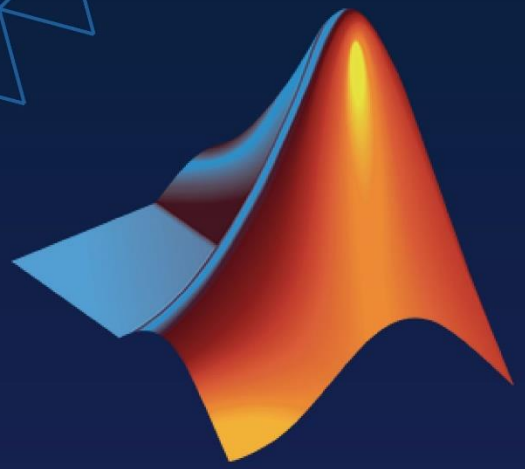
MATLAB EXPO
UNITED KINGDOM

Delivering Modern Luxury

Simon Message, JLR

MathWorks



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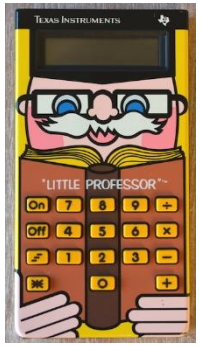
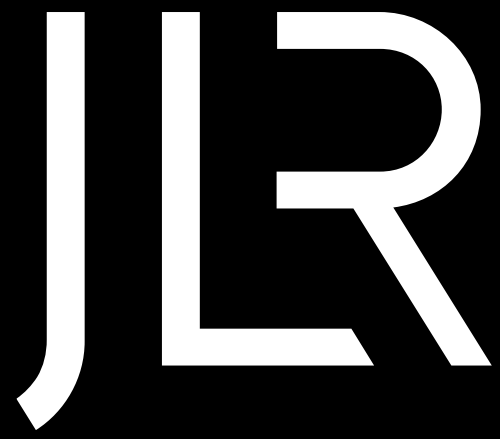
MATHWORKS ANNIVERSARY

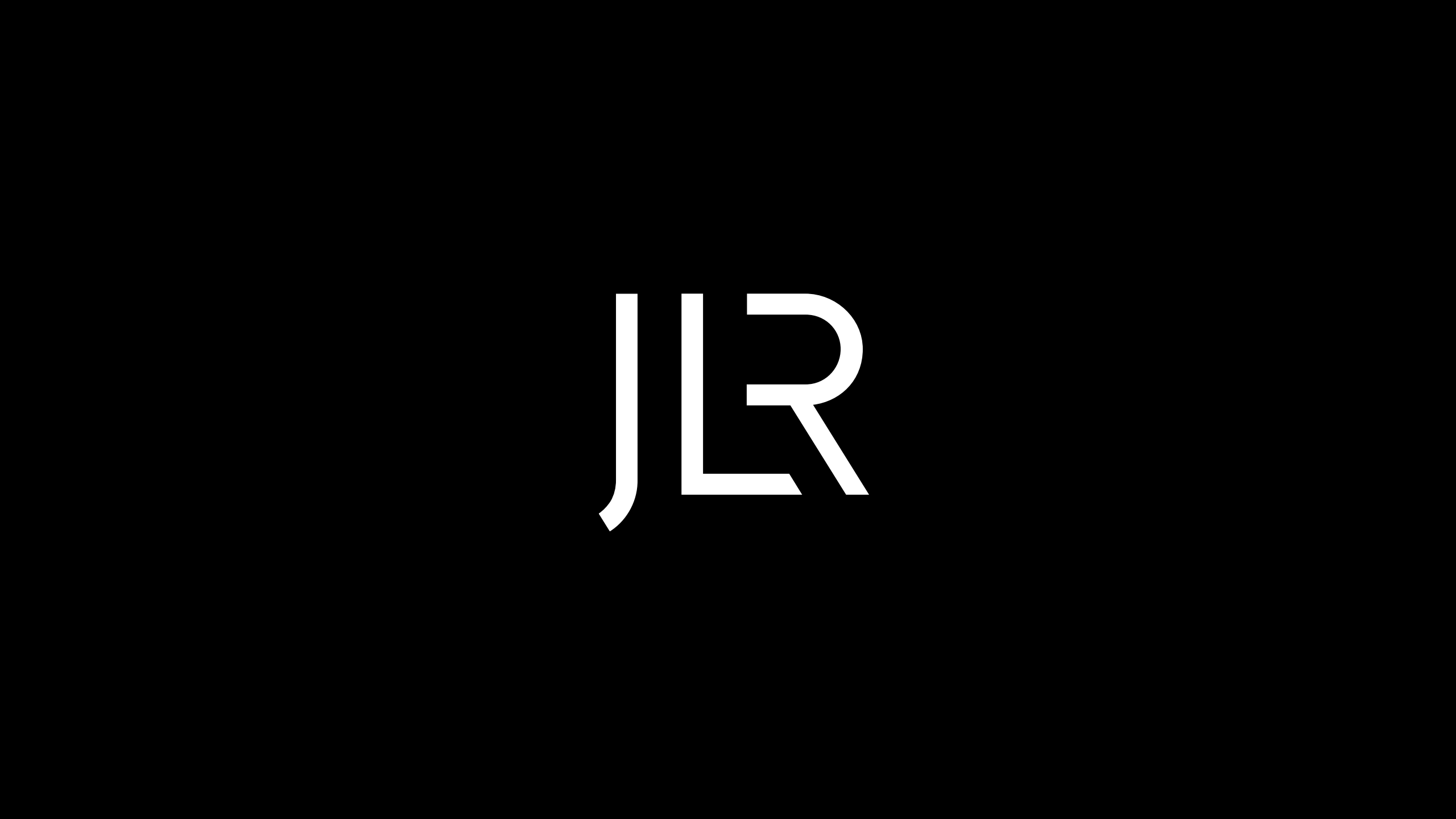
Simon MESSAGE



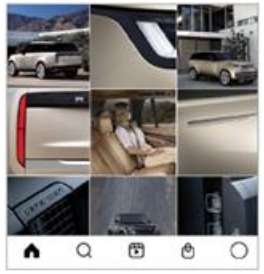
dw.m

```
function [dw,parm ]=dw(nomessai,flagi)
% Double loi de Wiebe depuis releve pression cylindre
%   [dw,parm ]=dw(nomessai,flagi)
%
% Input:
%   nomessai    Nom de fichier dessai
%   flagi   Niveau d'interactivity
% Output:
%   dw(1)=A1;   ) Paramètres de Wiebe
%   dw(2)=Cw1;  )
%   dw(3)=A2;   )
%   dw(4)=Cw2;  )
%   dw(5)=F2;   )

% Version 10

% Simon MESSAGE, 1998
% Ecole Centrale de Nantes, France
% University of Bath, UK
```


