Measuring and interpreting load spectra in the hydrostatic traction drive of a self-propelled forage harvester

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Overview

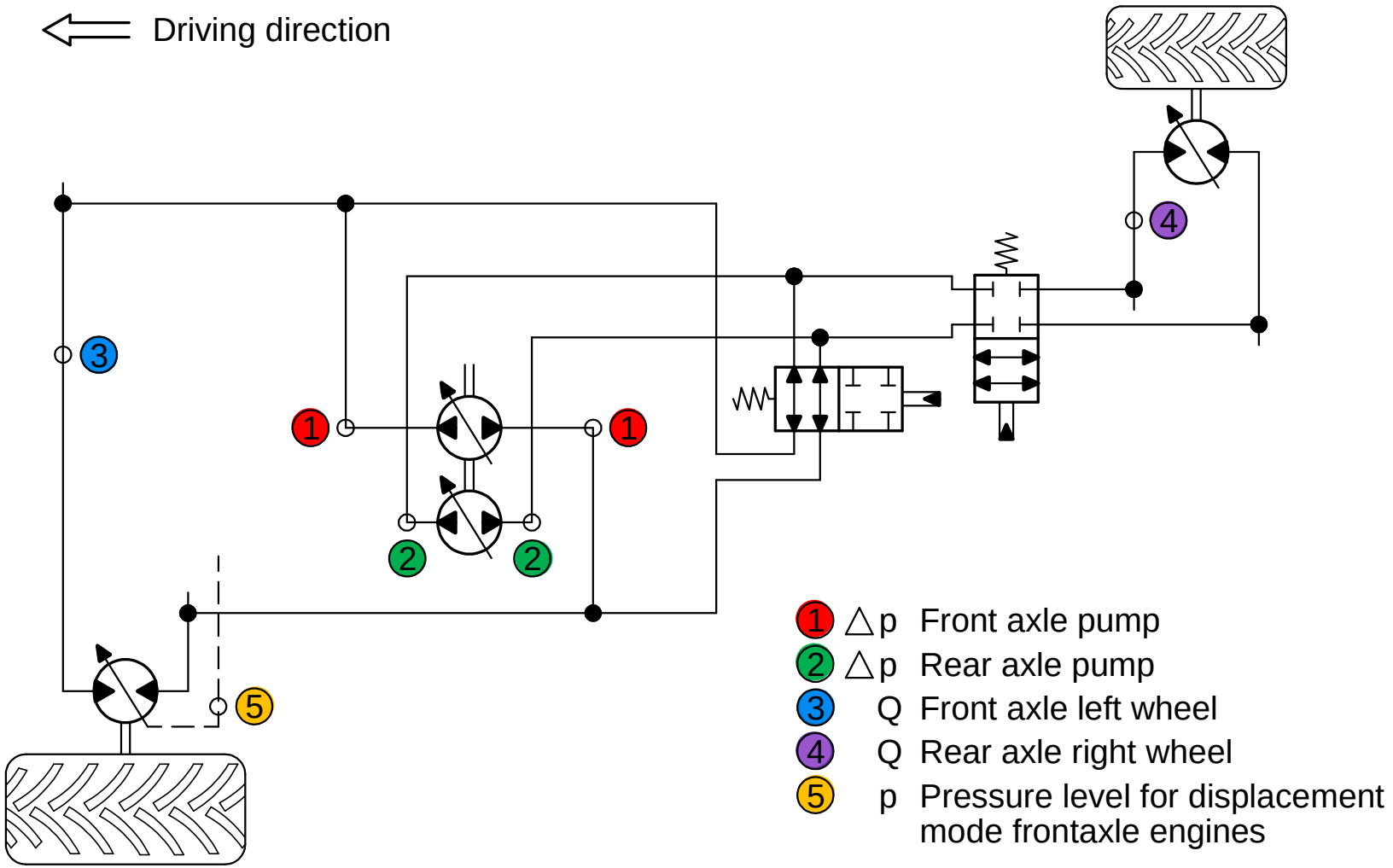
1 Establishment of continuously variable traction drives (CVTDs) in self-propelled harvesting machines
2 Assembly of measurement equipment and test lead
3 Results of field tests
4 Conclusions
5 Summary

