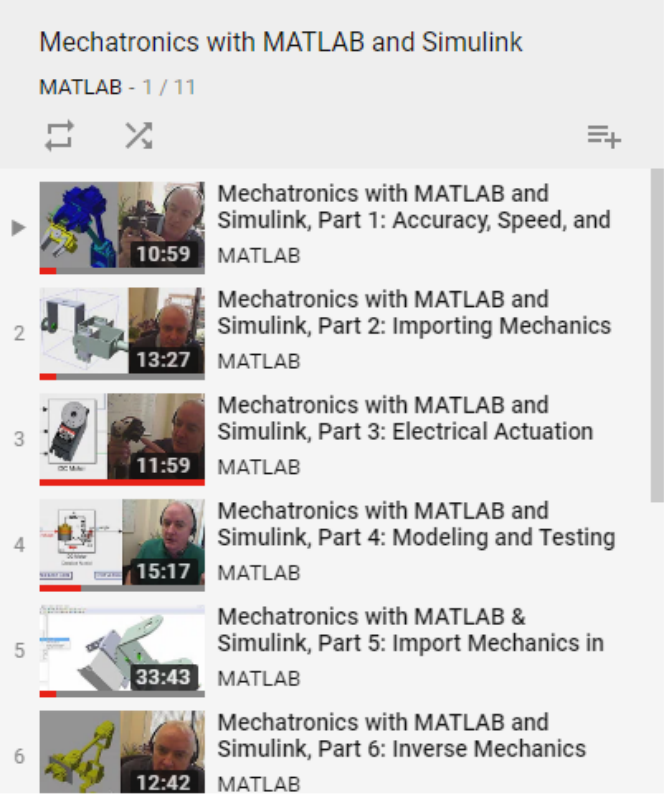
MATLAB EXPO 2018

Mechatronic Design for Aircraft Systems

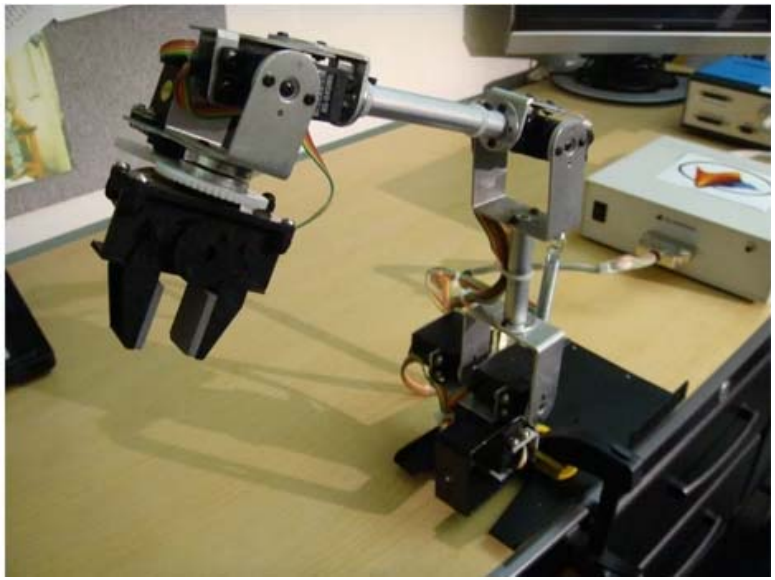
Terry Denery, PhD

Mechatronics with MATLAB & Simulink



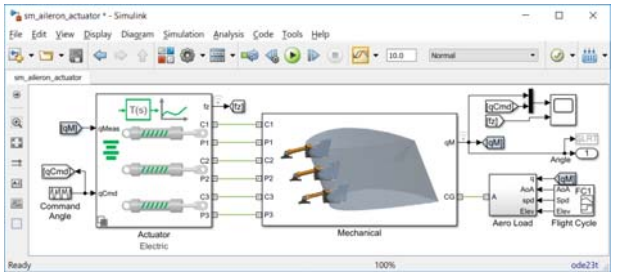
Terry Denery on Youtube!

