

# Design Space Exploration using Matlab/Simulink

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# Overview

- **Bode-RC project**
- **The model**
  - “Happy flow” animation
  - Compare to Excel-approach
  - How is it used?
  - Include motor simulation
- **Conclusions**

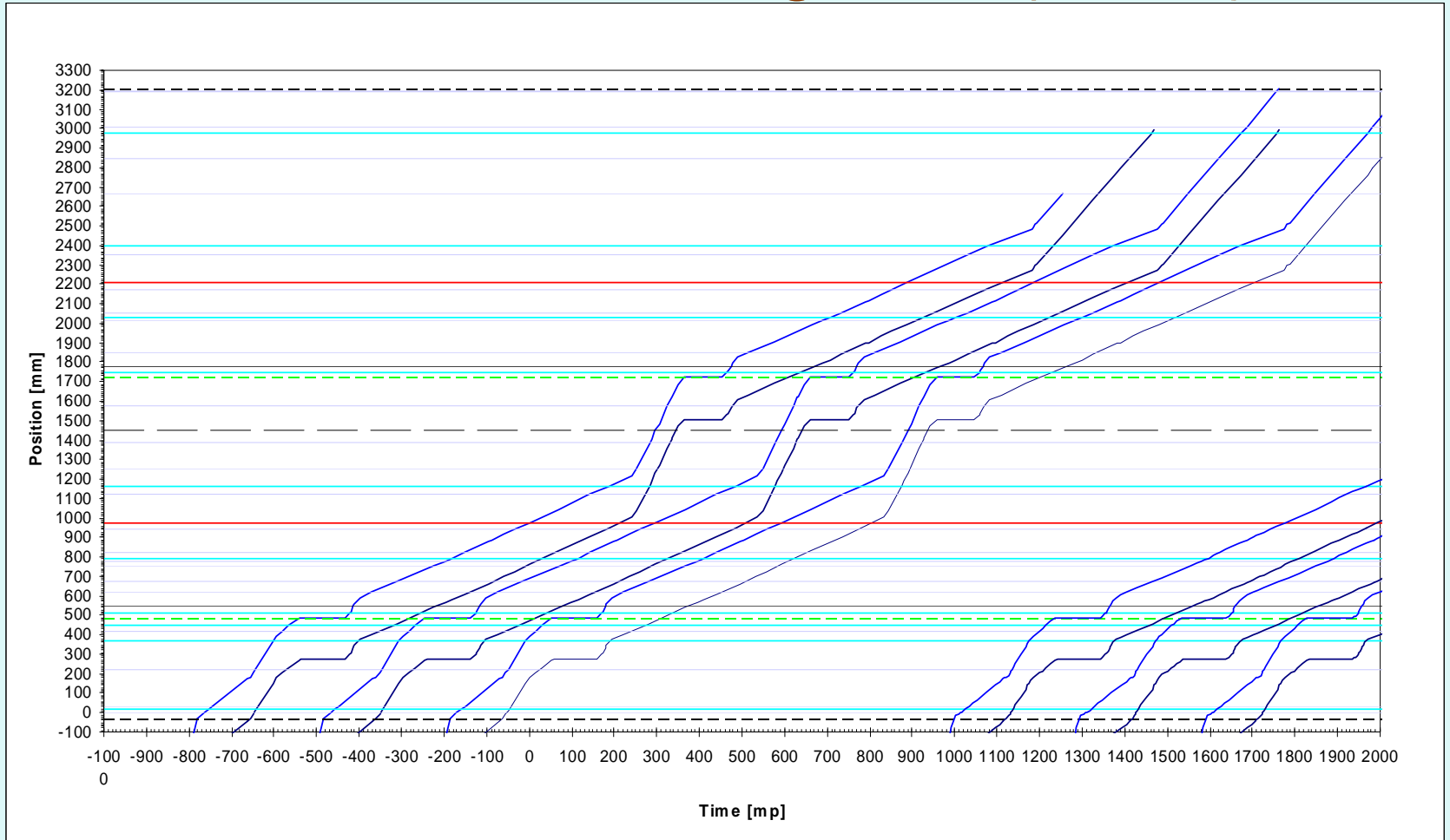
# Bode-RC

- **Multi-disciplinary models for design**
  - Make decisions in early design stage
  - Faster integration
  - Communication between disciplines
- **First year case: existing Océ printer**
  - “predict the past”
- **New case: new Océ development**
  - “predict the future”
  - Use project as playground

