

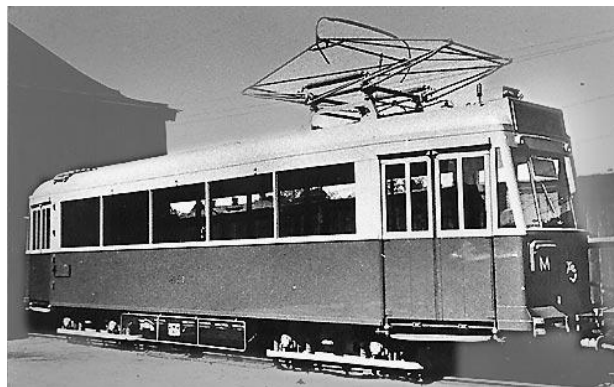
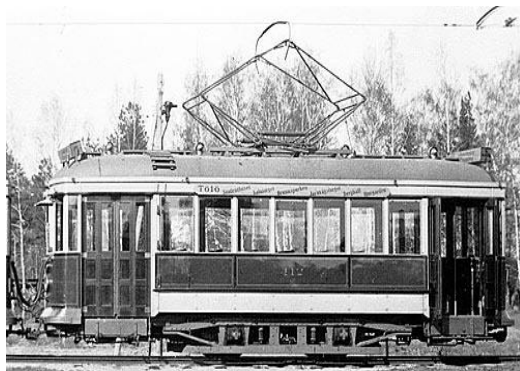
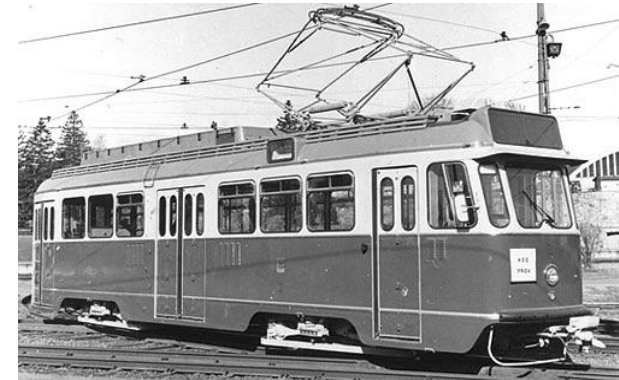
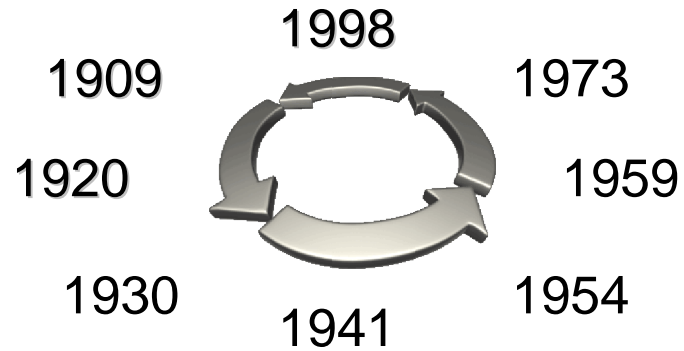
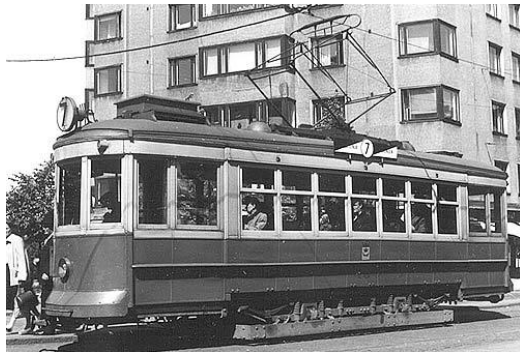
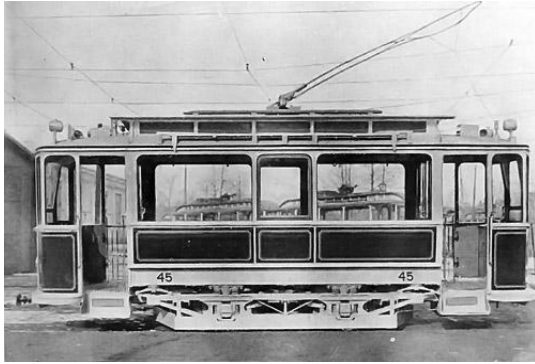
# PURCHASEMET OF 40-120 TRAMS FOR HELSINKI CITY

