

Strain and Displacement Management in Automotive Composites

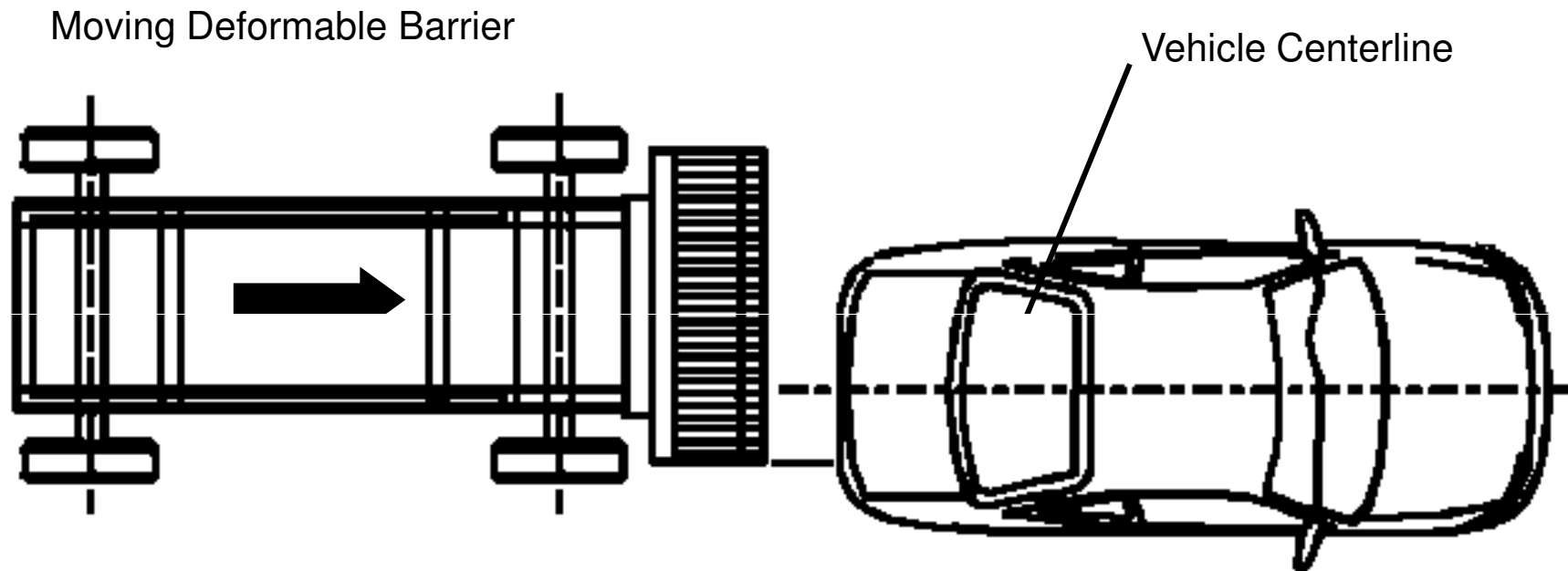
Dr. Peter H. Foss
Staff Researcher
Materials and Processes Lab
General Motors
Research and Development Center
Warren, MI

Displacement Management

- Composites usage in crash critical applications.
 - Not primary energy absorption role.
 - Displacements are relatively independent of composite structure.
- Displacements imposed on structure must be managed without catastrophic failure.