Establishment of CVTDs in self-propelled harvesting machines

- Innovation driven by increased productivity
- First load spectra in 1965
- In 1995 for hydrostatic modules in traction drives
- New investigations necessary because of
  - Increased top speed of 40 km/h
  - Wide spread of two powered axles
  - Direct hydrostatic traction drives

(Delfs,1965)

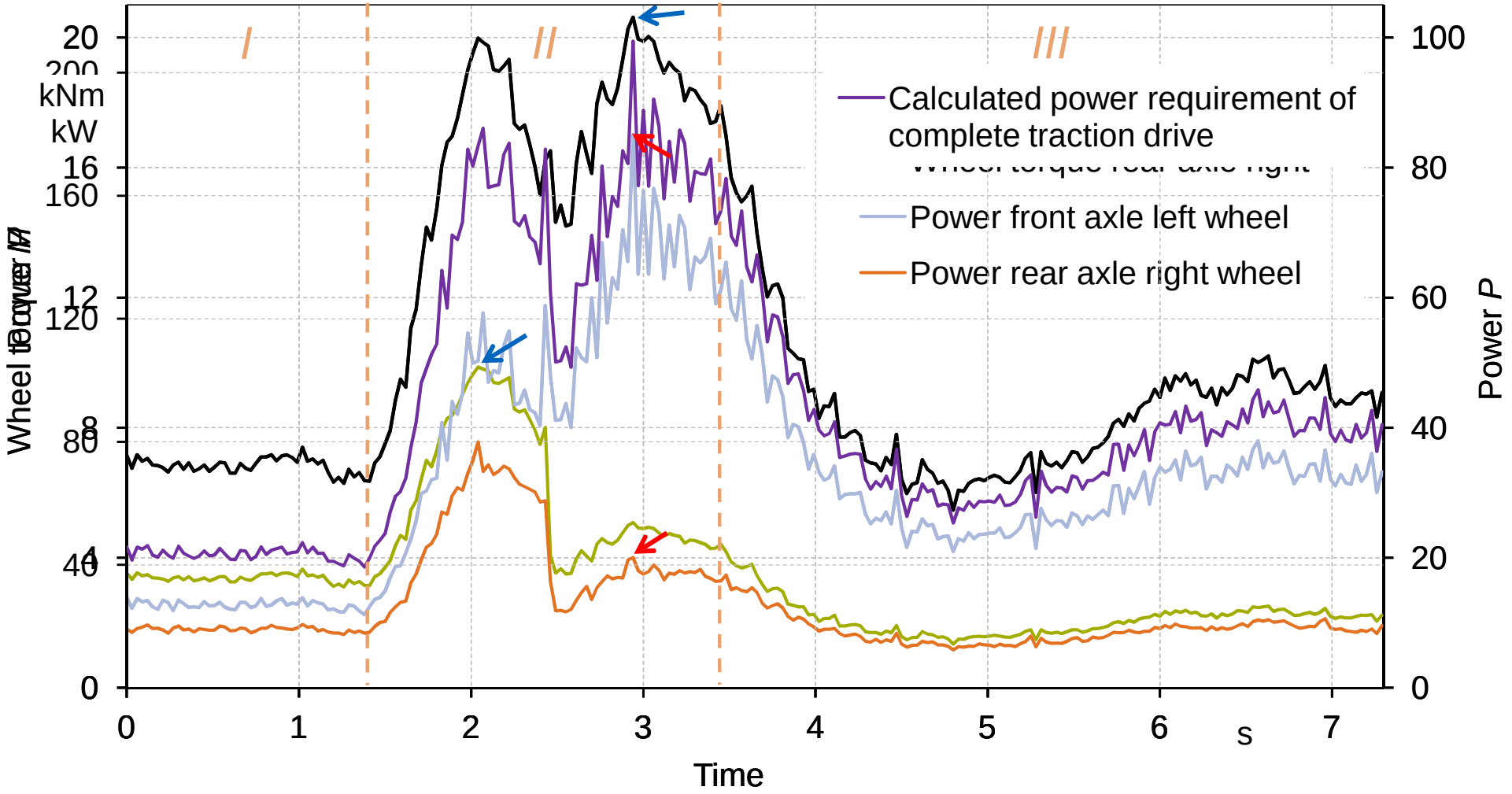
Assembly of measurement equipment