JLR


JLR

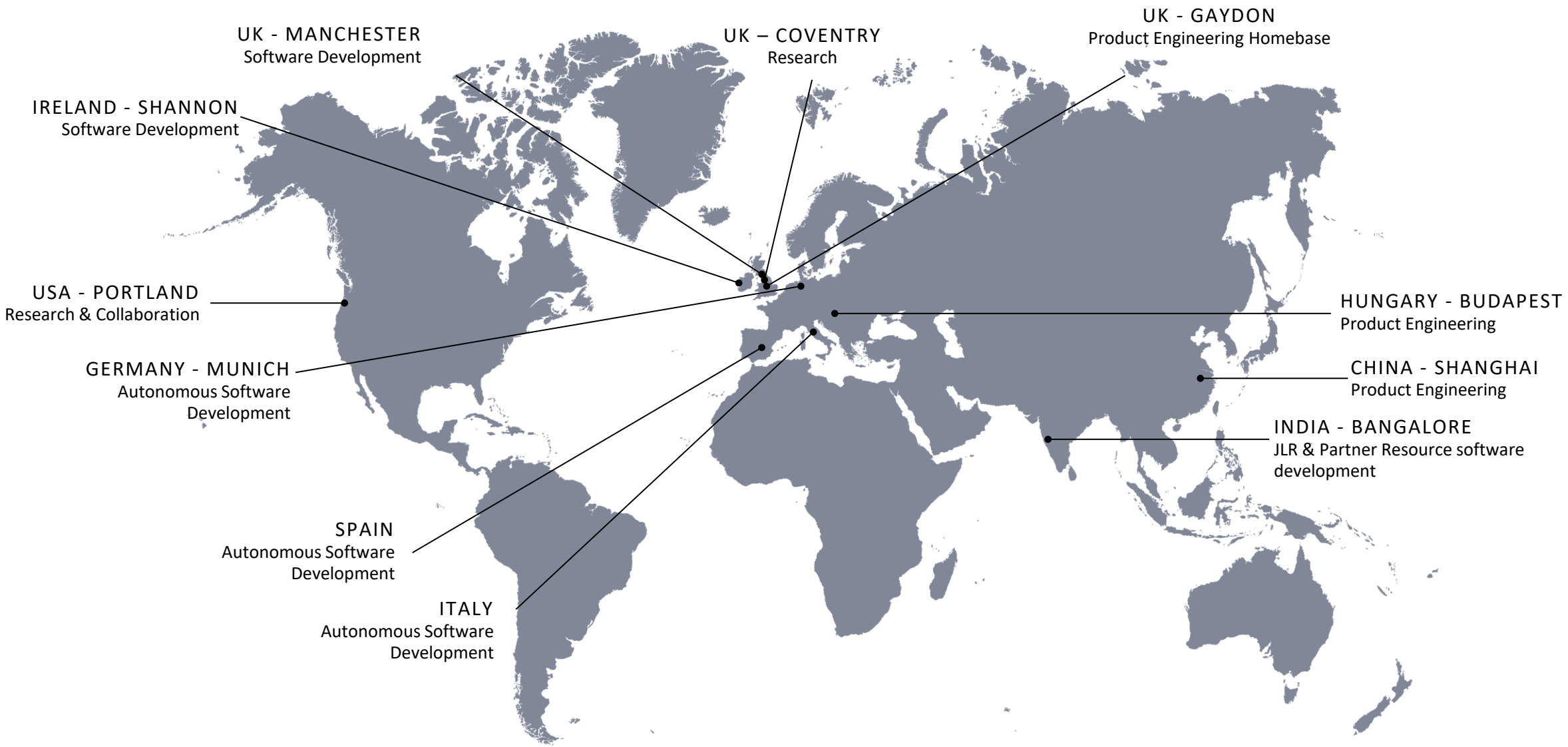
MODERN LUXURY







OUR GLOBAL ENGINEERING FOOTPRINT



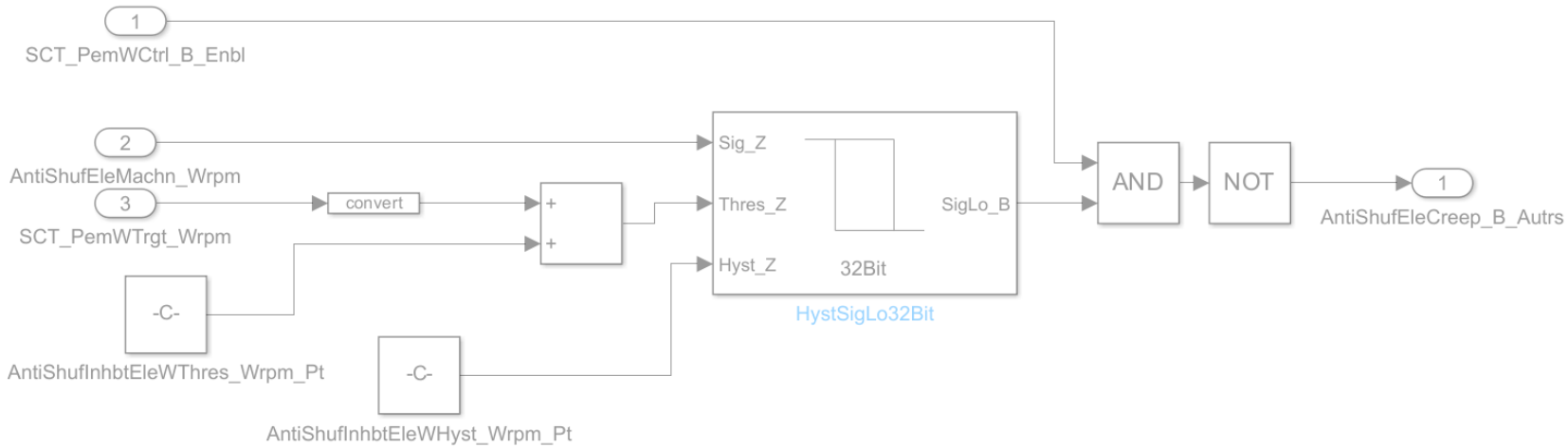
11 GLOBAL LOCATIONS WITH A TOTAL OF 10,000+ EMPLOYEES IN PRODUCT ENGINEERING

Mathworks Collaboration

Model Based Design

Model Based Design

```
void adjnvh(void)
{
  Bool rtb_LogicalOperator2;
  Bool rtb_LogicalOperator12;
  TqScal_s16 rtb_Switch_n;
  TqScal_s16 rtb_Switch2;
  UInt16 u0;
  UInt16 u0_0;

  rtb_LogicalOperator2 = ((OprOptmlMode_Zs == ((UntyScal_u8)PRLL_MODE)) &&
    ((Int32)OprEleMachnIncChrg_Tq_Ary[0] < (Int32)ChrgThres_Tq));

  if (EM_SelEleActvFast_B) {
    u0 = SelEleVehNoise_Vkph_Thres_Pt;
    u0_0 = SelEleEngNoise_Wrpm_Thres_Pt;
  } else {
    u0 = VehNoise_Vkph_Thres_Pt;
    u0_0 = EngNoise_Wrpm_Thres_Pt;
  }

  rtb_LogicalOperator12 = (NoiseChrgLim_B_Enbl_Pt && (I
    (IP_Pem_Wrpm < (Int32)u0_0) && rtb_LogicalOperator2

  rtb_LogicalOperator2 = (rtb_LogicalOperator2 && ((Int
    GradEstStats_Zs_Thres_Pt) && (IP_Pem_Wrpm < (Int32)
    UpHillChrgLimEngWThres_Wrpm_Pt));

  if (rtb_LogicalOperator12) {

    if (EM_SelEleActvFast_B) {
      rtb_Switch_n = SelEleChrgNoise_Tq_Pt;
    } else {
      rtb_Switch_n = ChrgNoise_Tq_Pt;
    }