## Purchasement schedule:

- Technical & commercial specification 9/2008
- Invitation to tender 10/2008
- Recevieng of tenders 2/2009
- Comparision of tenders 6/2009
- Signing of contract 12/2009
- Delivery of prototype 12/2011
- Delivery of first serial car 5/2013

20.11.2007

# HELSINKI TRAMS 1908-2008



# TRAM CONCEPT DESCRIPES COMFORT & LIFE-CYCLE COSTS

Requirement	bogie	multi articulated
• 100% low-floor	hard	easy
• 15m horizontal radius	possible	possible
• 100m vertical radius	easy	possible
• maximum 9t axle-load	easy	hard
• short transition curves	easy	hard
• long spring-ways	easy	hard
• good wheel life-time	easy	hard
• good running-comfort	easy	hard

# TODAY'S & TOMORROW'S CONCEPTS

## Low-floor multi-articulated trams :

- + 100% low-floor
- + many versions available
- bad experiences
- high maintenance costs
- short component life-time
- extensive track & wheel wear

## Partial low-floor boggie trams :

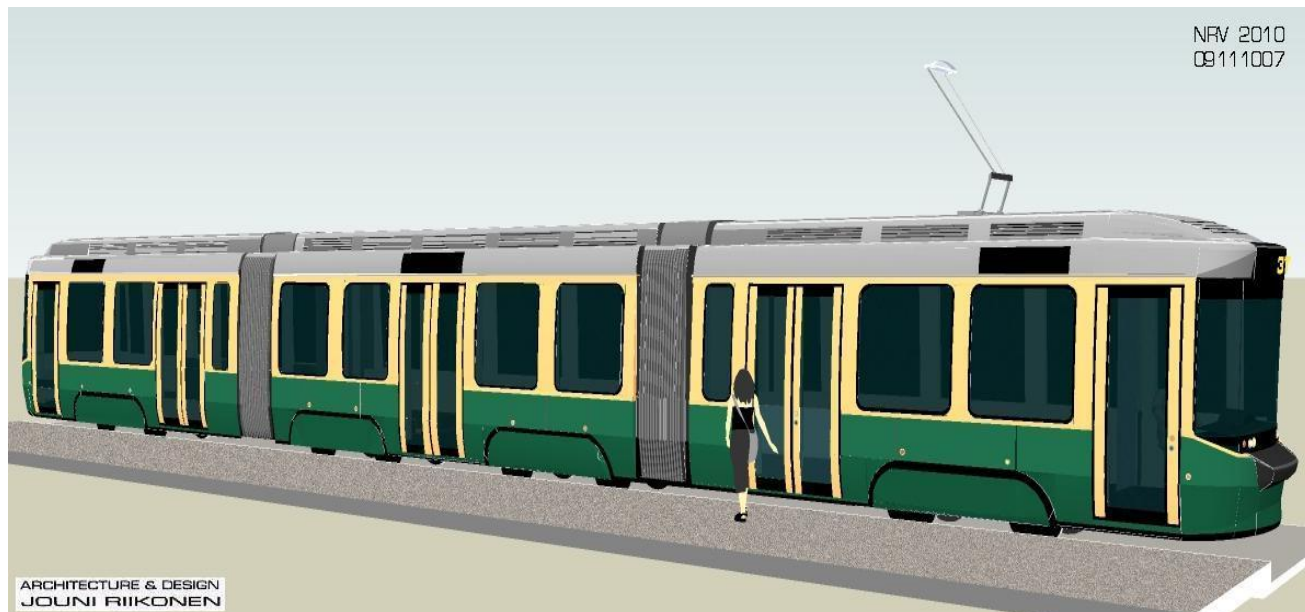
- + many versions available
- + good experiences
- + good running comfort
- maximum 70% low floor
- two different boggie types per tram
- at least one running boggie w/o axles

