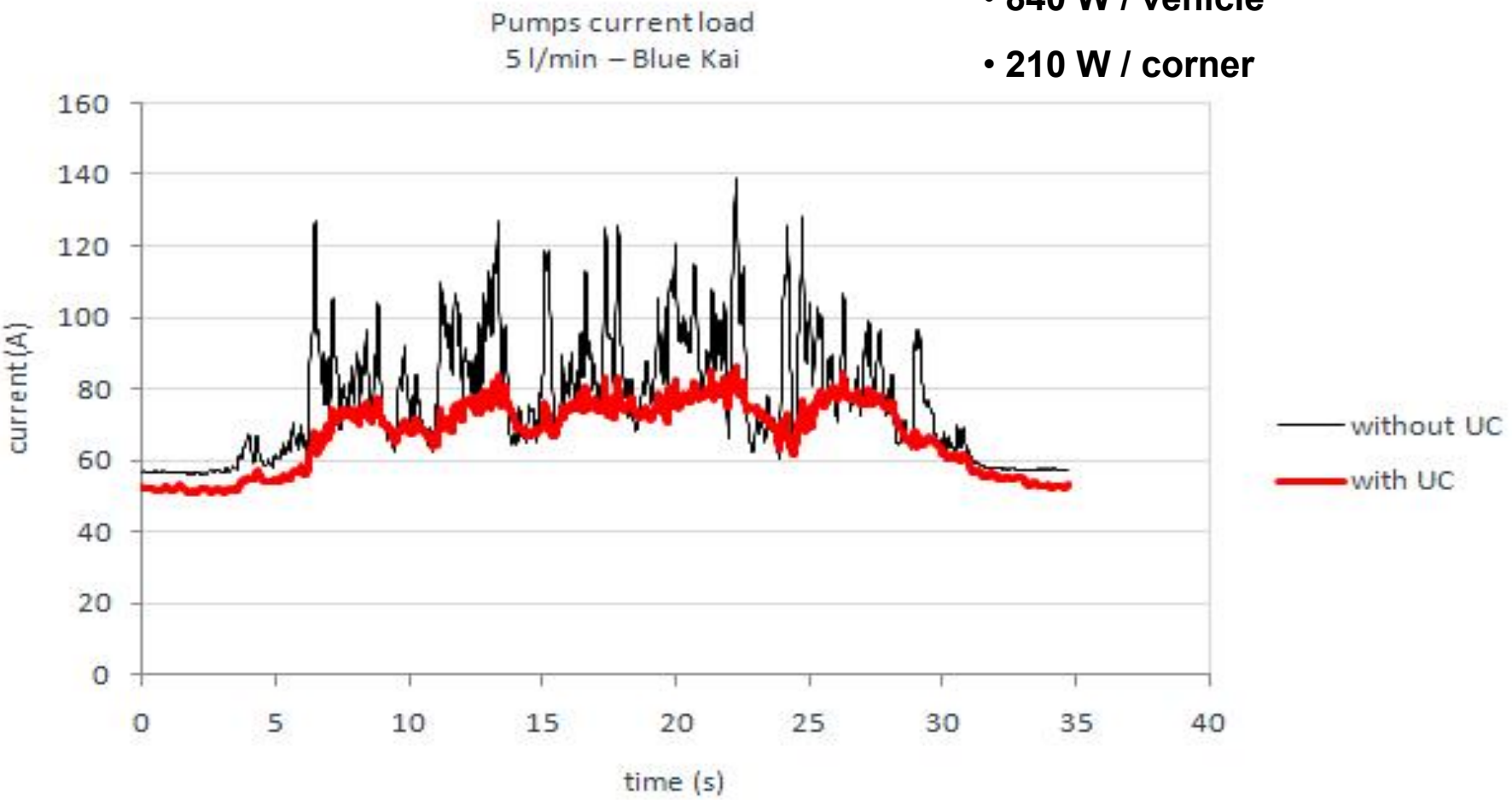
Active

Blauwe Kei, Lommel, 80km/h

Vehicle performance: Energy consumption
Rough road (w/wo Ultracaps)

Average power consumption pumps:

- **840 W / vehicle**
- **210 W / corner**

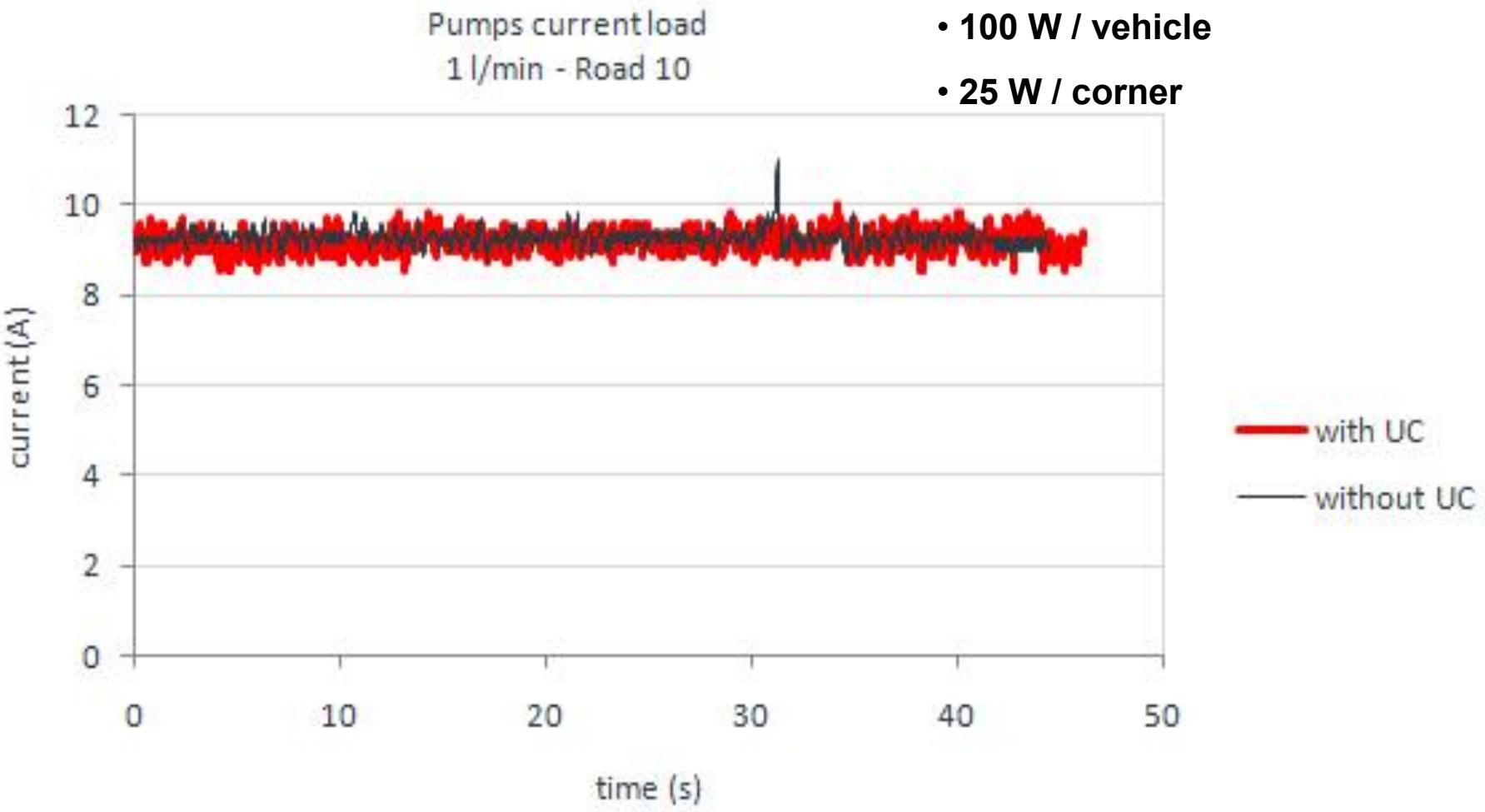


(Blauwe Kei, Lommel, 60km/h)

Vehicle performance: Energy consumption
Normal road (w/wo Ultracaps)

