Tutorial: Connecting Aircraft Concept Development to Systems Simulation

Let’s give it a try!

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Additional tutorial material can be found at
www.modprod.org

Tools

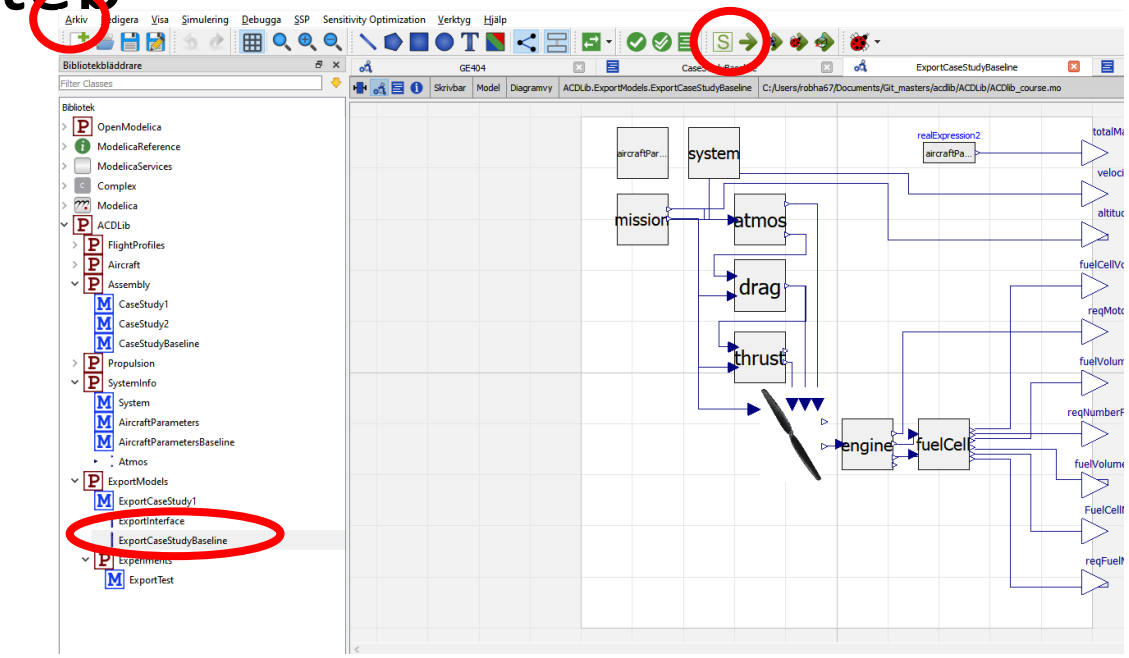
- You can download the tools needed for the tutorial via the links below.
- Hopsan
  - https://github.com/Hopsan/hopsan/releases

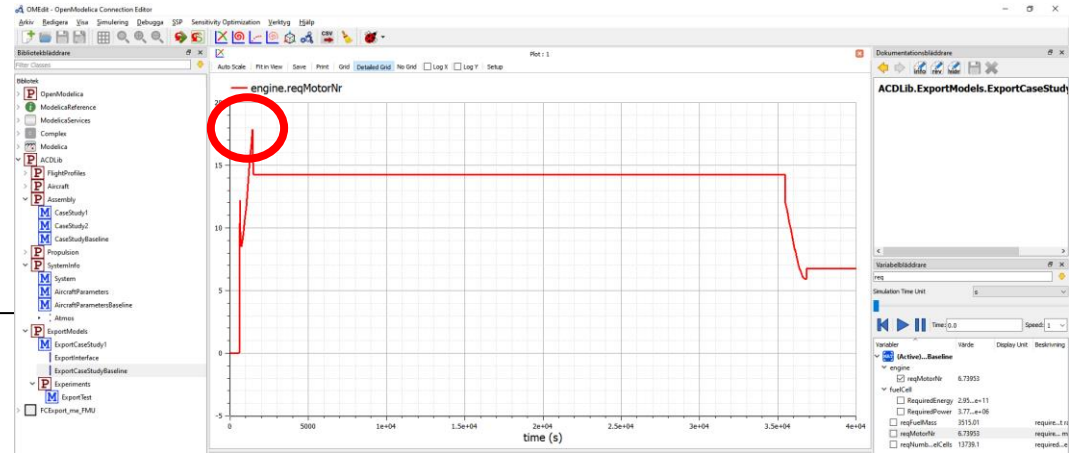
    Hopsan-2.16-win64-with_compiler-zip.zip