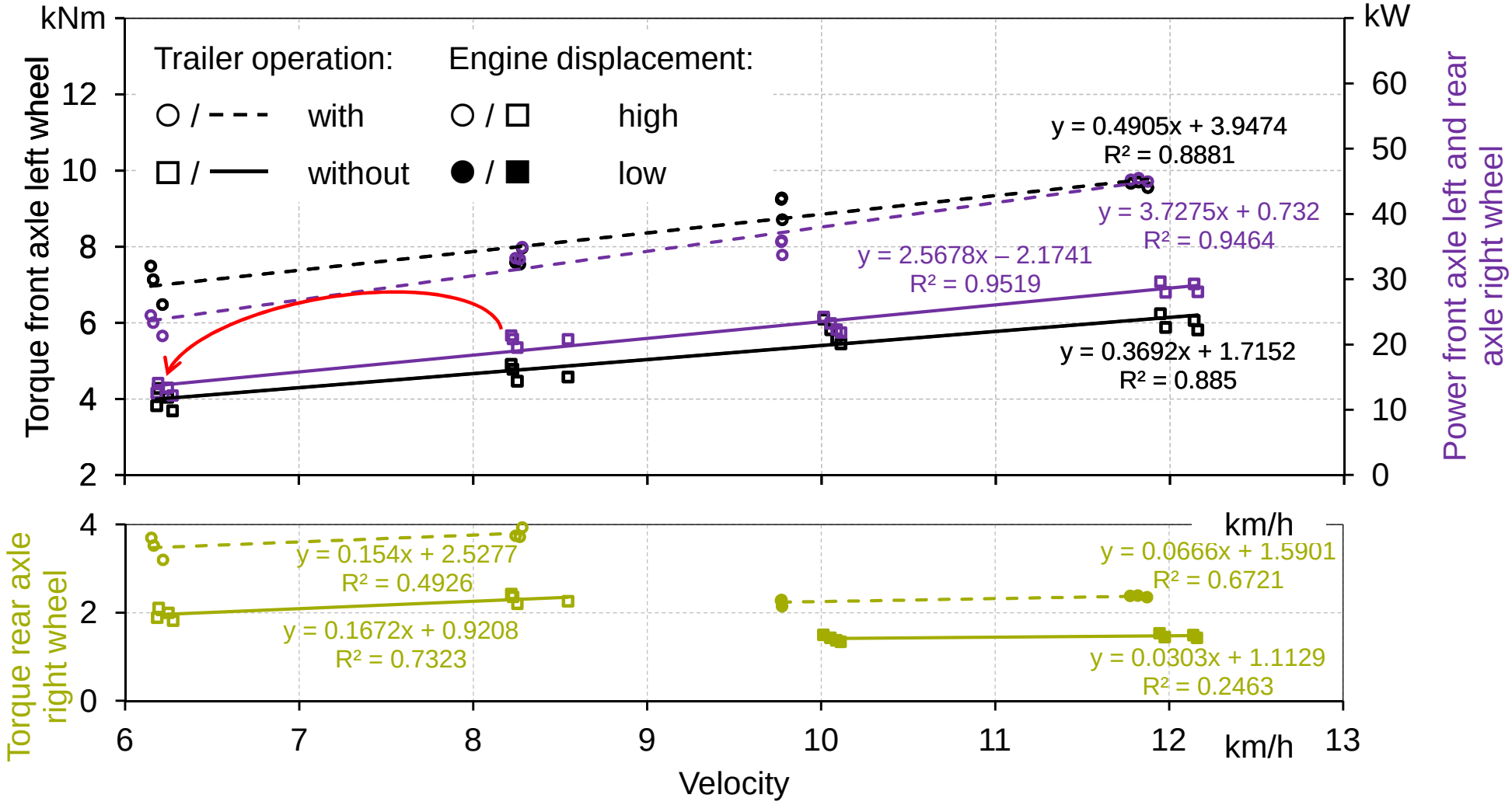
Test lead

- Investigation of in-field and on-road operation during typical conditions with following machine settings:
  - Mode of driving
  - Mode of header guidance
  - Speed over ground
  - Acceleration and deceleration
  - Operations with or without trailer
- Three different levels of aggregation:
  - Illustration of every single test trial
  - Comparison of different machine settings
  - Generation of load spectra