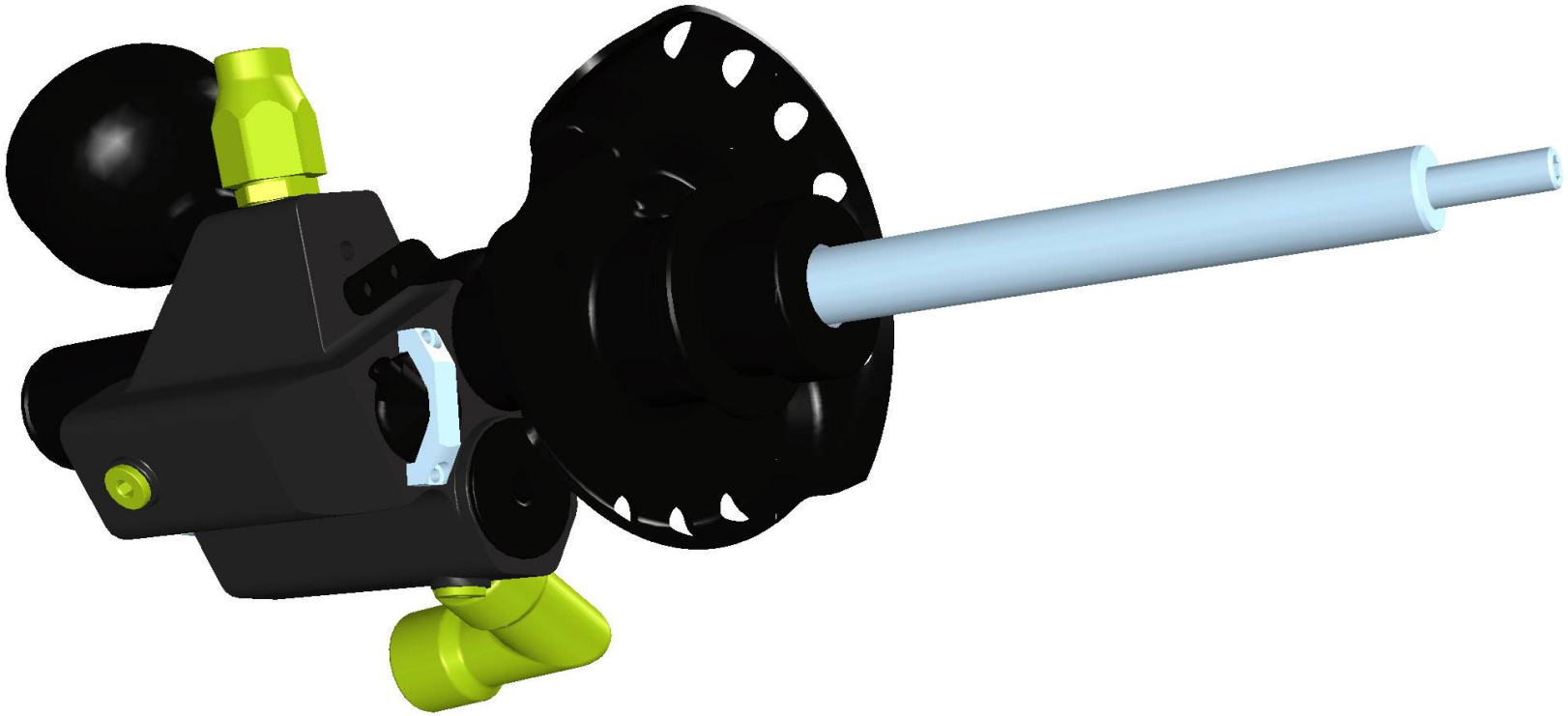
Average power consumption pumps:

- **100 W / vehicle**
- **25 W / corner**

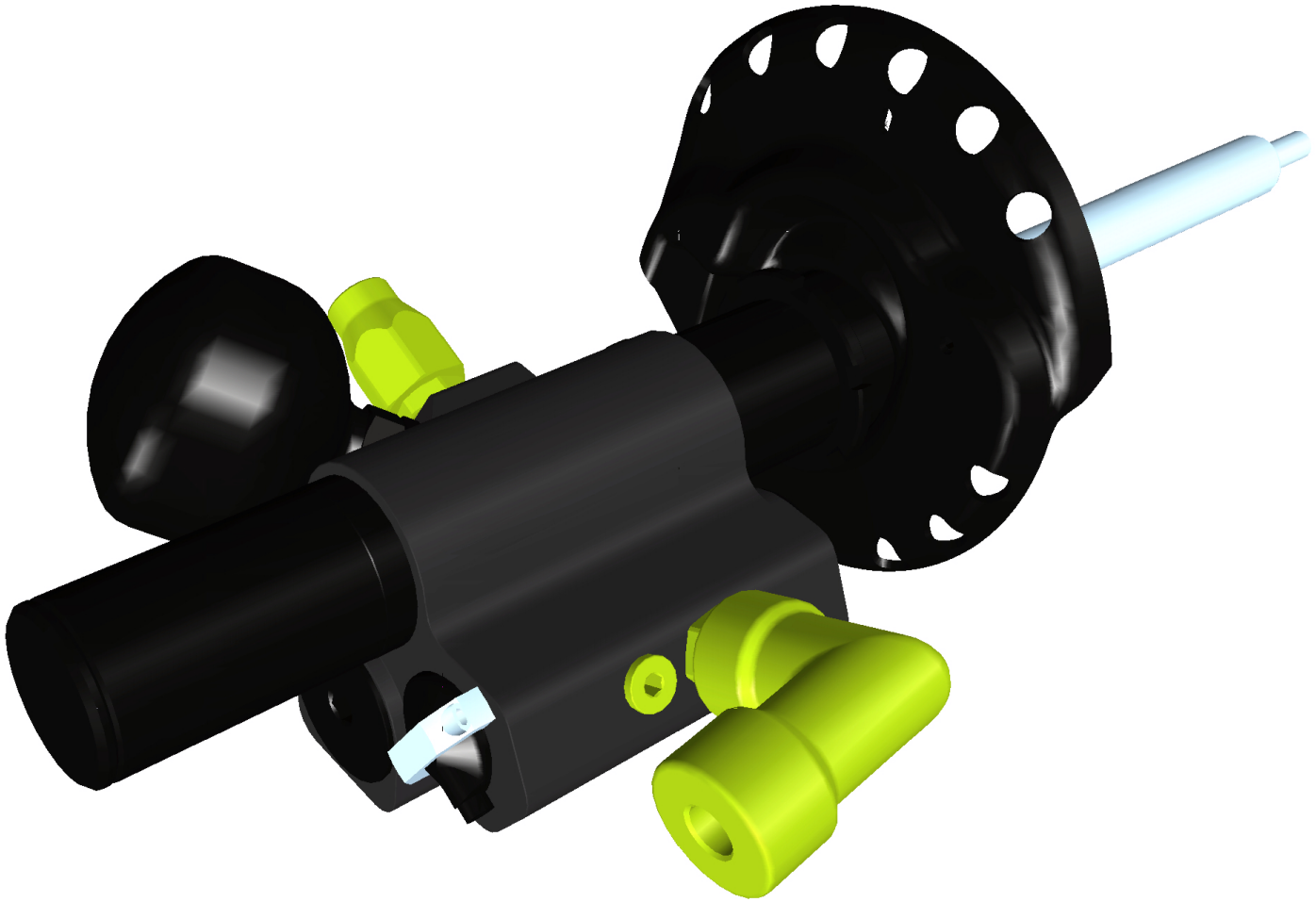


(Road 10, Lommel, 100km/h)

Design front ACOCAR actuator



Design front ACOCAR actuator



Design rear ACOCAR actuator

Market position of the ACOCAR technology

- Ultimate comfort combined with excellent handling
- Full active suspension system with low power consumption
- Eco driving mode with almost no power consumption is possible

-> Target segment are top-class limousines and GT’s

Conclusions

- ACOCAR provides unsurpassed vehicle performance on comfort and handling
- Low energy consumption
- Low weight and easy packaging vs. current active systems
- Suited for the next generation of conventional hybrid or electric top range vehicles
- Demonstration vehicles available