- OpenModelica
  - https://openmodelica.org/download/download-windows
- OpenVSP
  - http://openvsp.org/

Tutorial: OpenModelica step-by-step

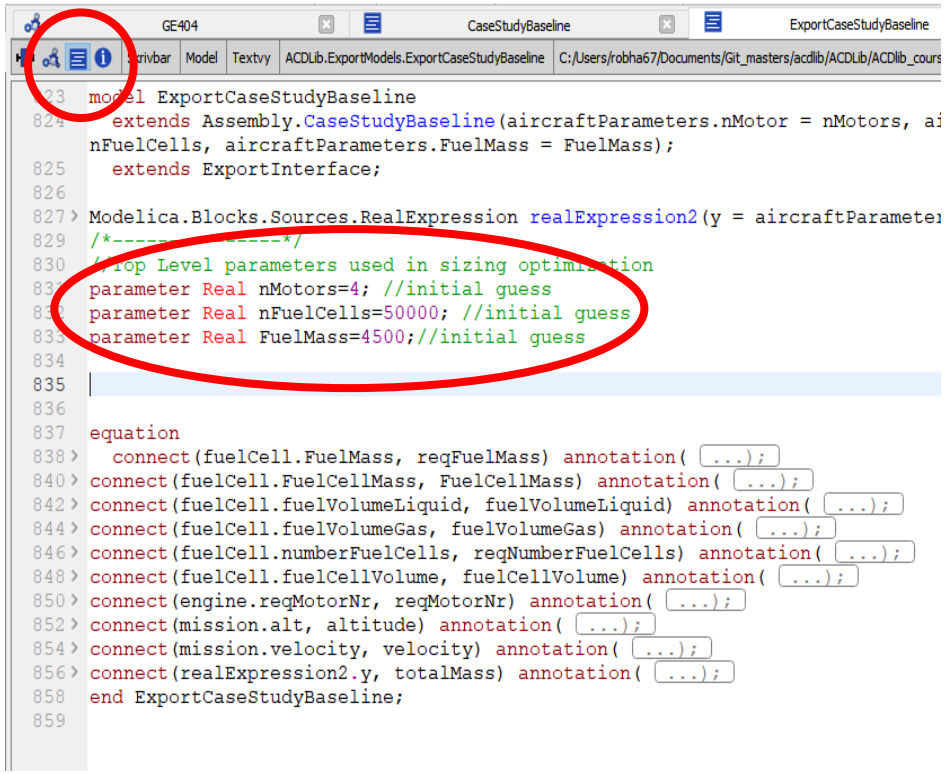
- Open ACDLib
  - Arkiv->Öppna Modell-/Biblioteks-fil(er)
- Navigate to model
  - ACDLib->ExportModels->ExportCaseStudyBaseline
- Simulate(for 37000s)
- Investigate results
  - For example, plot reqMotorNr