FMVSS 301

Rear Offset Deformable Barrier Test



GM

FMVSS 301 Rear Offset Deformable Barrier Test



FMVSS 301

Rear Offset Deformable Barrier Test

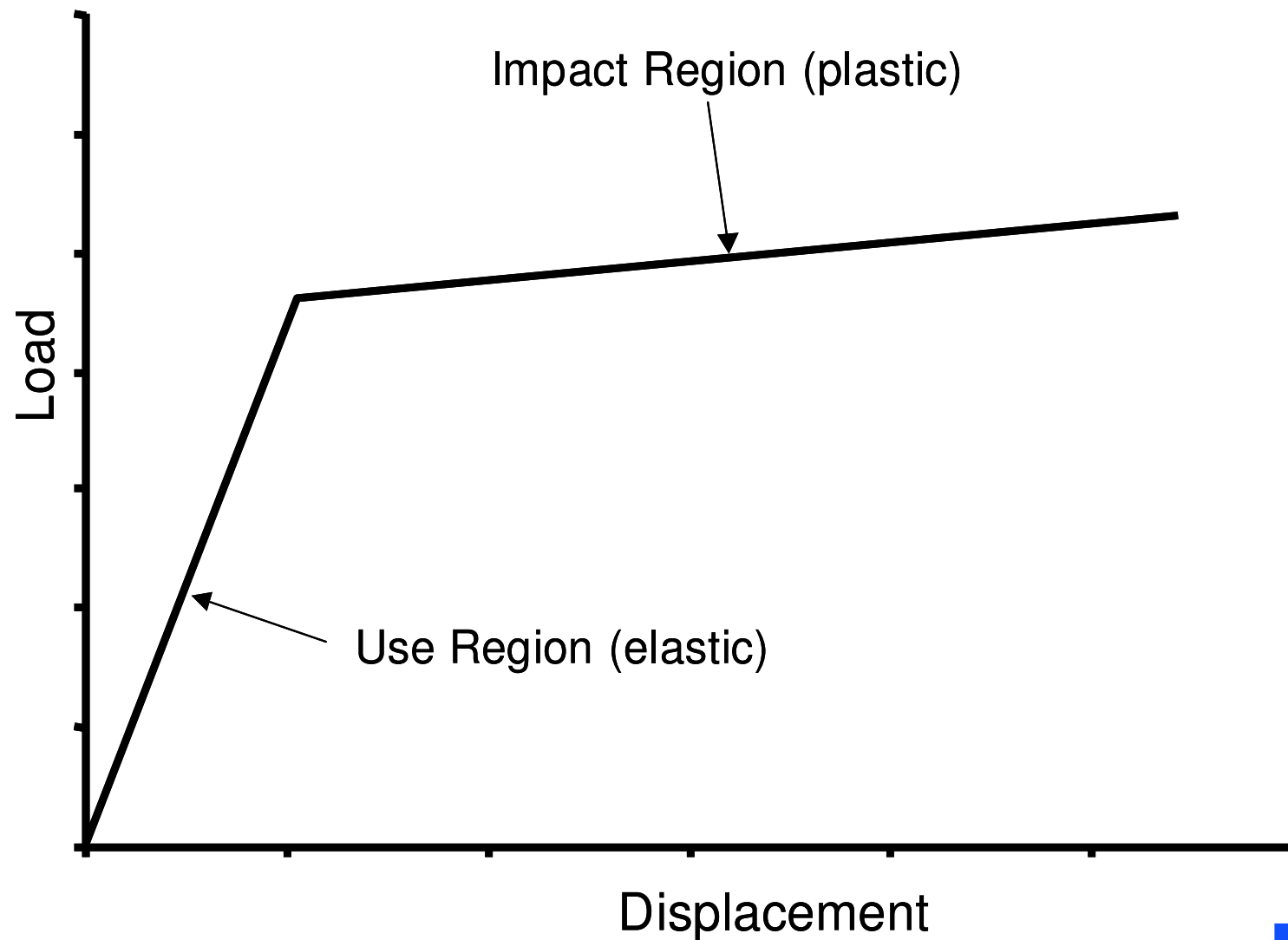


GM

FMVSS 301 Rear Offset Deformable Barrier Test



System Characteristic Response



GM

Liftgate Load-Displacement Testing



Materials and Processes Lab



Liftgate Load-Displacement Testing (Long Glass PP Only)