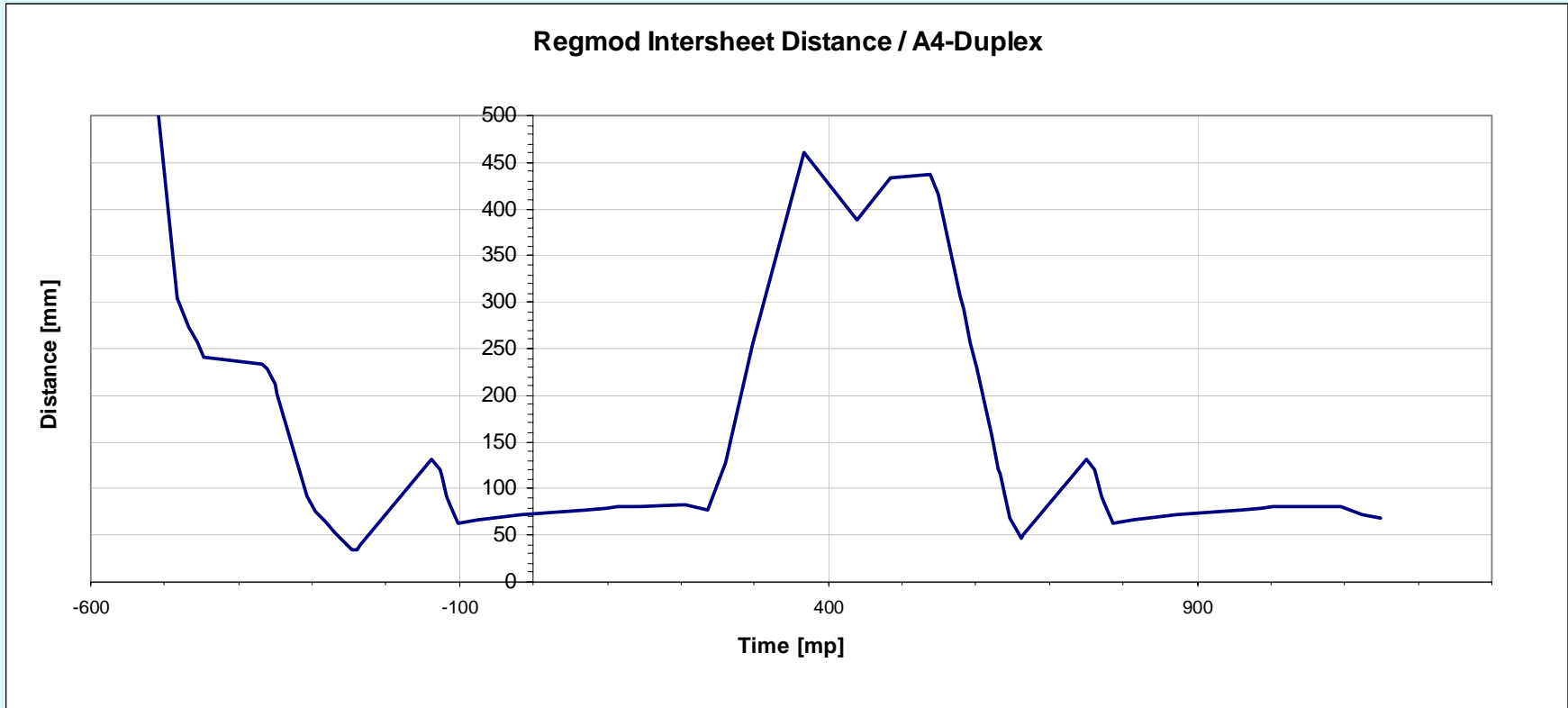
# Case: Océ VarioPrint® 2090



# Position-time