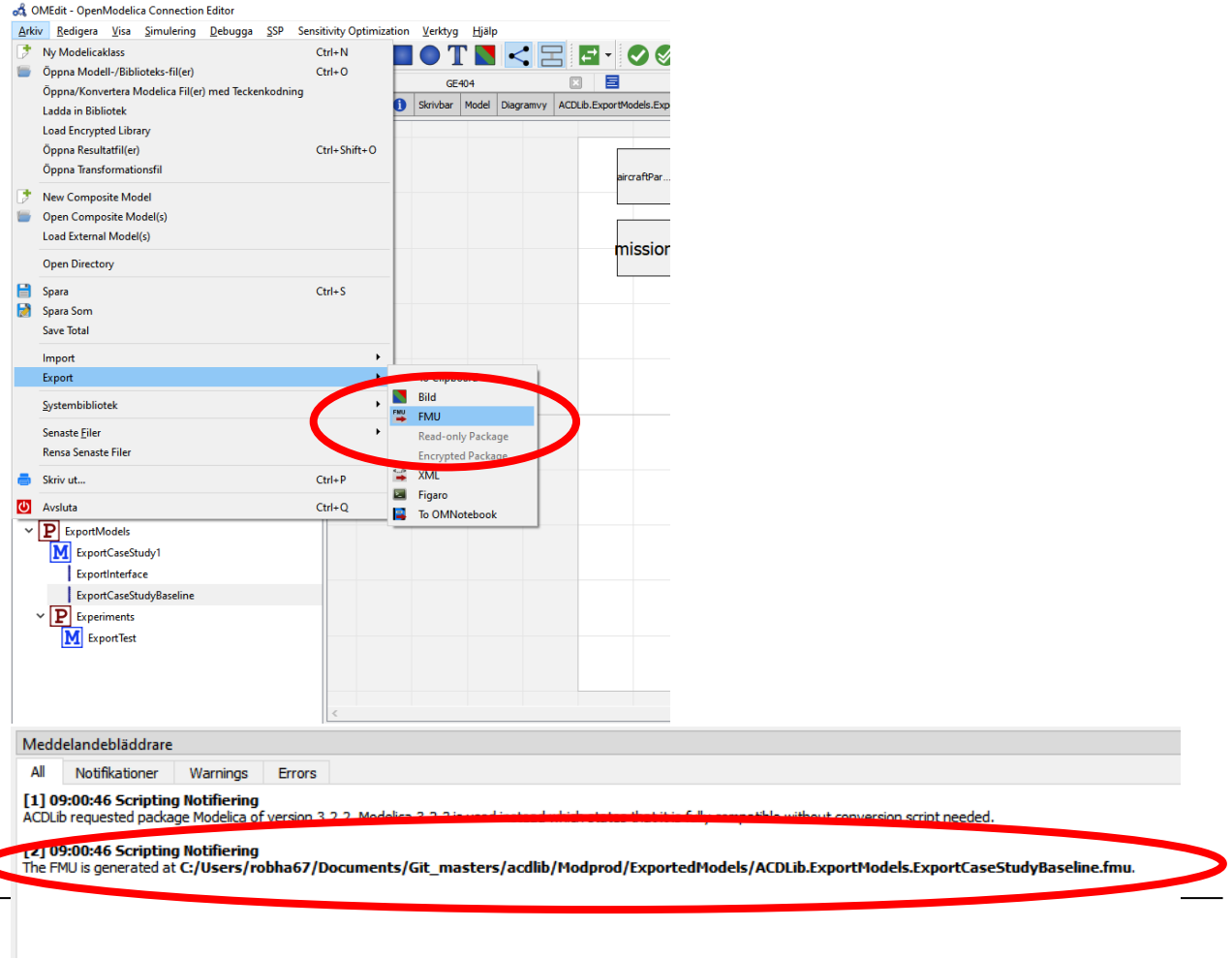
Tutorial: OpenModelica step-by-step

- Inspect “code-layer” of model
- Sizing parameters
  - The specified values serve as initial guess values for the sizing optimization
  - These are the parameters that are determined during the sizing optimization; provided a given aircraft geometry
  - Change “initial guess” values



