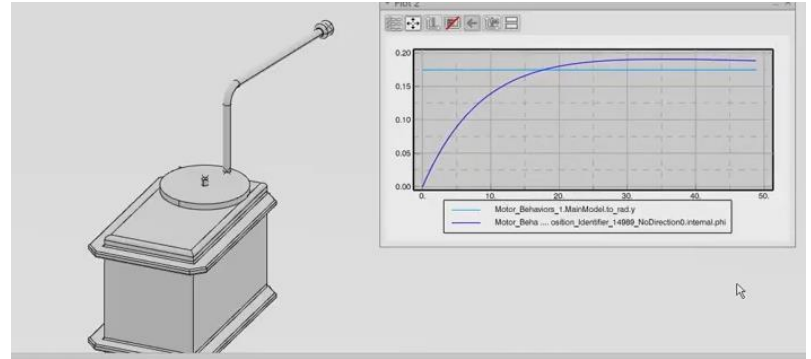




3DEXPERIENCE®

3DEXPERIENCE and Matlab Simulink Co-Simulation

Example of Motor Control



Package Content

► In this package you will find:

1. Workshop
2. Resources
 - ▷ FMKit_for_Simulink
 - ▷ PID_ModelSimulink_FMU
 - ▷ 3DExp_Matlab_Root A.1

About this course

The objective of this course is to build 3DS Experience and Matlab/Simulink co-simulated scenarios for control system purposes.

► Upon completion of this course, learner will be able to :

- ▷ Create a Matlab/Simulink system block to export to the **3DEXPERIENCE** platform
- ▷ Import the exported systems into 3DS Experience
- ▷ Execute and validate the co-simulated systems

► Keywords

- ▷ Programming: Simulation, Matlab/Simulink, FMI
- ▷ Systems Engineering: Virtual Universe, Co-Simulation
- ▷ Mechatronics: PID control, Dynamixel

► Audience

- ▷ Educators and students interested in systems engineering co-simulation

► Prerequisites

- ▷ CATIA Mechanical Systems Design Essentials
- ▷ CATIA Mechanical Systems Experience
- ▷ CATIA Functional and Logical Design Fundamentals
- ▷ CATIA Dymola Behavior Modeling Essentials
- ▷ Knowledge on Matlab/Simulink

Environment Requirements

In order to practice, you must have access to a software installation and environment that include:

- ▶ The **3DEXPERIENCE R2017x** platform
- ▶ Roles granted :



- ▶ Matlab/Simulink versions 2010a to 2016a are supported
- ▶ Licenses granted : MATLAB Coder



- ▶ Access to the following applications :



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1. Case of Study : Dynamixel Motor MX-64T

The MX-64T Dynamixel is a Servo Actuator designed by Robotis with an operating range of 360°. By default the motor has a PID included but the purpose of this course is to build a system block in Matlab/Simulink and to test its performance with the virtual model in the 3DS Experience.

For more technical information about the motor, please visit:
<http://www.robotis.us/dynamixel-mx-64t/>



2. Introduction to FMI concept

- ▶ The FMI concept, Functional Mock-up Interface, allows any modeling tool to generate C code or binaries representing a dynamic model which may then be seamlessly integrated in another modeling and simulation environment.



- ▶ The FMI supports both the model exchange of data and the co-simulation of dynamic models using a combination of xml-files and compiled C-code(FMU). For further details visit: <https://www.fmi-standard.org/>

3. Introduction to Matlab/Simulink

Matlab is a matrix-based engineering software that allows matrix manipulation, plotting of functions and data, implementation of algorithms, and creation of user interfaces.

Simulink is a block diagram environment for multidomain simulation and Model-Based Design. It is integrated with MATLAB, enabling you to incorporate MATLAB algorithms into models and export simulation results to MATLAB for further analysis.



4. Set up your environment

FMI Kit for Simulink is located in the :

`$ProgramFiles\DassaultSystemes\B419\win_b64\resources\Dymola\mfiles\FMIKit_for_Simulink_230`

Dymola files can also be downloaded as a zip-archive from DS FileTransfer after contacting the DS support. Since the package is independent from Dymola, it can be extracted or copied to any location.

Follow these steps to set up the environment in MATLAB:

- Add the FMIKit_for_Simulink directory to your MATLAB path then execute the command : `FMIKit.initialize()`.

For more information about this package please read the [FMI Kit for Simulink - Users Guide](#)

5. 3DEXPERIENCE, Matlab/Simulink Co-simulation

Follow the instructions