    if ((Int32)rtb_Switch_n <= (Int32)OprEleMachnIncChr
      rtb_Switch_n = OprEleMachnIncChrg_Tq_Ary[0];
    }

  } else {
    rtb_Switch_n = OprEleMachnIncChrg_Tq_Ary[0];
  }
```



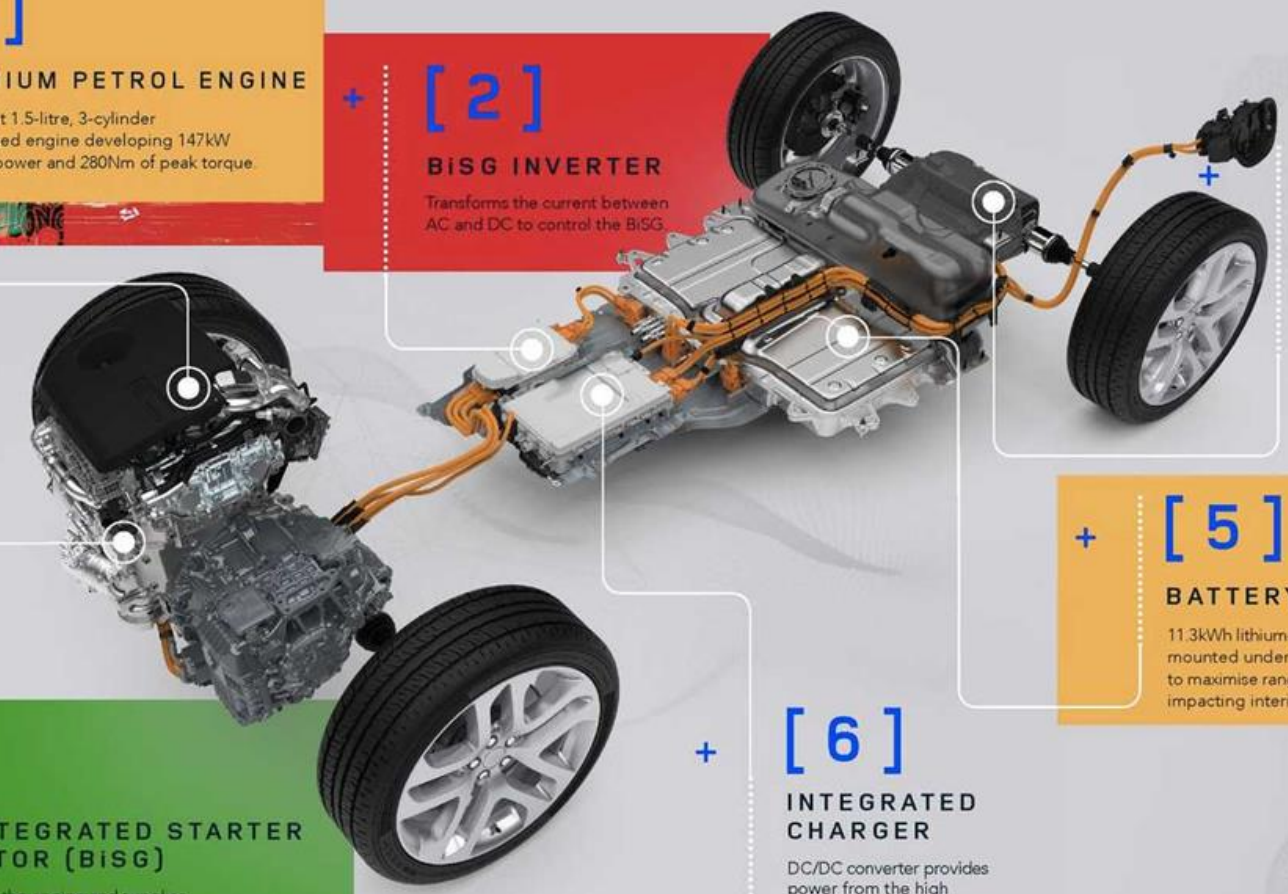

VX61 BVH

THE NEW RANGE ROVER EVOQUE

PLUG-IN HYBRID

State-of-the-art PHEV technology is available on the New Range Rover Evoque providing silent running, responsive performance and emission-free city driving – all without any range anxiety.

LAND ROVER
ABOVE & BEYOND



+ [1]

INGENIUM PETROL ENGINE

Lightweight 1.5-litre, 3-cylinder turbocharged engine developing 147kW (200PS) of power and 280Nm of peak torque.

+ [2]

BiSG INVERTER

Transforms the current between AC and DC to control the BiSG.

+ [3]

BELT-INTEGRATED STARTER GENERATOR (BiSG)

Seamlessly starts the engine and supplies power to the high voltage system.

+ [4]

ELECTRIC MOTOR

Electric Rear Axle Drive system with integrated gearbox and inverter, producing 80kW (108PS) of power and 260Nm of torque.

+ [5]

BATTERY

11.3kWh lithium-ion battery mounted under the floor to maximise range without impacting interior space.

+ [6]

INTEGRATED CHARGER

DC/DC converter provides power from the high voltage battery to the 12V system.