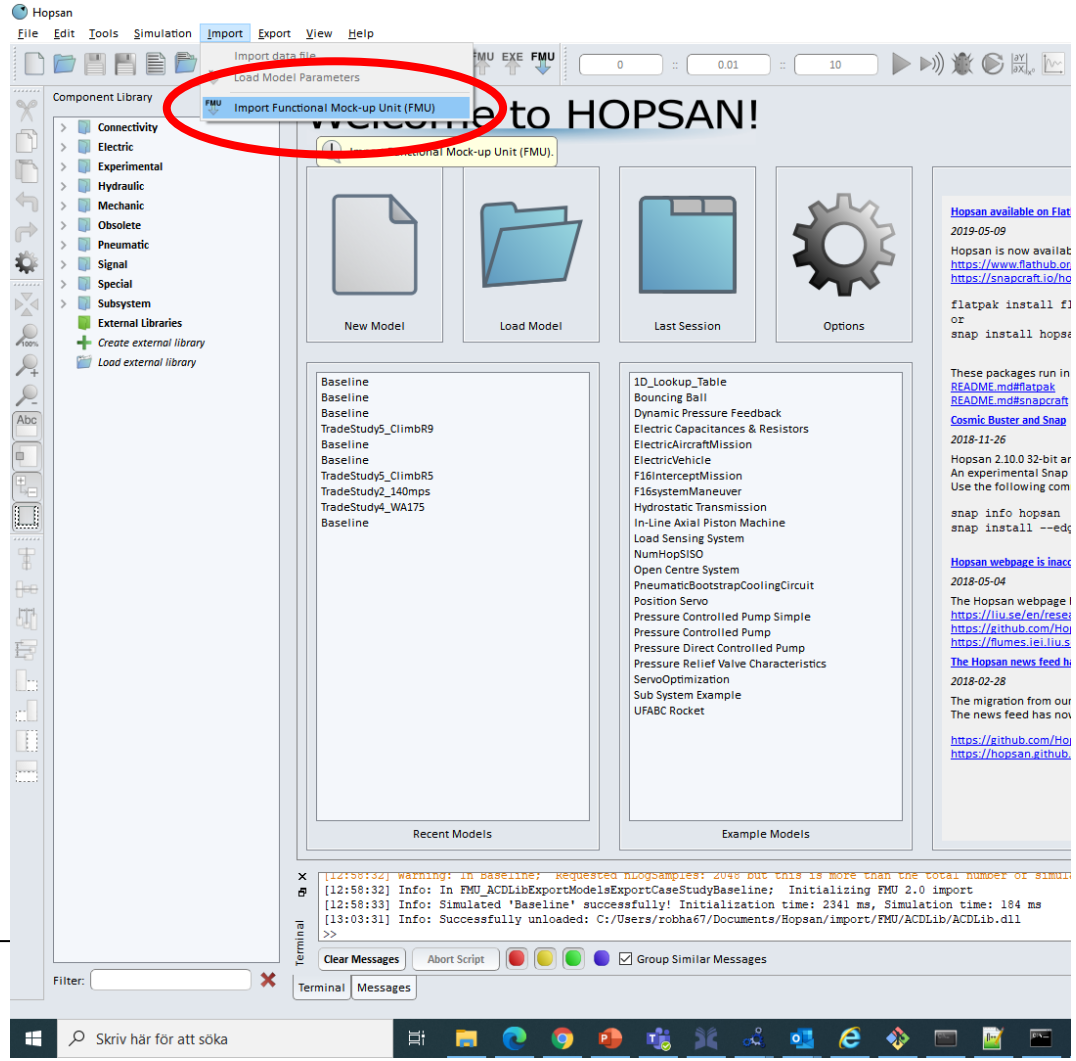
Tutorial: OpenModelica step-by-step

- Export Model
  - Arkiv->Export->FMU
- The exported FMU is located at the path presented in the message browser