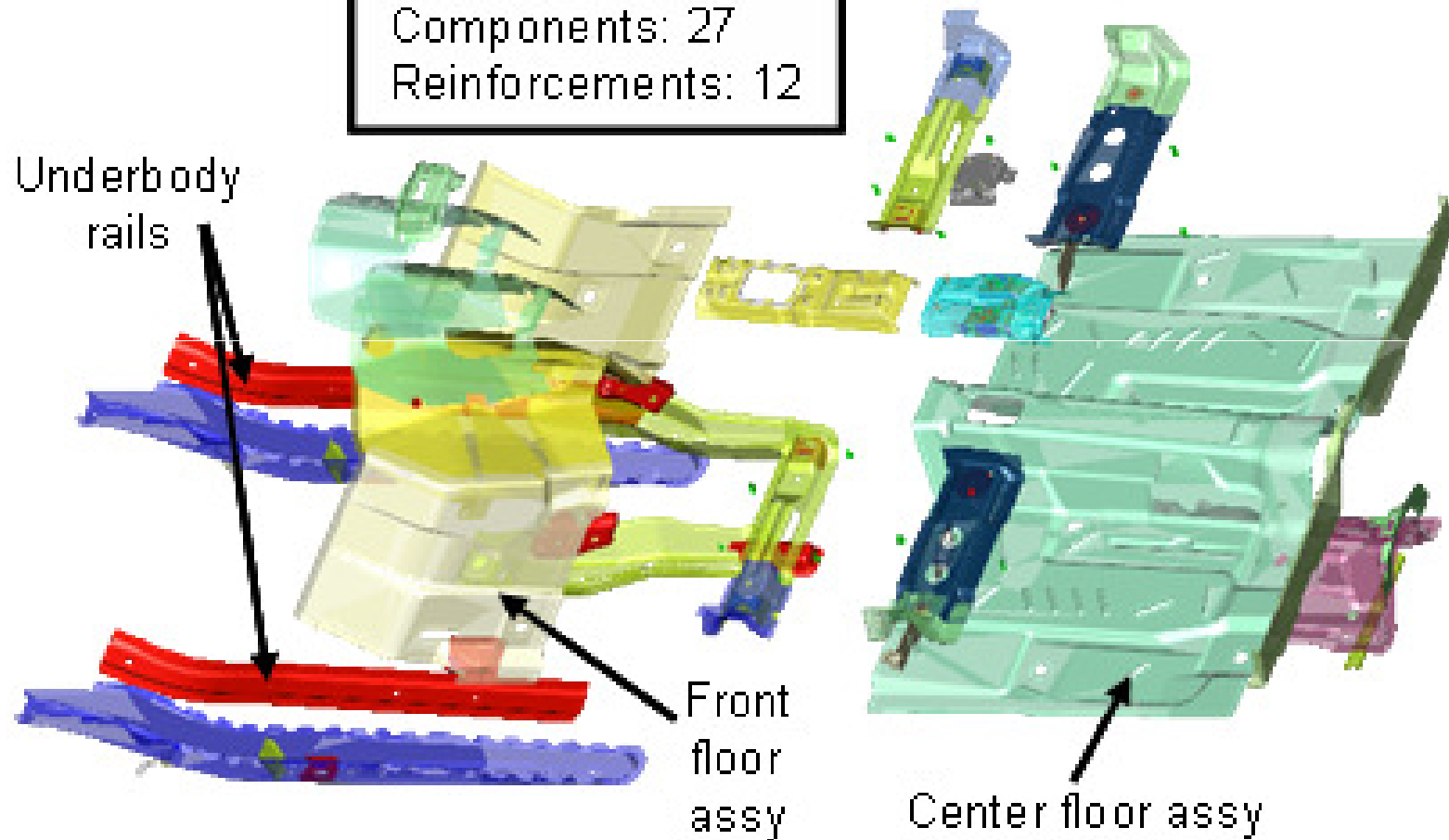


Liftgate Load-Displacement Testing (Twintex Reinforced LGPP)