JAGUAR i-PACE

THE AWARD-WINNING JAGUAR I-PACE

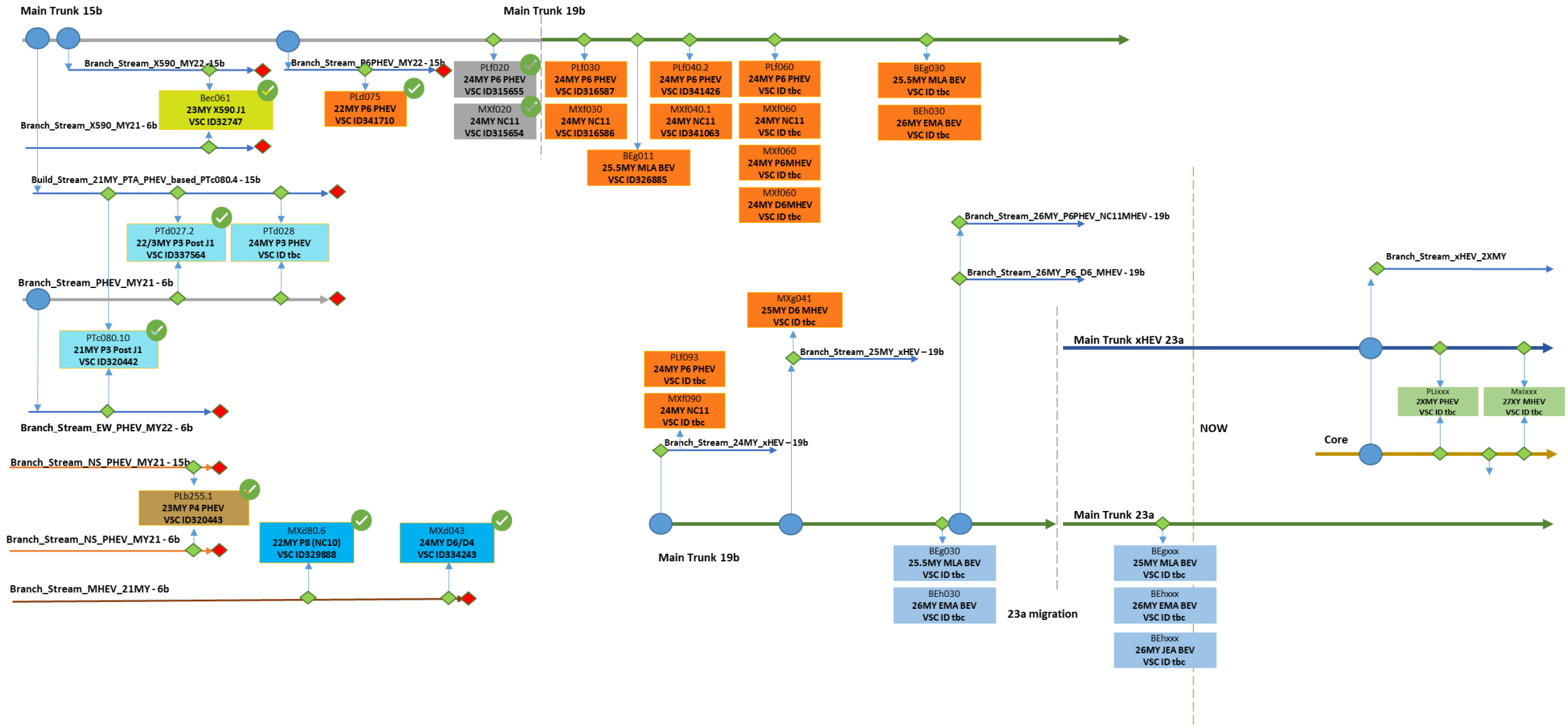
Nothing else looks or drives like the I-PACE.

IN FOCUS

- Winner of over 60 awards, including 2019 European and World Car of the Year
- World's first truly premium electric SUV
- Ground-breaking cab-forward design, engineered from the ground up for electric architecture
- Lightweight aluminium body and integrated battery, delivering exceptional stiffness
- Leading-edge safety, connectivity and driver assistance features