diagrams (Excel)



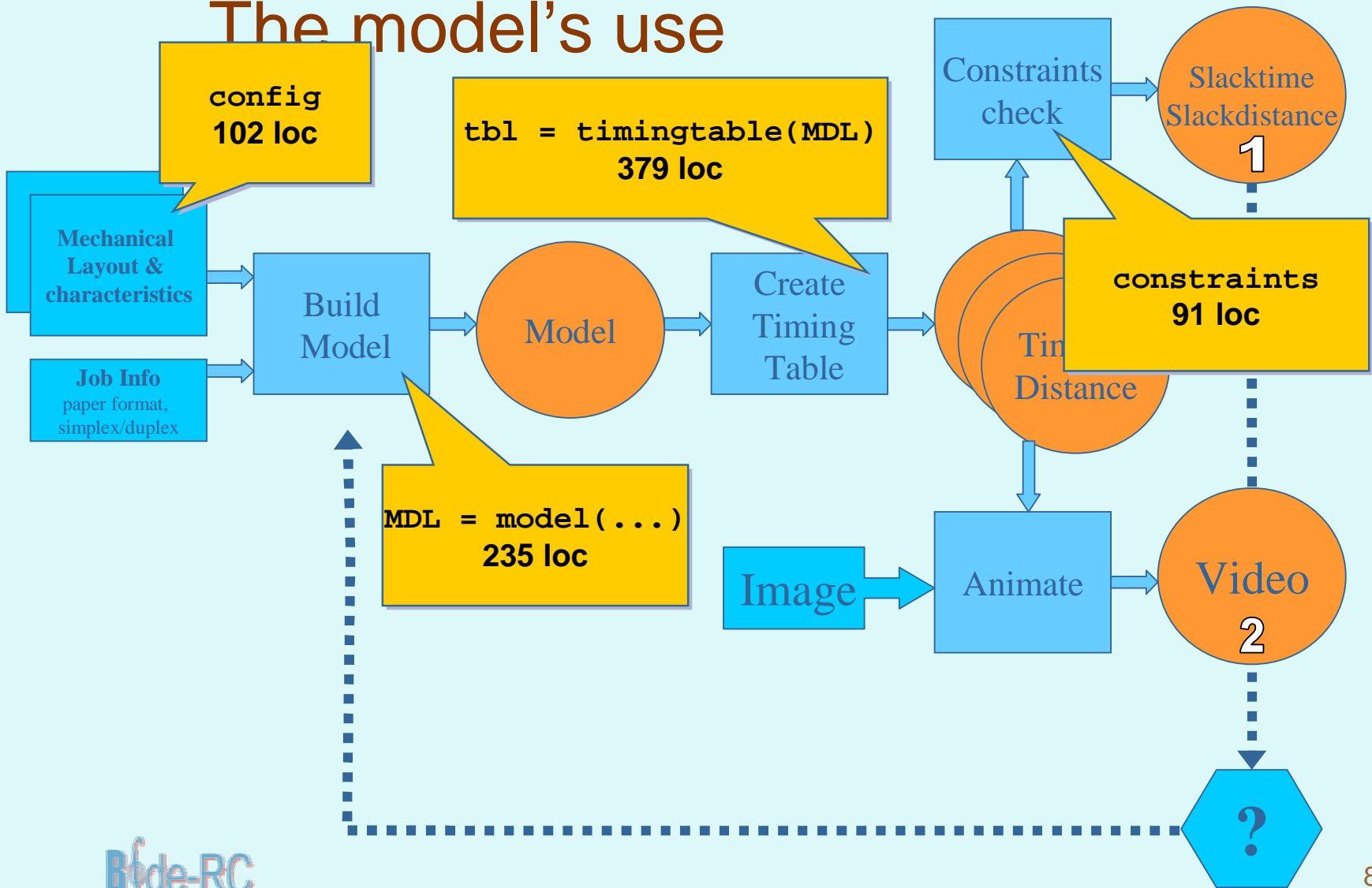
# Position-time diagrams (Excel)