## Low-floor boggie trams (not existing):

- + 100% low-floor
- + low track & wheel wear
- + good life-time expectation
- + good running comfort
- in concept phase
- 10% door ramps & rised seating (bodesters)
- prototypes must be built

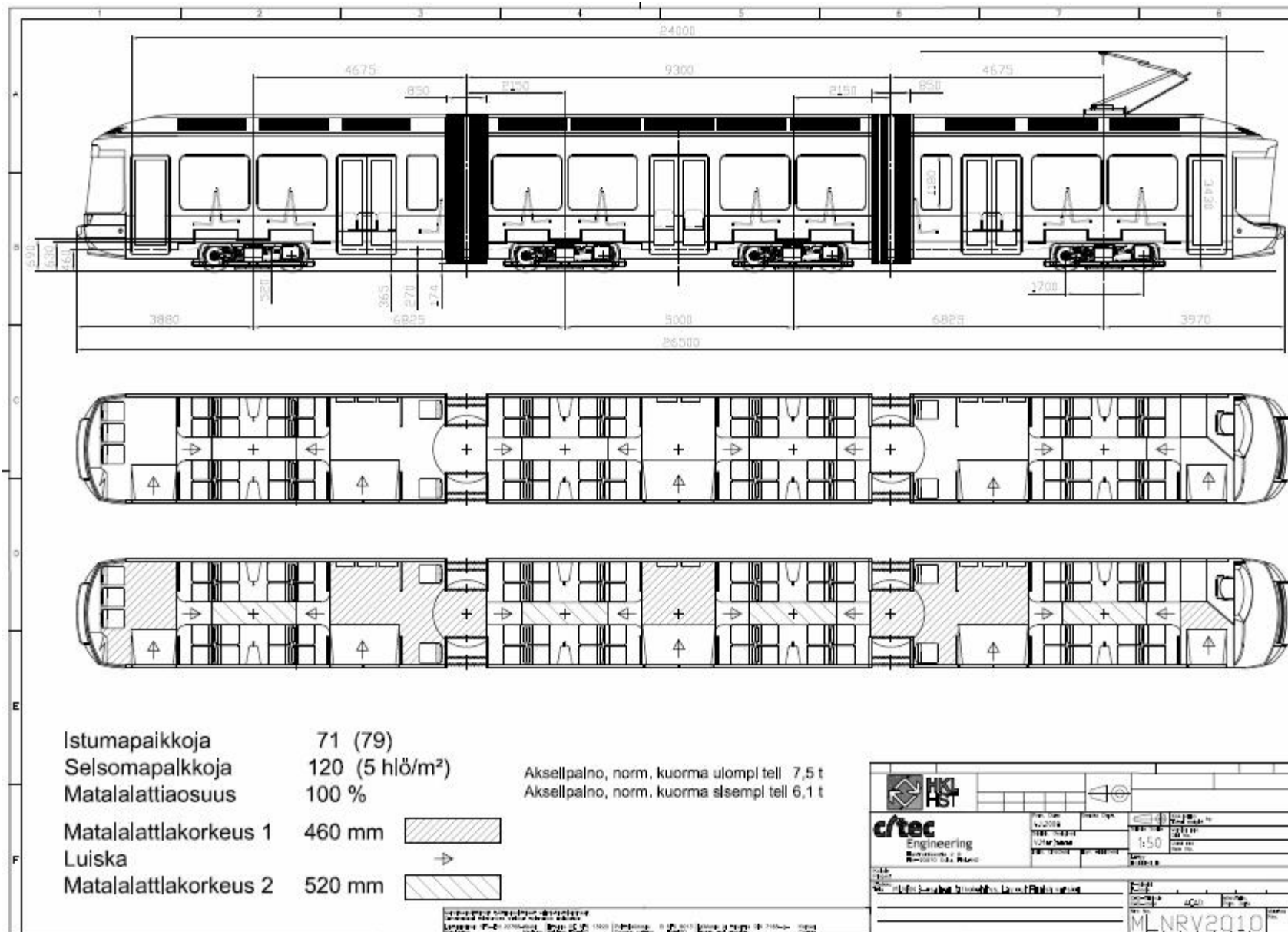


# FUNCTIONAL TRAM CONCEPT

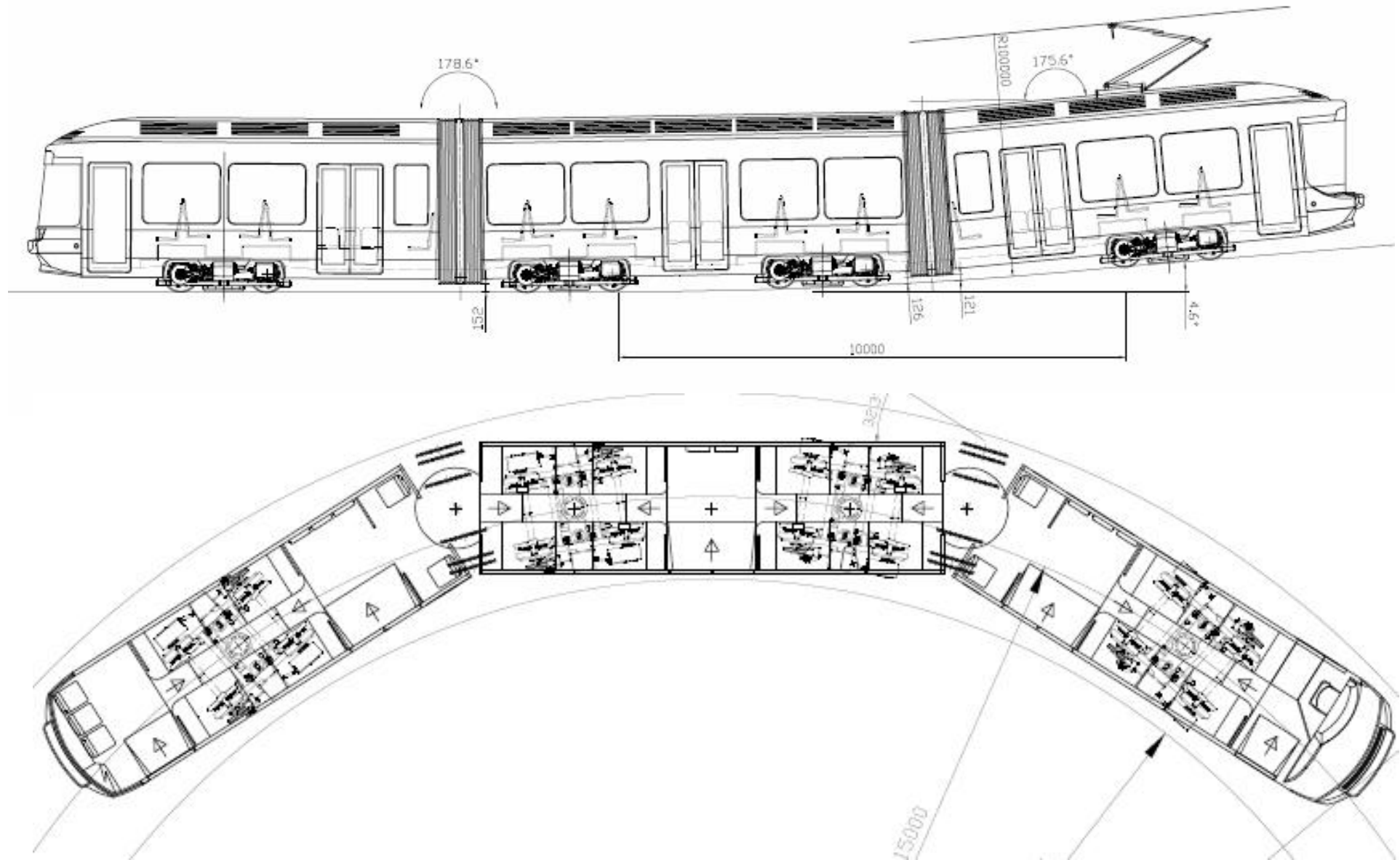