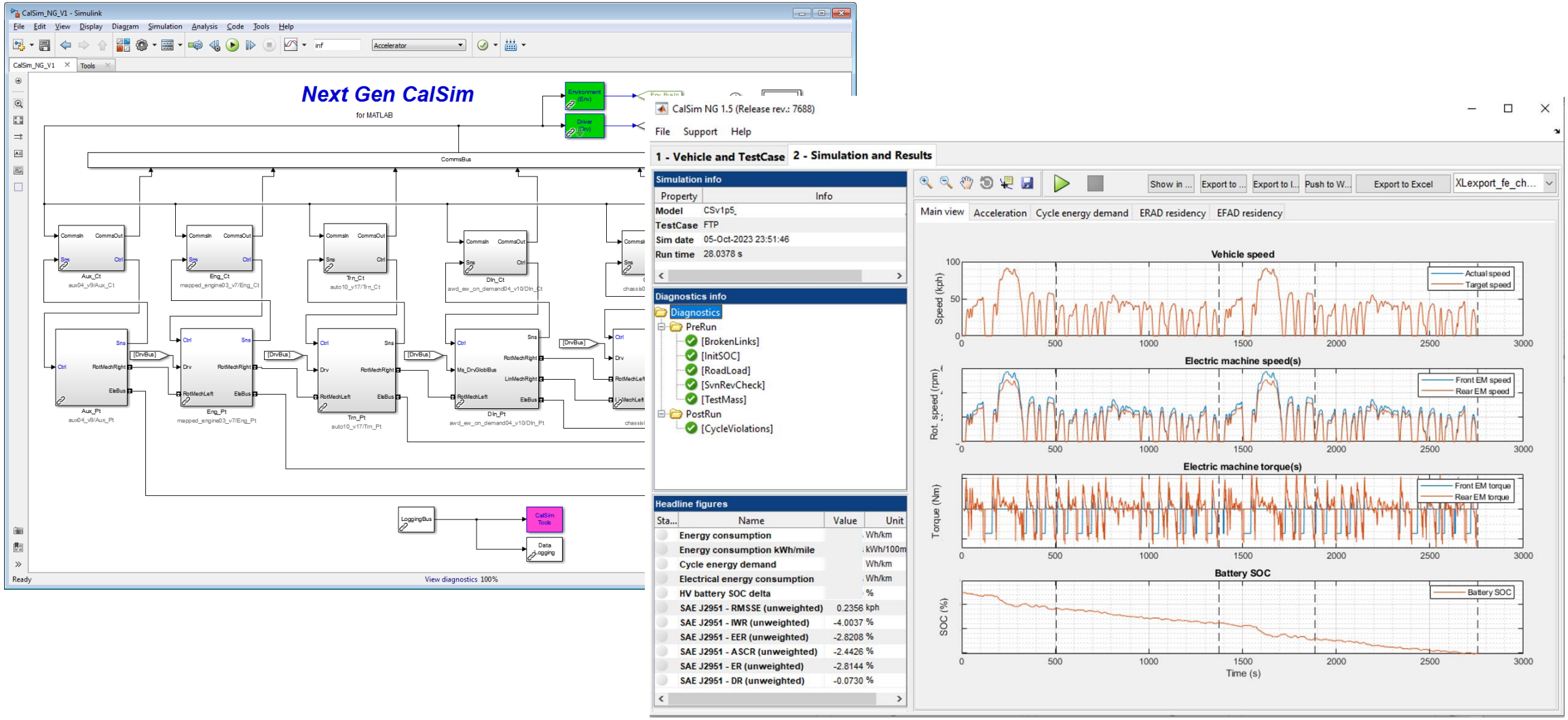
Range Rover PHEV

MAINLINE SW DEVELOPMENT

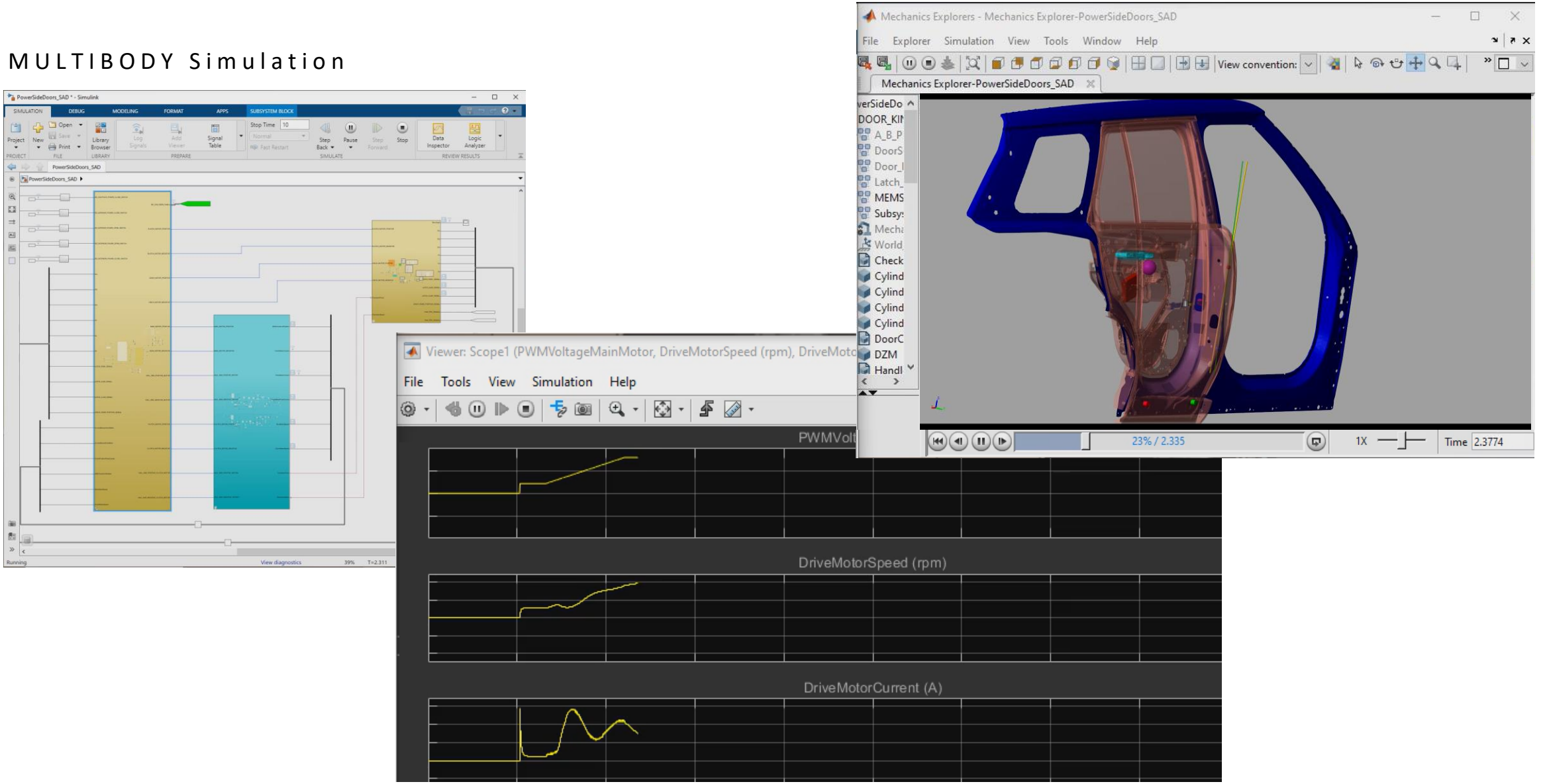


System Simulation

1D Simulation

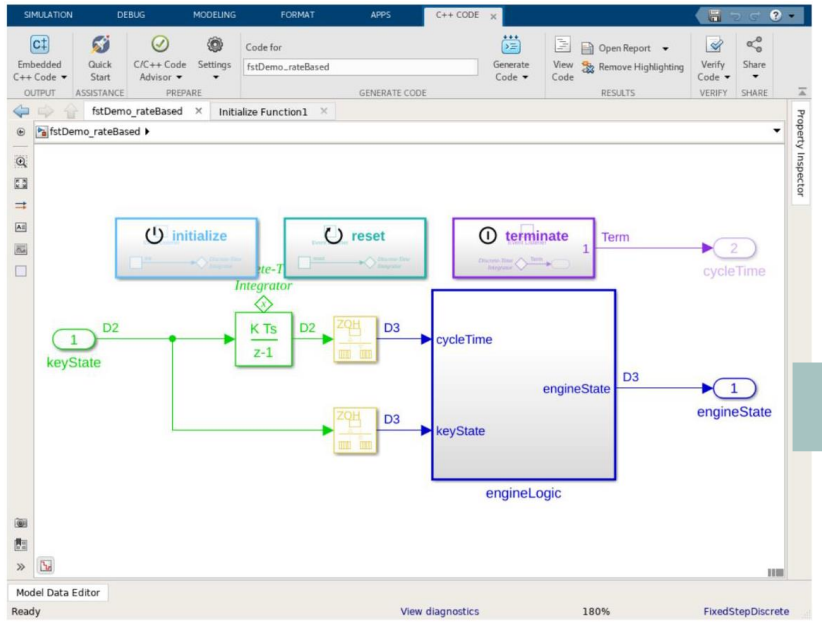


MULTIBODY Simulation



Software Pipeline

Models to code



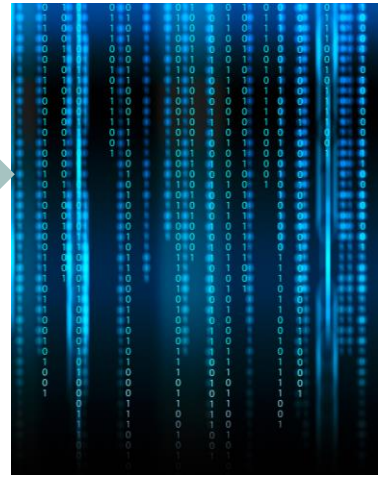
Code Generation

```
namespace pcg
{
  class fstDemoModelClass {
    // public data and function members
   public:
    // External inputs
    ExtU_fstDemo_rateBased_T fstDemo_rateBased_U;

    // External outputs
    ExtY_fstDemo_rateBased_T fstDemo_rateBased_Y;

    // model initialize function
    void initialize();

    // model step function
    void step0();

    // model step function
    void step1();

    // model step function
    void step2();

    // model event function
    void fstDemo_rateBased_reset();

    // model terminate function
    void terminate();

    // private data and function members
   private:
    // Tunable parameters
    static P_fstDemo_rateBased_T fstDemo_rateBased_P;

    // Block signals
    B_fstDemo_rateBased_T fstDemo_rateBased_B;

    // Block states
    DW_fstDemo_rateBased_T fstDemo_rateBased_DW;
  };
}
```