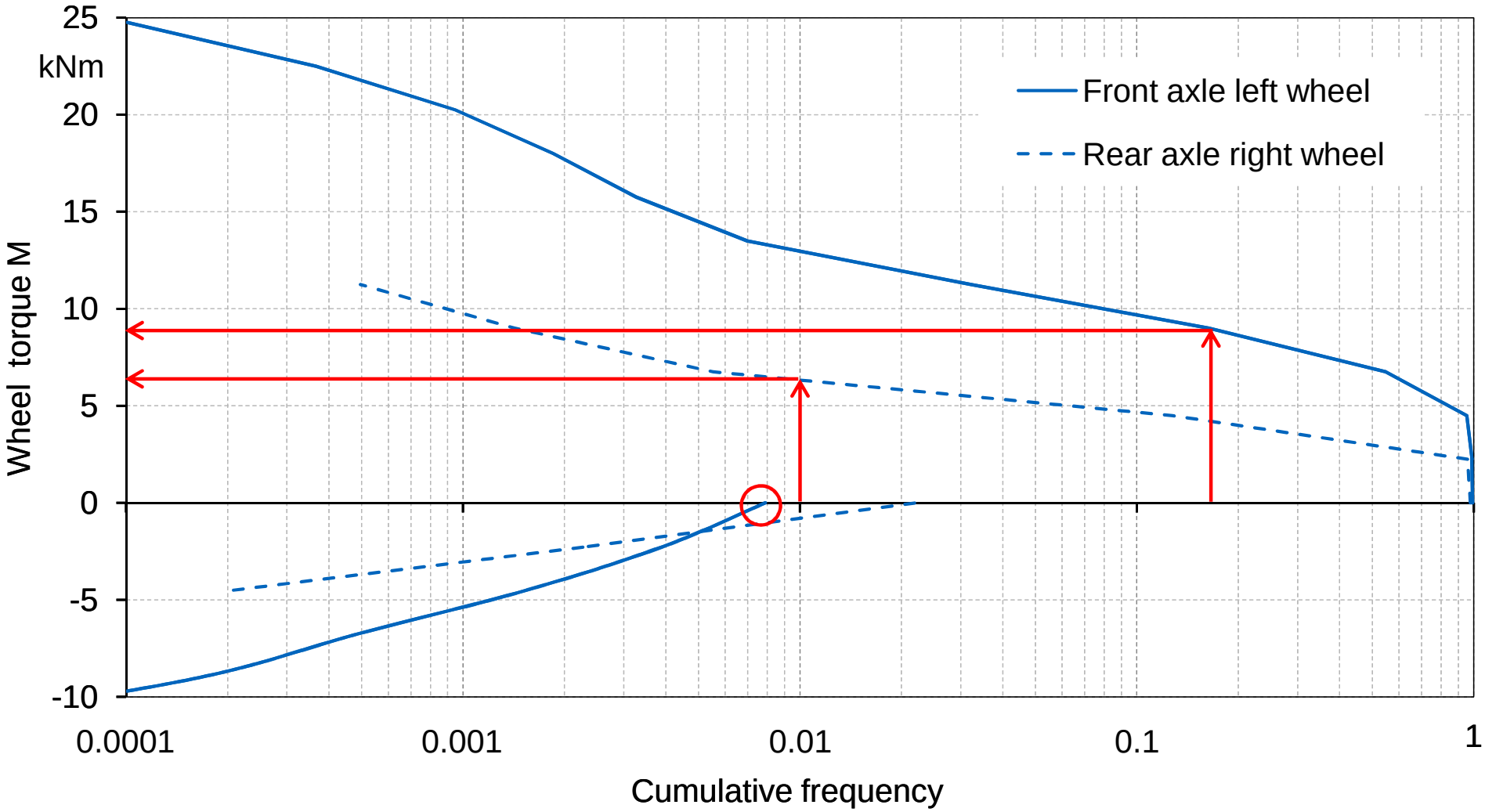
Illustration of single test trial