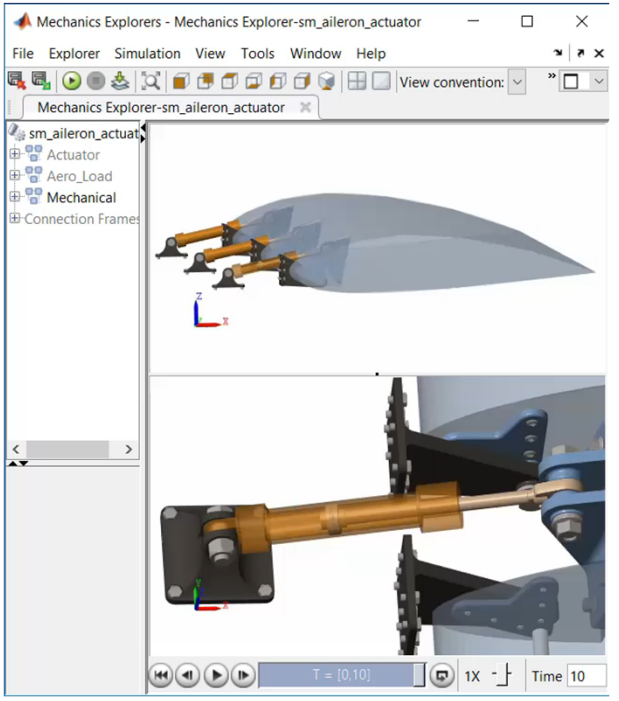
(Thousands of views, and lots of likes)

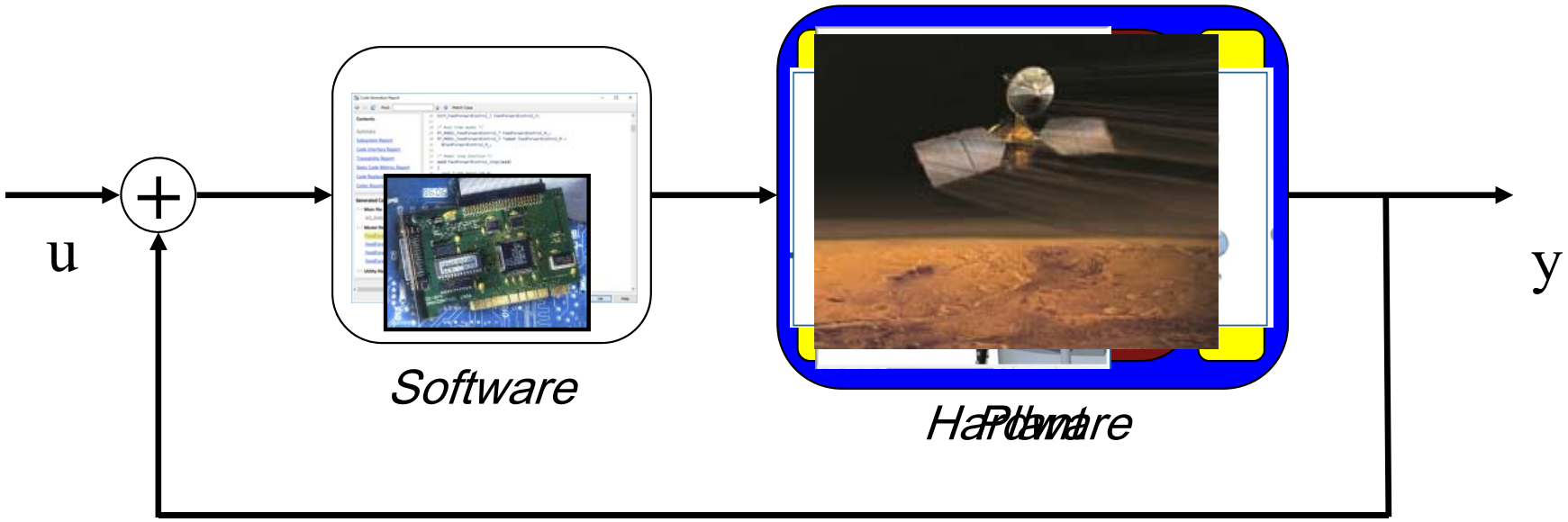


Key Points

- Simulation Platform for Mechatronics
- Design Languages
  - Mechanical CAD
  - Electric Circuits
  - Hydraulic Circuits
  - Etc.
- Better embedded control software