ISO 26262

UN R155
UN R156

Compiling & Linking

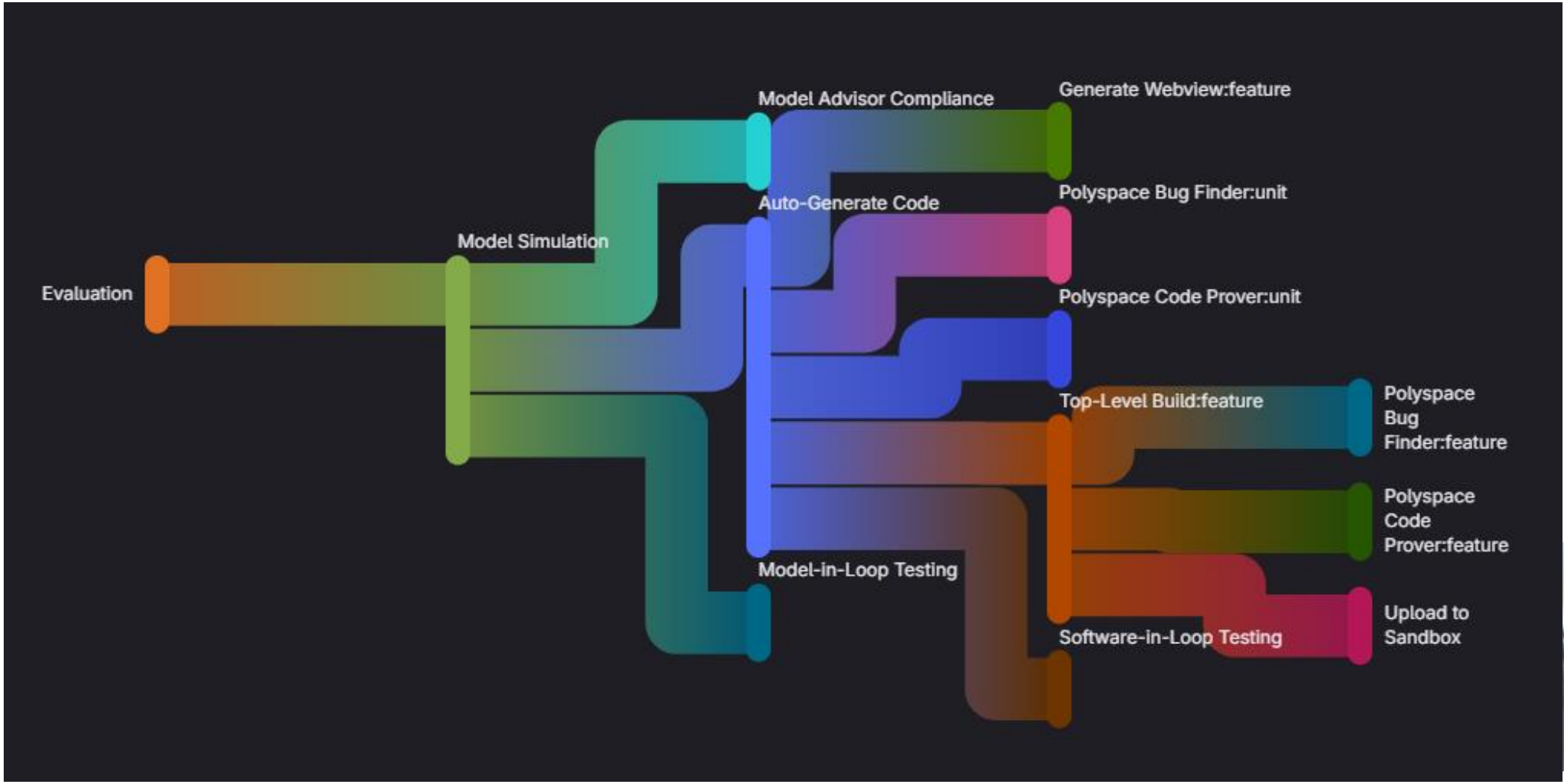


Software Robustness

Model Simulation	- Error checking of models to ensure basic functionality. - Acquisition of Model Metrics (e.g. Complexity)
Model Advisor Compliance	- Model syntax checking (aka Linting) - Ensures Models meet software development standards.
Model-in-Loop Testing	- Functional/Unit testing of models to ensure desired behaviour.
Software-in-Loop Testing	- Equivalence/back-to-back testing to ensure code behaviour matches models.
Polyspace Static Analysis	- Check code for errors & vulnerabilities - Coding rule compliance (MISRA / AUTOSAR)