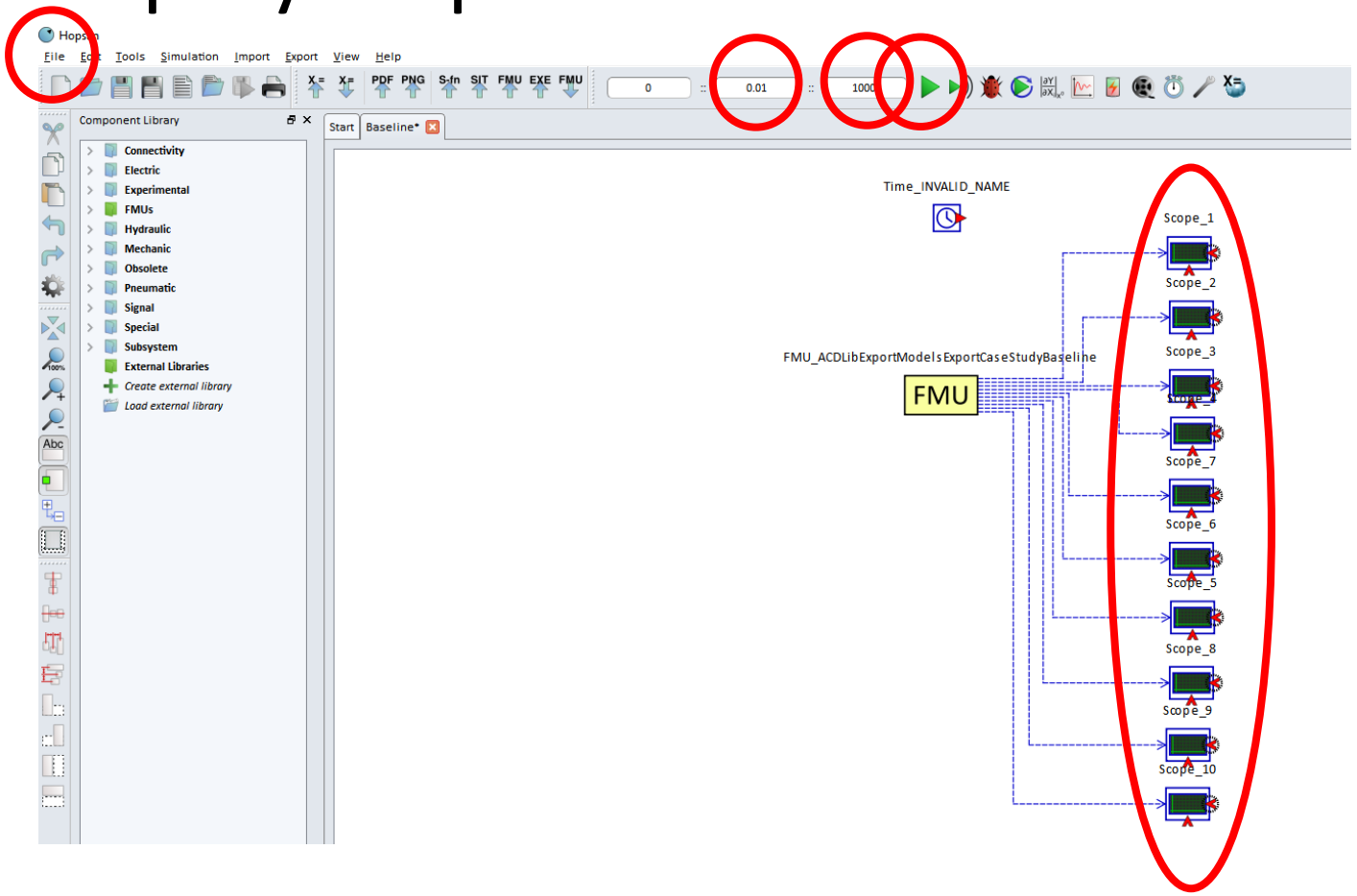
Tutorial: Sizing in Hopsan. Step-by-step

- Open HOPSAN
- Import the generated FMU
  - Import->Import Functional Mock-up Unit (FMU)