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Software
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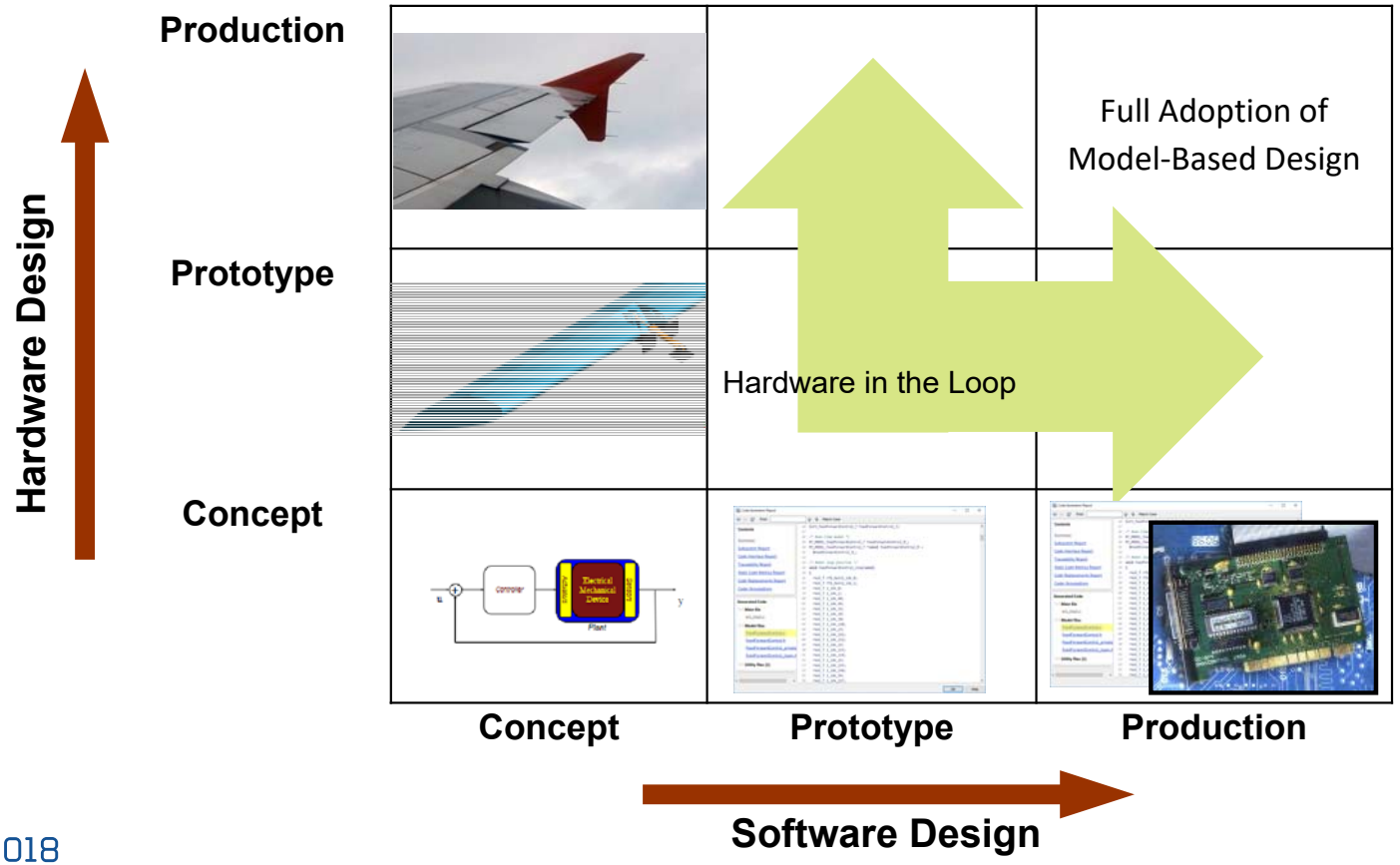
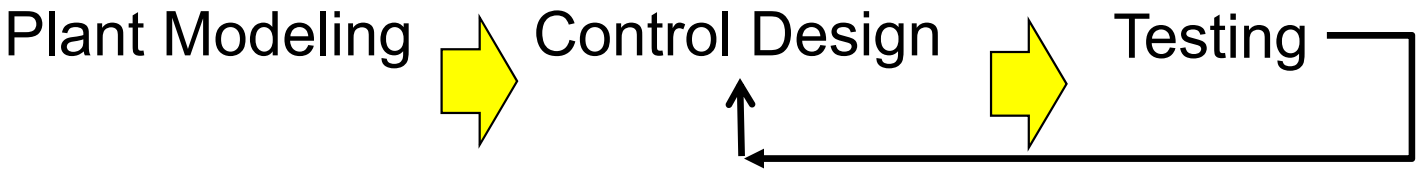
The Board Game