Continuous Integration Pipeline

Process efficiency



PEOPLE

OUR CREATORS' CODE

CUSTOMER LOVE

WE LOVE OUR **CUSTOMERS**

UNITY

WE WORK AS **ONE**

INTEGRITY

WE SPEAK THE **TRUTH**

GROWTH

WE PROGRESS **TOGETHER**

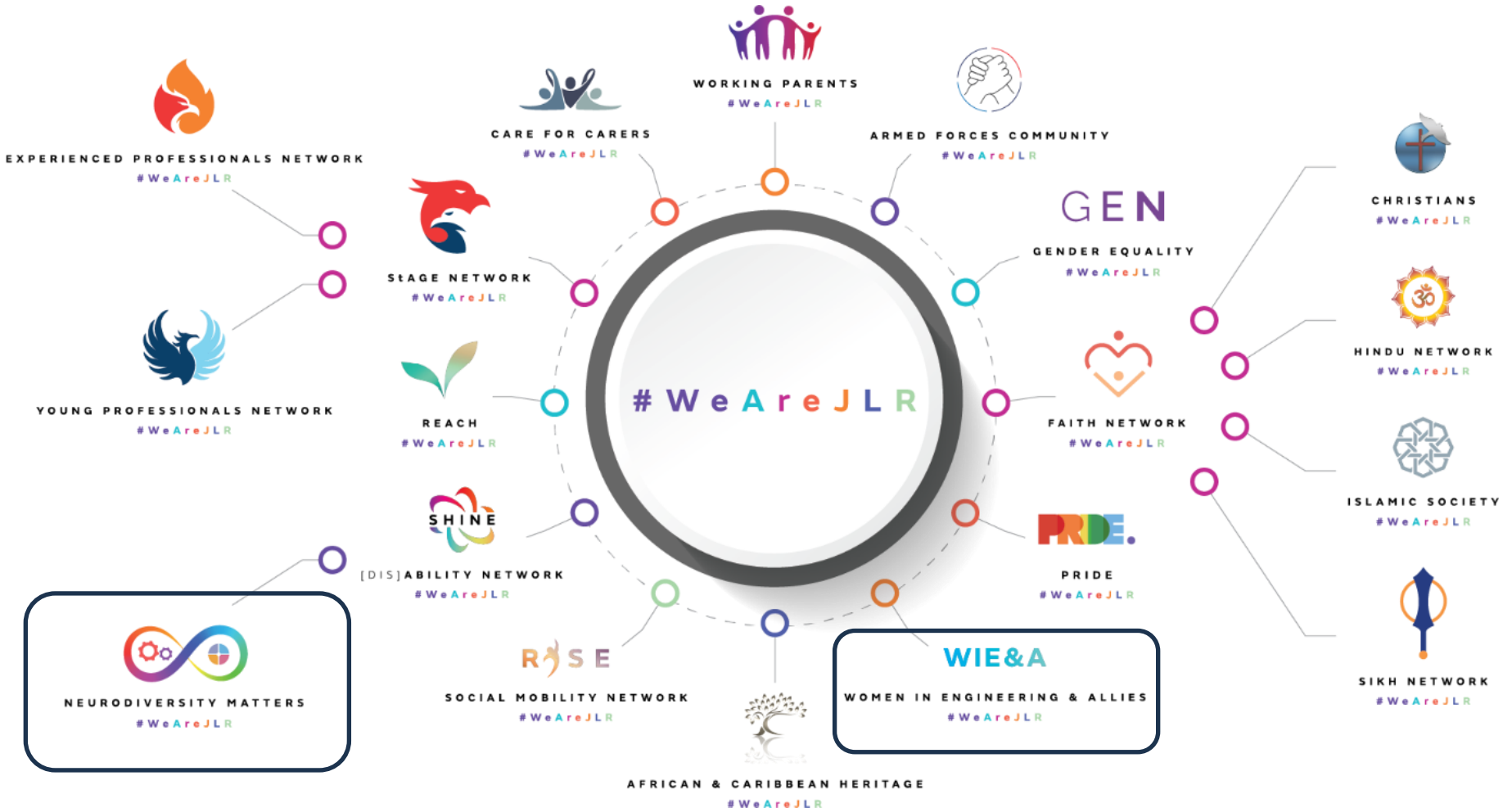
IMPACT

WE ARE **PURPOSE** ORIENTED

DIVERSITY + INCLUSION

DRIVING EQUITY AND BELONGING AT JAGUAR LAND ROVER

OUR 14 GLOBAL NETWORK GROUPS HAVE OVER 10,000 EMPLOYEE MEMBERS



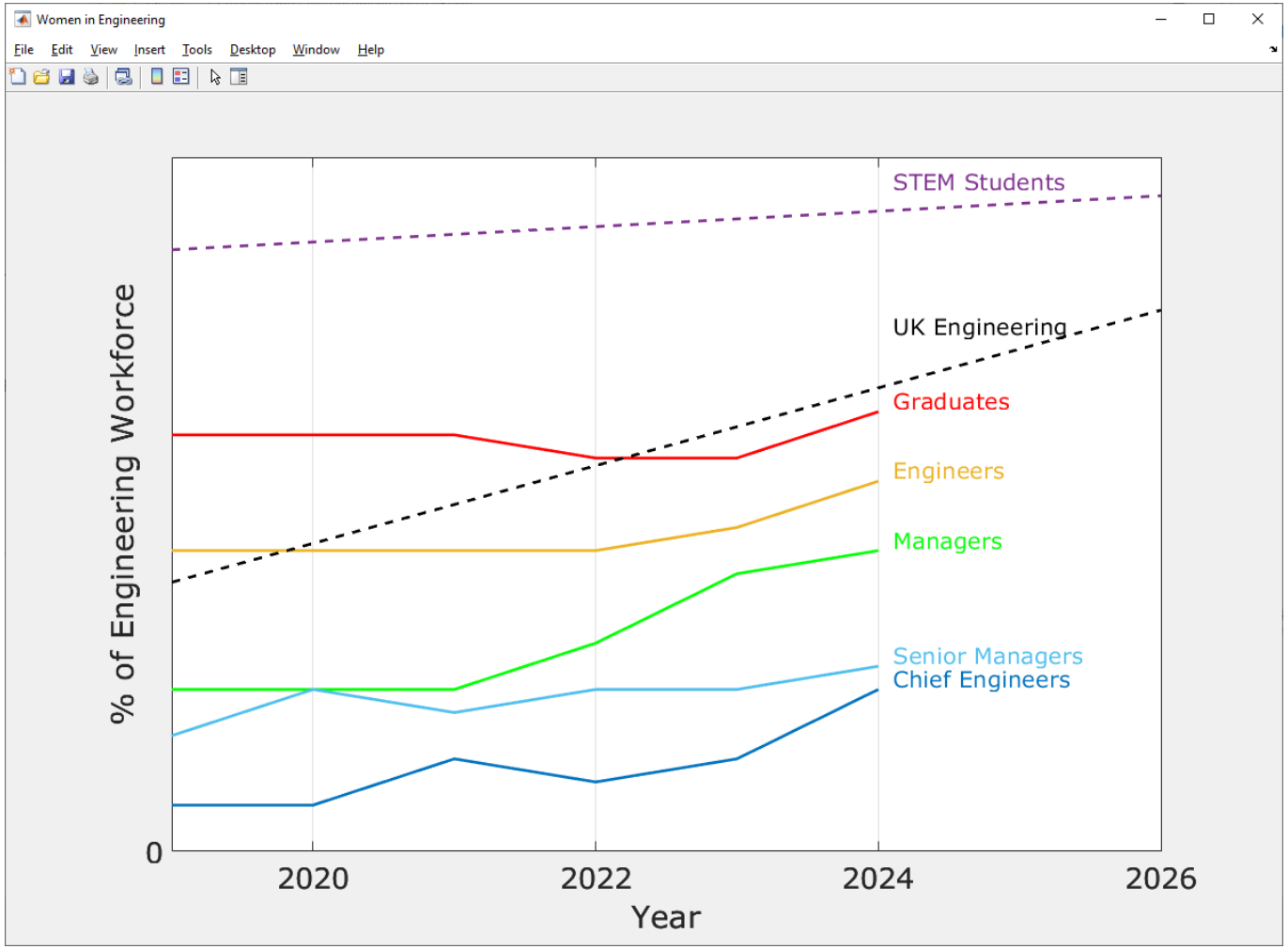
INTERNATIONAL D+I NETWORKS

Drive - North America's Diversity Network