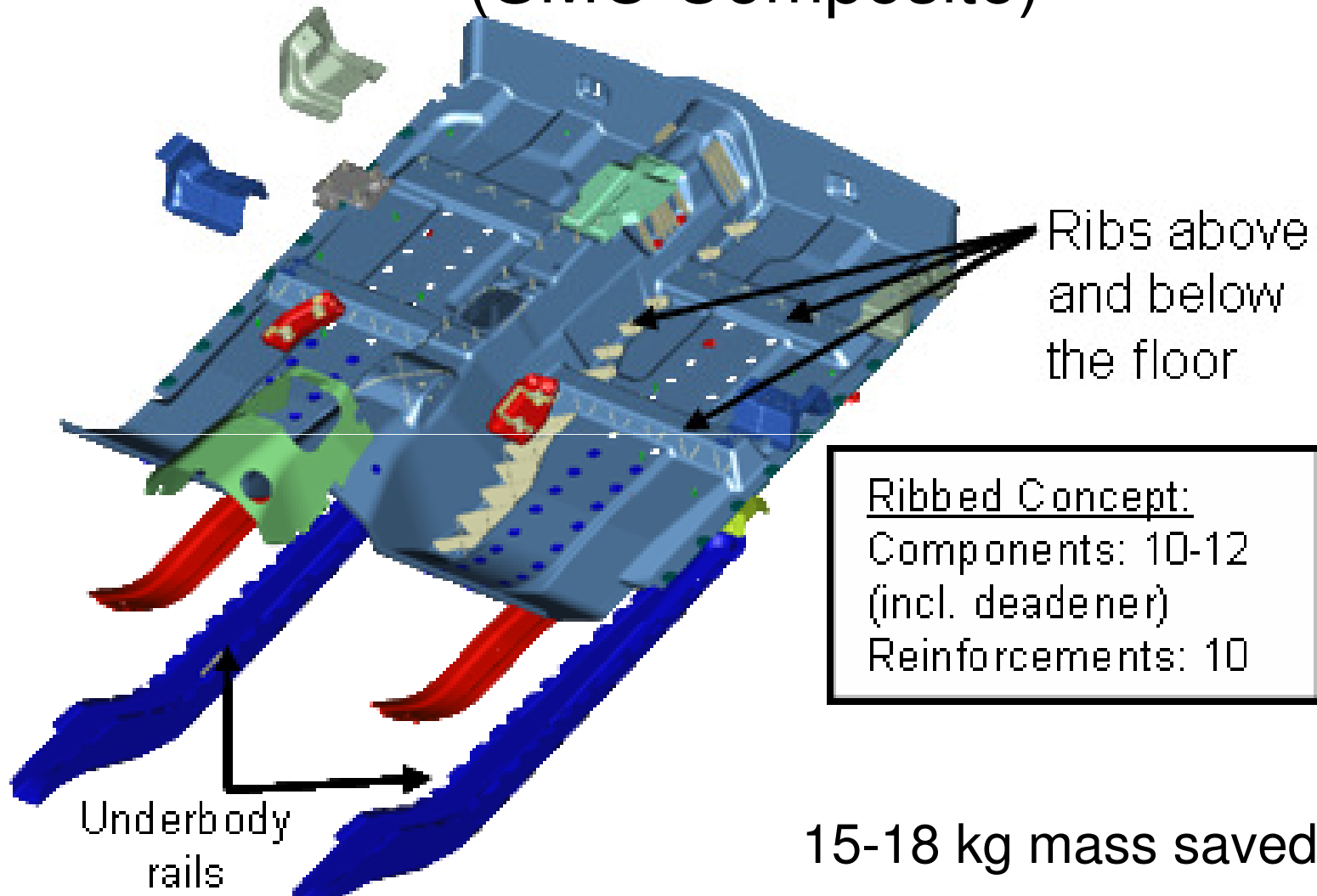


ACC Floorpan Project (Steel Baseline)