MathWorks Products



Simscape
- Multibody
- Electrical
- Fluids

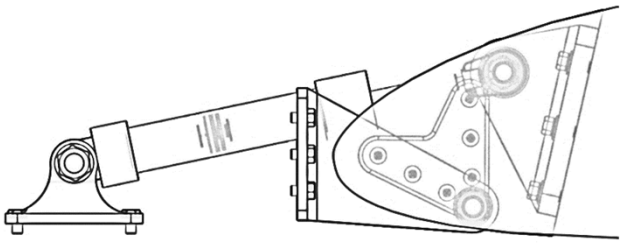
Simulink Design Optimization

Simulink Control Design
Control System Toolbox

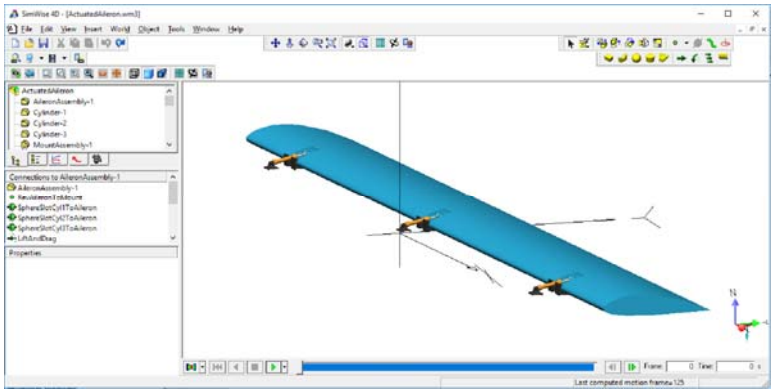
Simulink Realtime
MATLAB Coder
Simulink Coder
Embedded Coder
+ V&V Tools