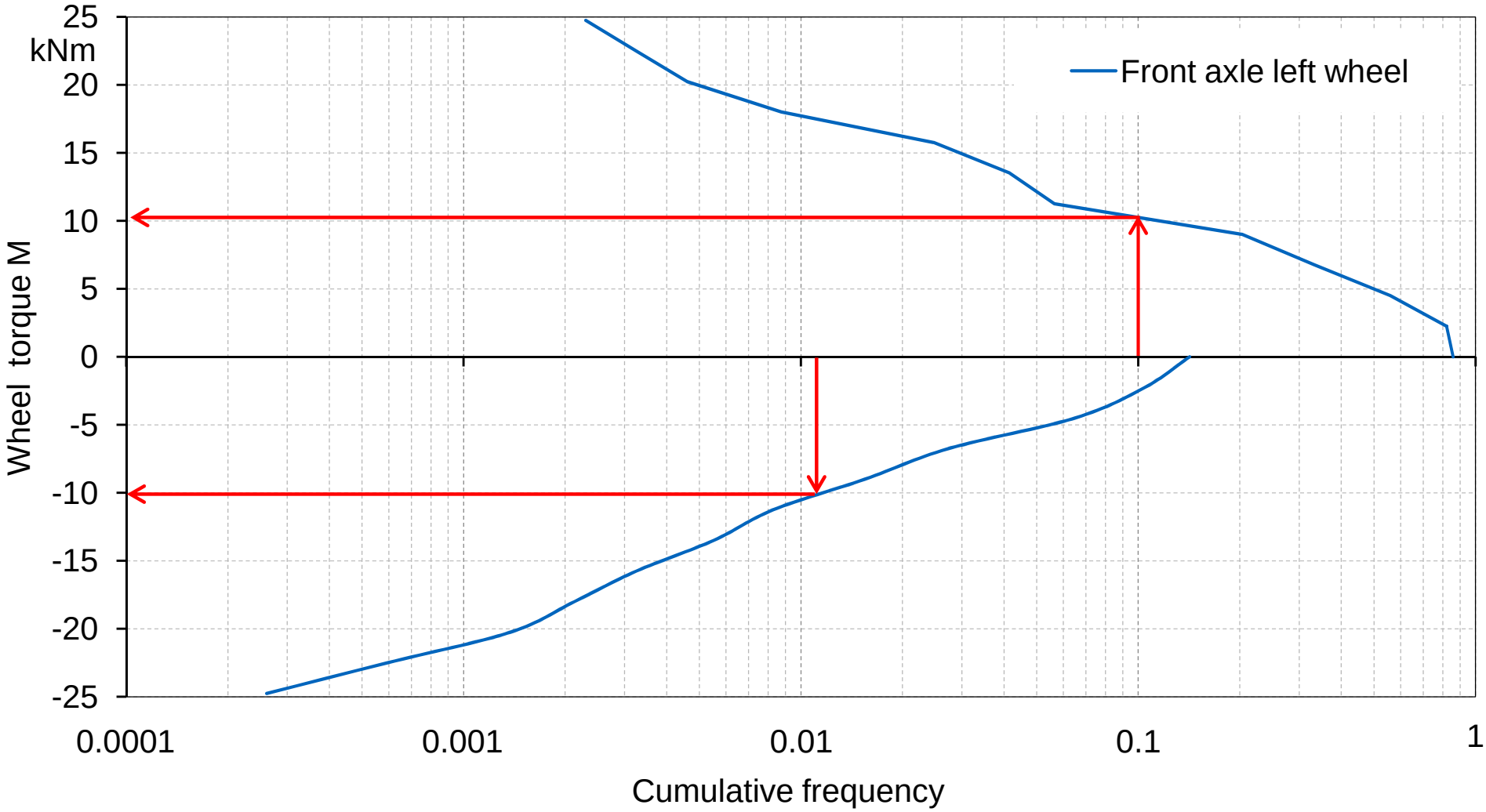
Comparison of different machine settings