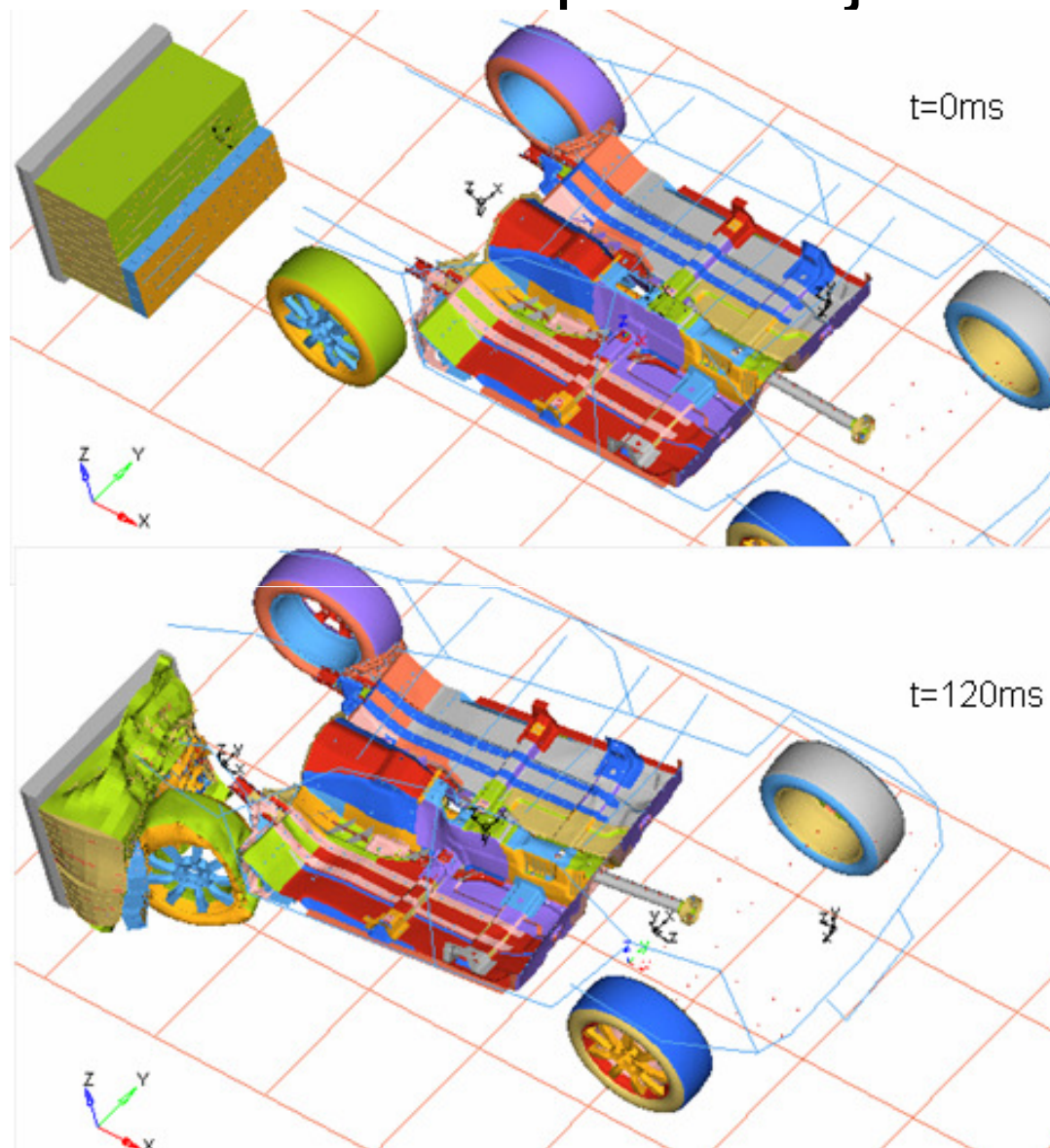
Total parts
Components: 27
Reinforcements: 12



ACC Floorpan Project (SMC Composite)



ACC Floorpan Project



Displacement Management

- Selective reinforcement of chopped fiber structures with continuous fiber fabrics.
- Promote local failure and damage without catastrophic failure.
- Experimentally practical but failure modeling is not robust.