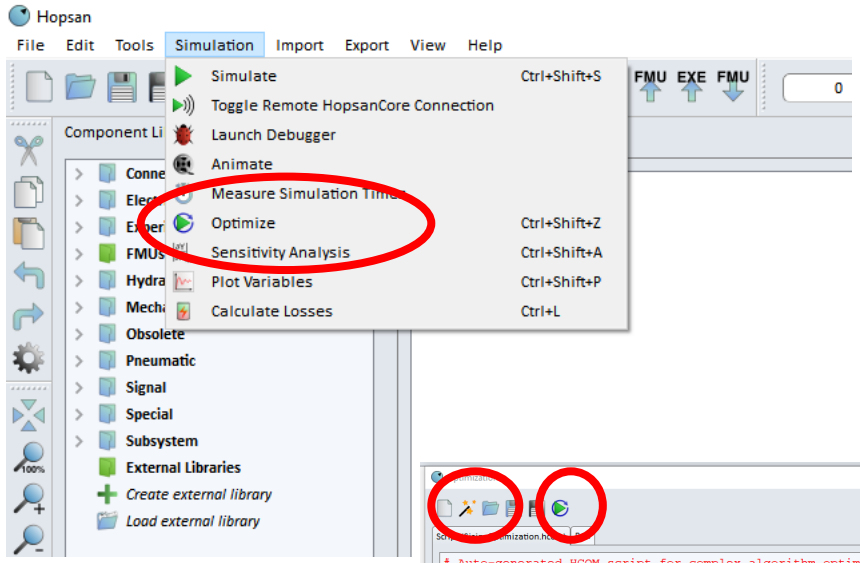
Tutorial: Sizing in Hopsan. Step-by-step

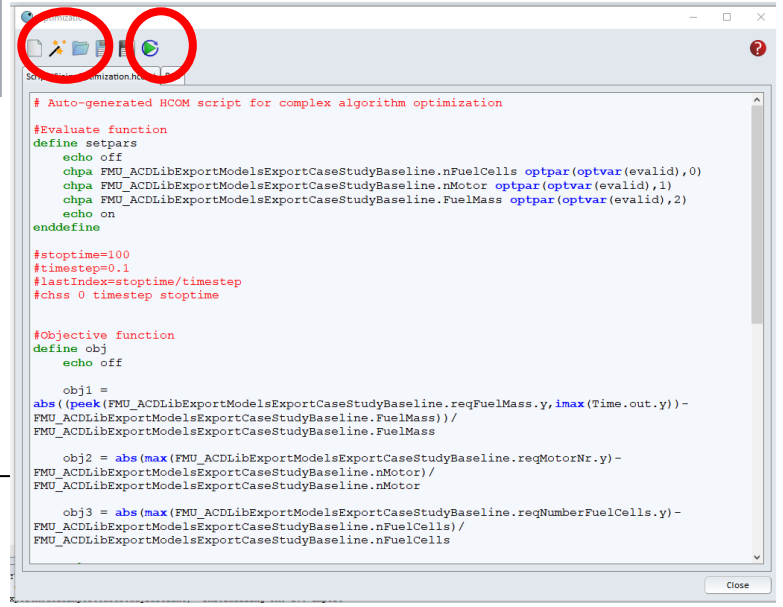
- Open “Baseline.hmf”:
  - File-Open
- Set simulation time (mission length~37000s)
- Specify step length (1-10s suggested)
- Simulate
- Check results