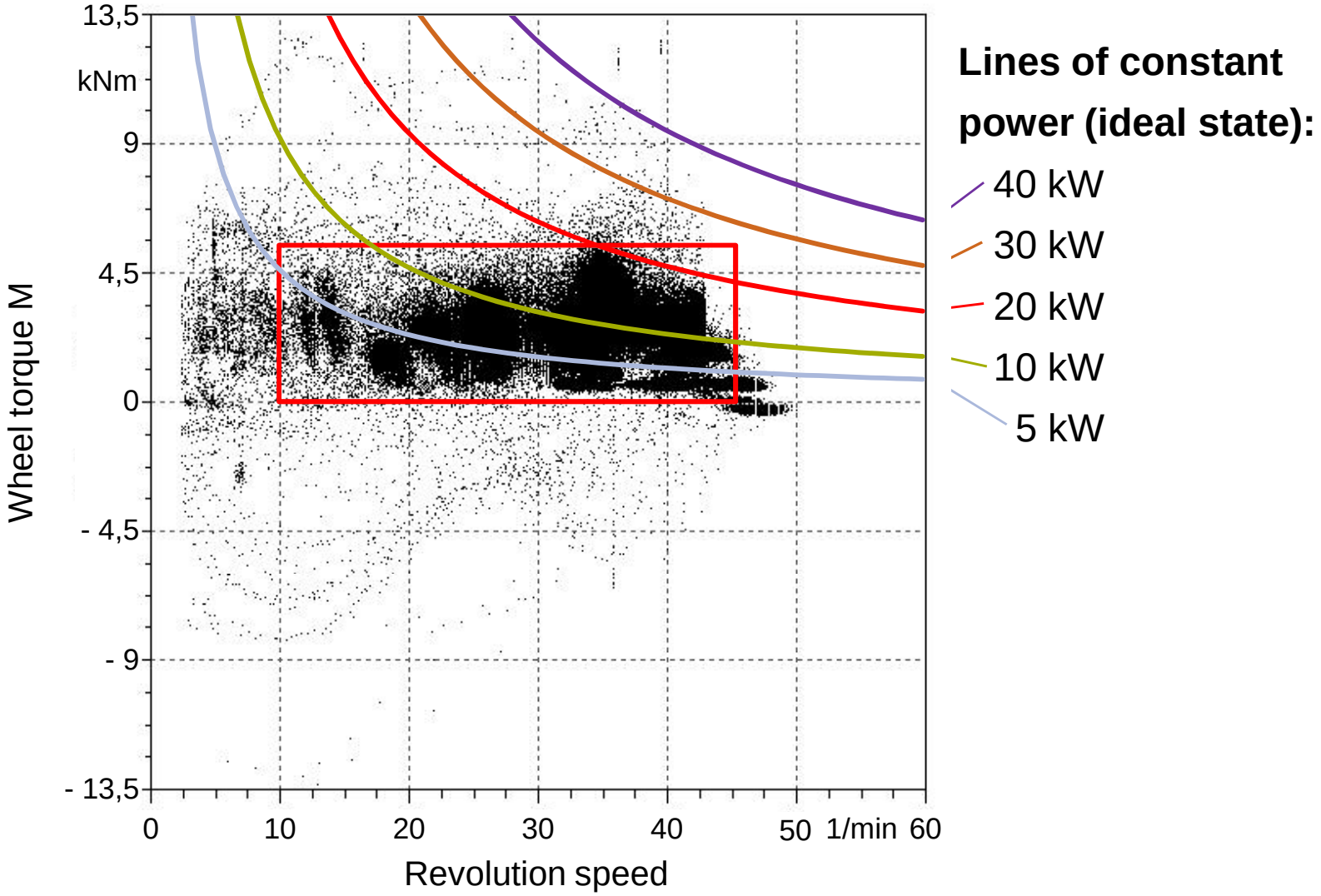
Load spectra in-field 4-WD driving mode



Load spectra on-road 2-WD driving mode



Load spectra rear axle right wheel



Conclusions

- Ranking the investigated machine settings on the basis of their relative influence on the power requirements
  - Operations without vs. with trailer ➔ ≈ + 75 %
  - Speed over ground ➔ ≈ + 38 %
  - Mode of header guidance ➔ ≈ + 24 %
  - Mode of driving ➔ ≈ + 10 %
- Potential issues for future projects:
  - Optimizing the existing drives
  - Transfer of the results to other self-propelled machinery after standardization
  - Development of alternative drives based on the logged load spectra

Summary

- Logging hydrostatic parameters to generate load spectra for the traction drive of a self-propelled forage harvester
- Examining impacts of different machine settings on the power demand of the traction drive
- Derive load spectra from the complete logged data
- Continue the work at Agricultural Systems Engineering

Thank you very much for your attention!

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