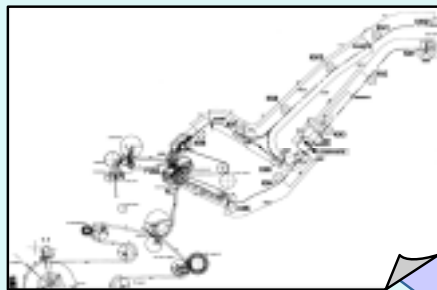
# The model's use

- **Communication**
  - Insight in kinematic behaviour
  - Requirements
- **Constraints check**
  - collisions
  - start-up time of motors, solenoids
- **Iterative design**
  - what-if scenarios

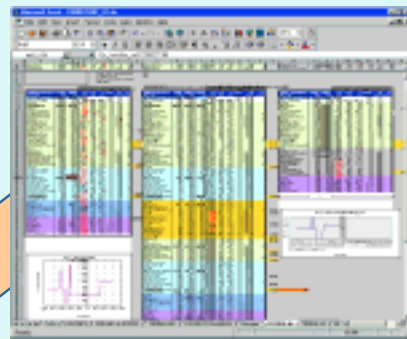
# The model's use



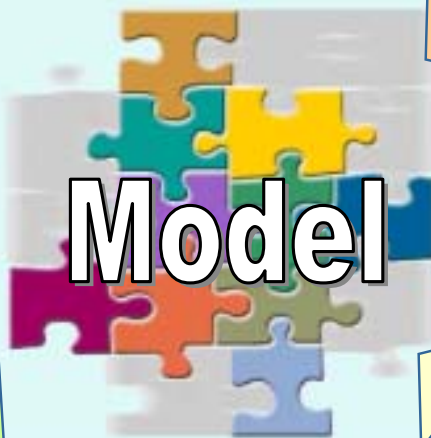




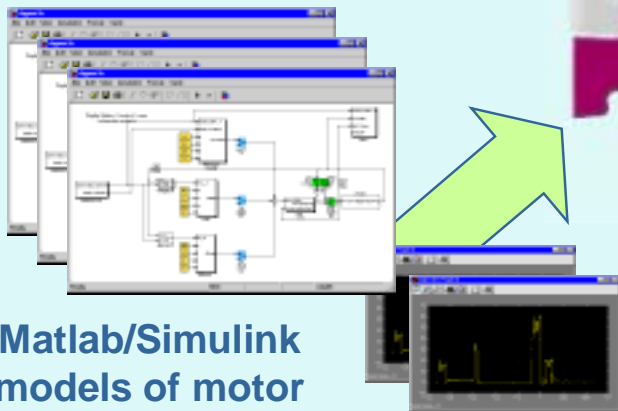
3D CAD & total construction drawings



Excelsheets with "happy flow" time/position scenario



Model



Matlab/Simulink models of motor controllers



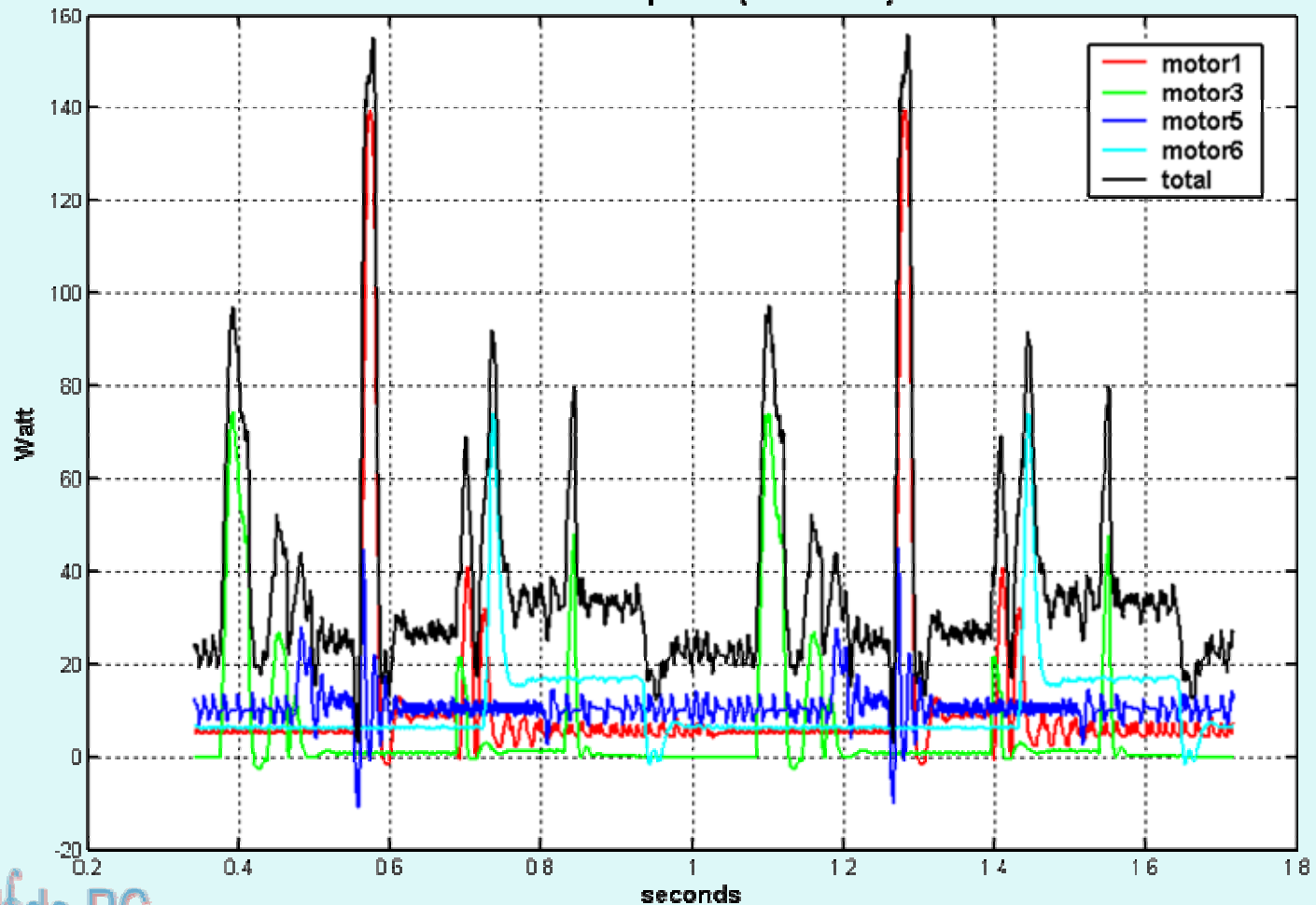
Product documents

# Motor&controller model (Simulink)

- **Adds**
  - (electrical) motor power
  - Dynamic motor+controller behaviour
- **But not**
  - Disturbances / variations, still “happy flow”
  - Software effects (latency)
- **More details -> more like simulation**

# Motor&controller model

Total motor power (simulation)



# Requirements: sensor scores



# Conclusions / discussion

- **Visualization improves**
  - understanding
  - communication
- **Model is useful in design**
  - verification and iteration
  - specify requirements
- **Simulation is less flexible because it is very detailed ...**