MATLAB & Simulink

Accommodating Mechanical Workflows with 3rd Party Partners



Import CAD with SimWise 4D



Generate Optimized Mechanics Code with MotionGenesis

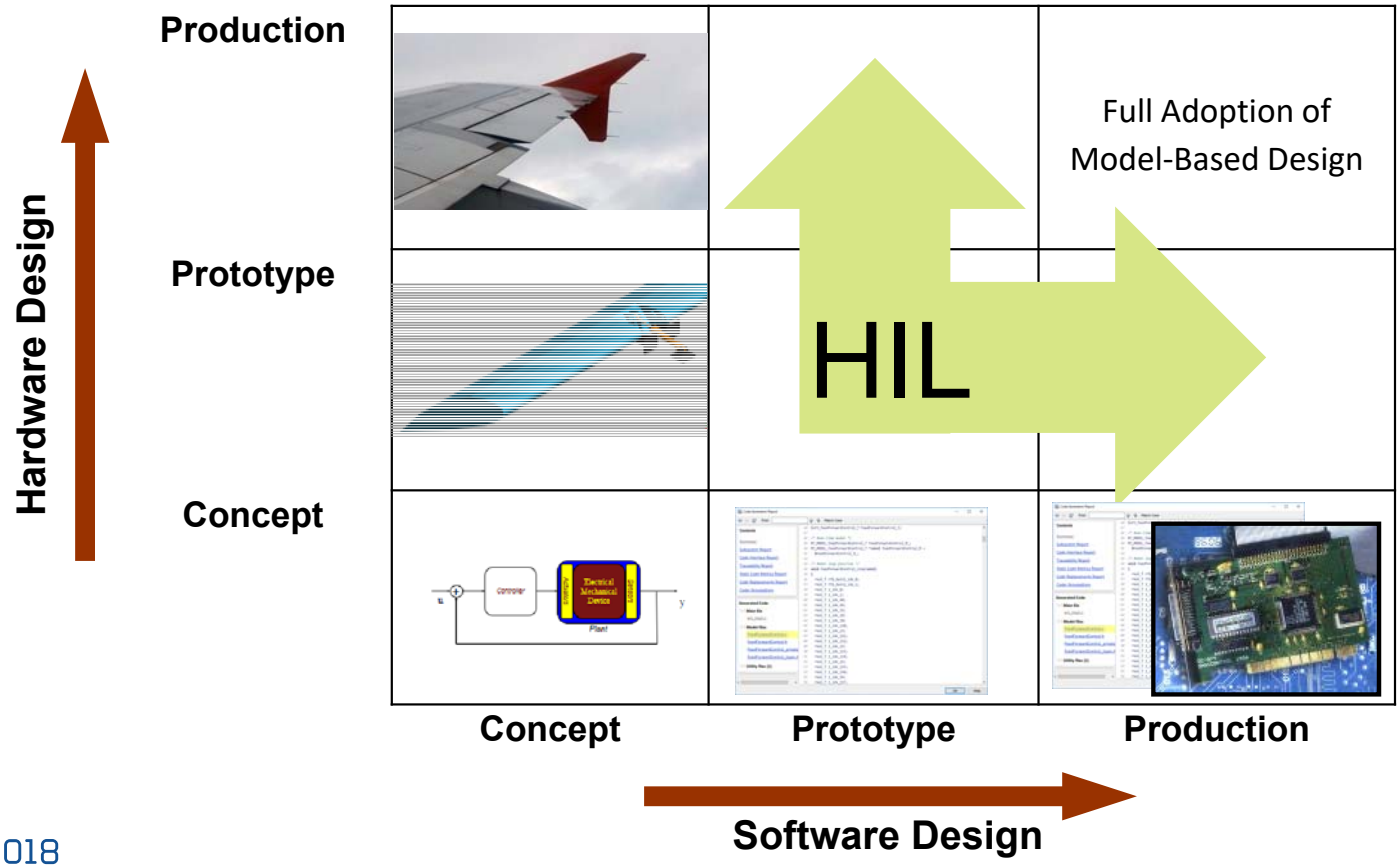
```
Function [ForceZActuator2, qPZActuator2p, qRZRevCyl2ToMount2p] = InverseDynamics( qRZRevAileronToMountSpec, qRZRevA

z = zeros( 1, 275 );
g                              = 9.80665;                % m/s^2          Constant


z(1) = cos(qRZRevCyl2ToMount2);
z(2) = sin(qRZRevCyl2ToMount2);
z(45) = z(1) + 1.911447804693936E-12*z(2);
z(46) = 1.911447804693936E-12*z(1) - z(2);
z(52) = 0.18975113955260645*z(45) + 0.9818321689046*z(46);
qRZRevAileronToMount = qRZRevAileronToMountSpec;
z(20) = sin(qRZRevAileronToMount);
z(19) = cos(qRZRevAileronToMount);
z(111) = 9.367439983409386E-12*z(20) - 1.233296968181336E-12*z(19);
z(24) = -9.367439983409386E-12*z(19) - 1.233296968181336E-12*z(20);
z(112) = 0.9976644737719798*z(111) - 0.06830518115984024*z(24);
z(113) = z(19) + 9.367440998622832E-12*z(20);
z(26) = z(20) - 9.367440998622832E-12*z(19);
z(114) = 0.9976644737719798*z(113) - 0.06830518115984024*z(26);
z(115) = 9.367438681437966E-12*z(19) - z(20);
```

Inverse Kinematics
&
Inverse Dynamics

The Board Game



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