Tutorial: Sizing in Hopsan. Step-by-step

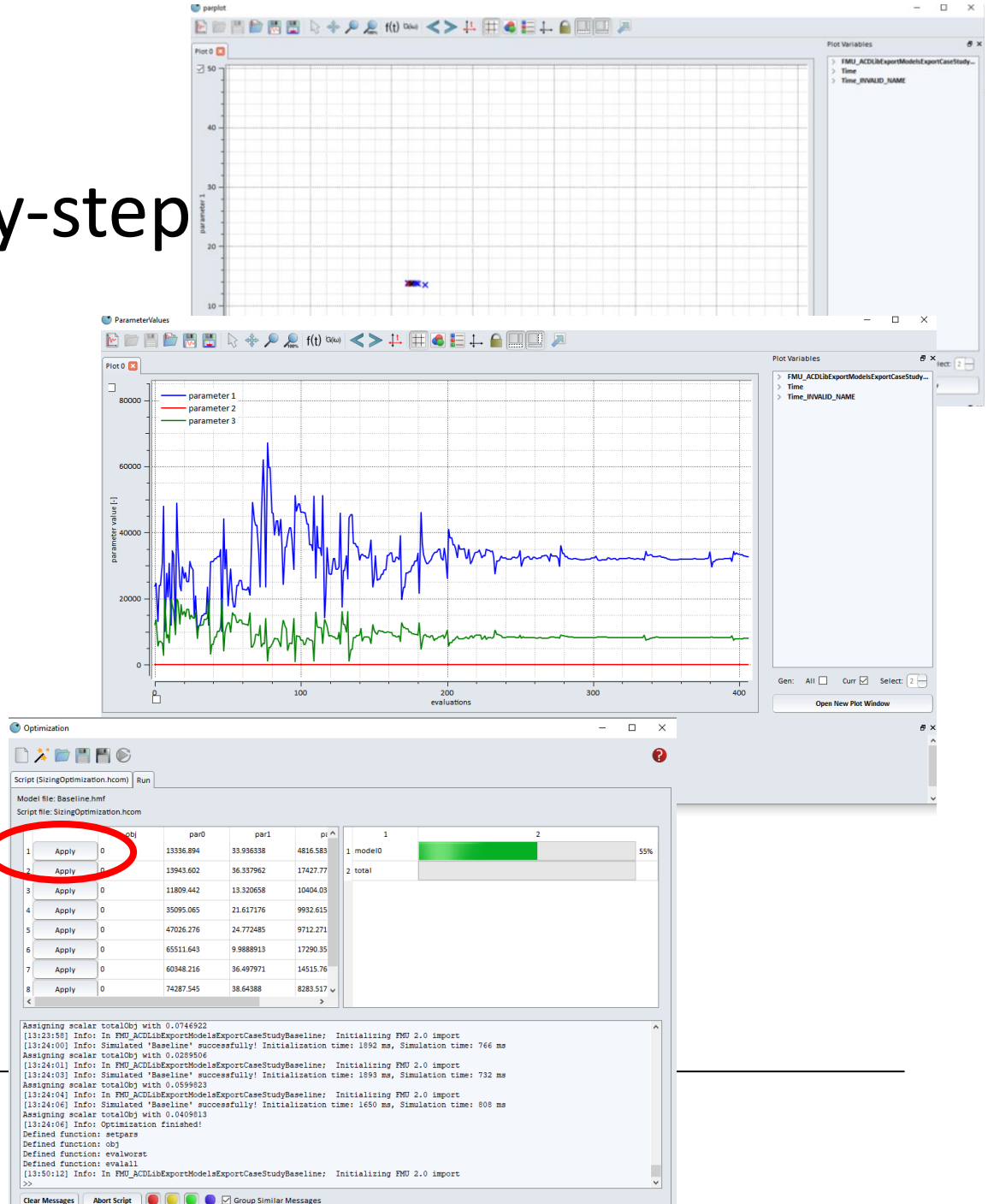
- Optimization
  - Simulate->Optimize
- Load Script File
  - Select “SizingOptimization.hcom” or make your own using the script wizard
- Start optimization





Tutorial: Sizing in Hopsan. Step-by-step

- Optimization takes 10-15min with 10s step length
- Finished when parameter values have converged
- Sizing iteration completed!!
  - Apply found parameter values to FMU
  - Simulate with new parameter values



Thank you!

Questions?

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