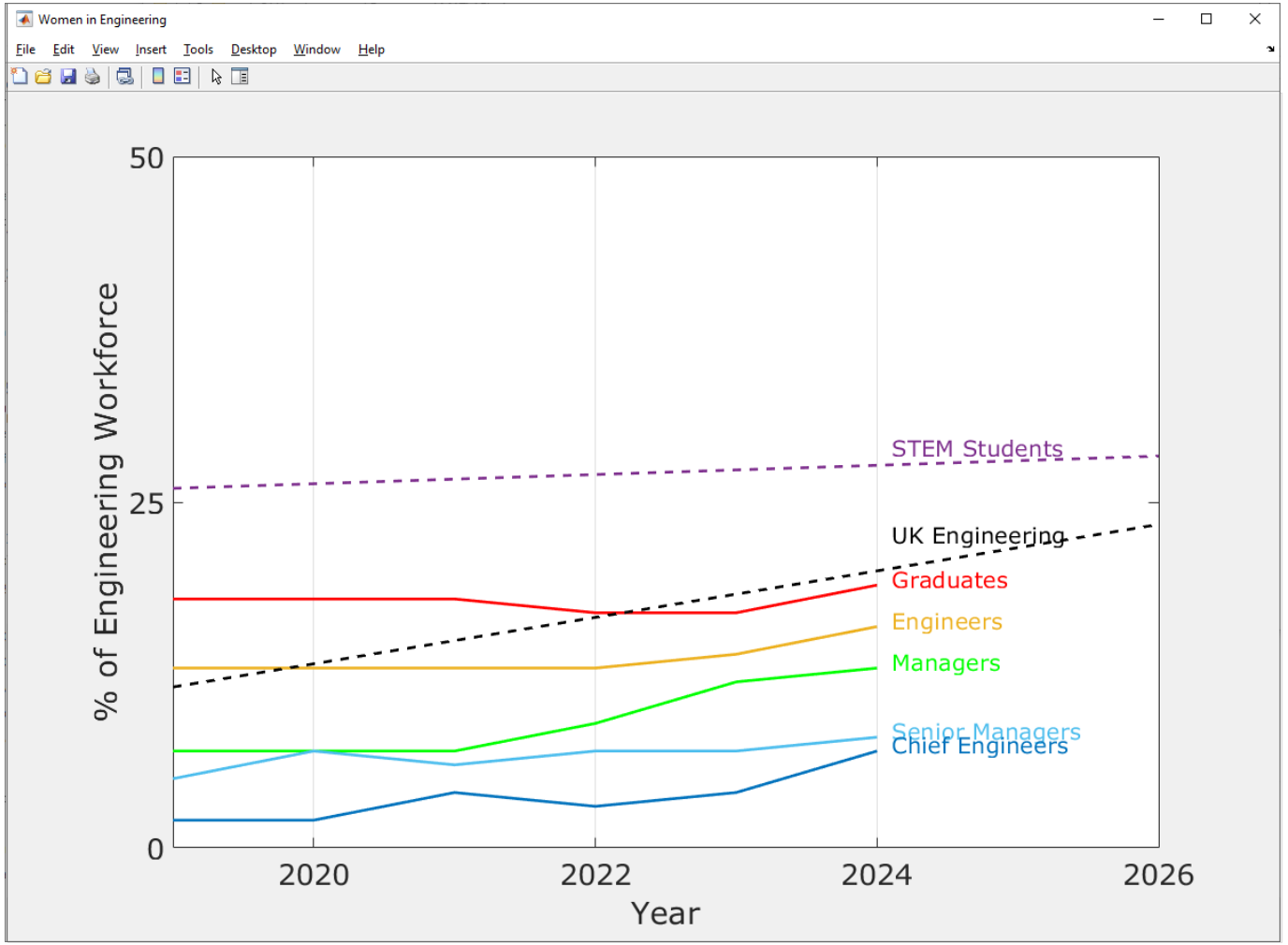
Ireland's Diversity Network

Brazil's Inclusion Programme

Women in Engineering



Women in Engineering



The following video contains flashing images

JAGUAR

tcs

RACING


DOW
FIA

JLR

JAGUAR

tcs RACING

Jaguar TCS Racing

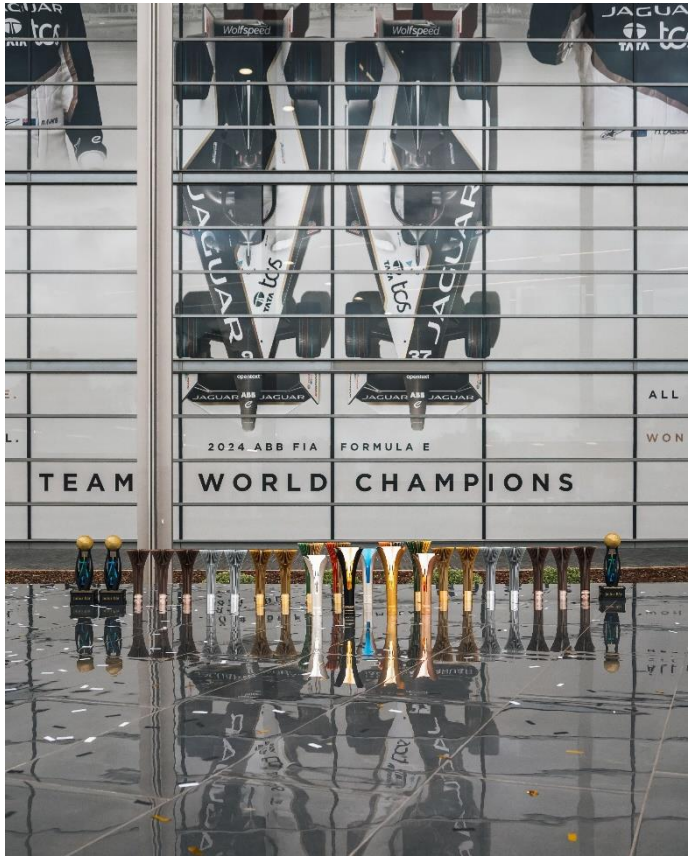
Control System Development

Analysis, Modelling and Visualisation

Optimisation

Report Generator

App Designer w/ Mathworks UI Element




RANGE ROVER TEST FACILITY:
SOMEWHERE NEAR THE ARCTIC CIRCLE

Q&A