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# FEASIBILITY STUDY

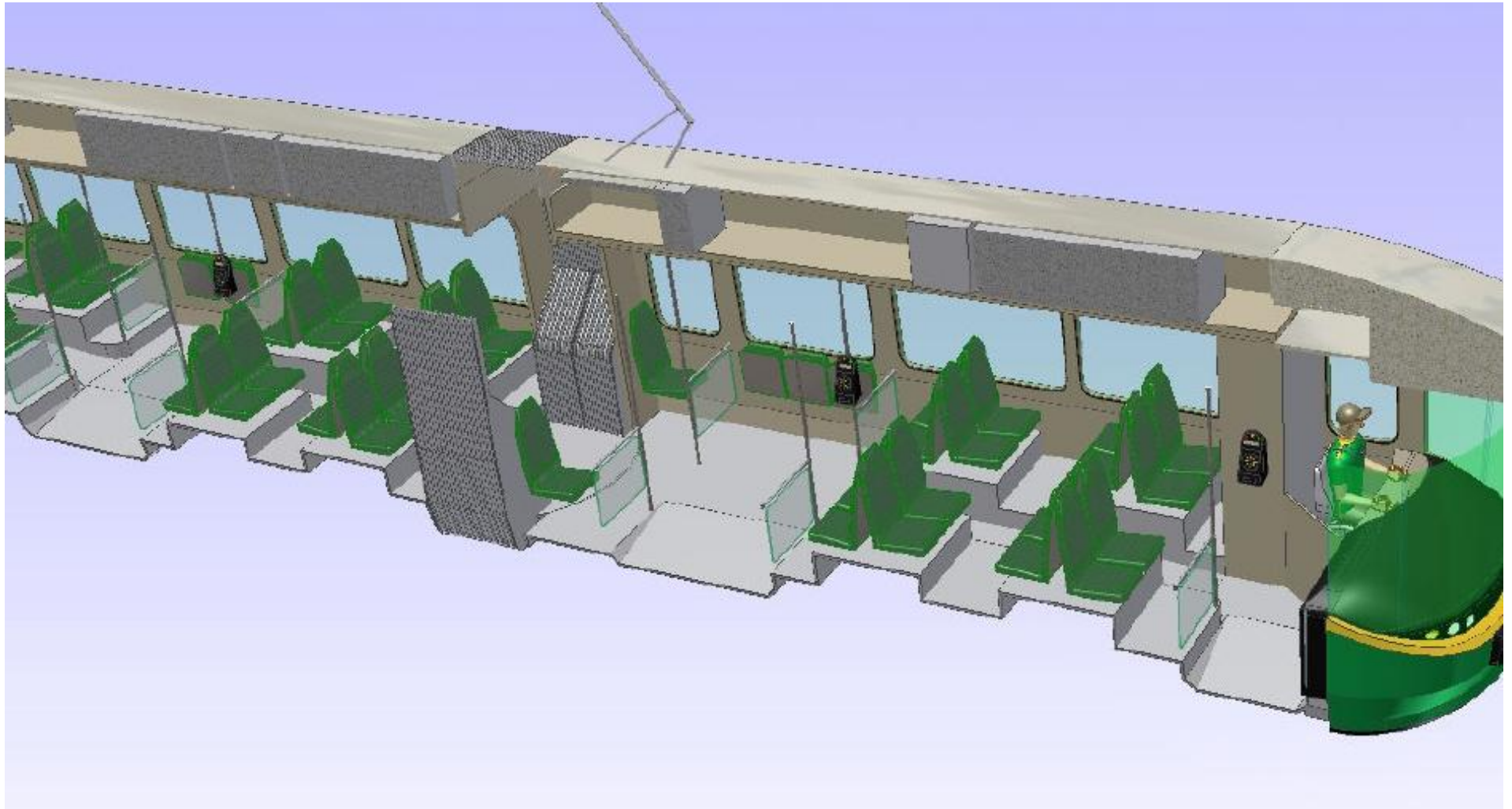


# RADIUS OF 15M AND 110M



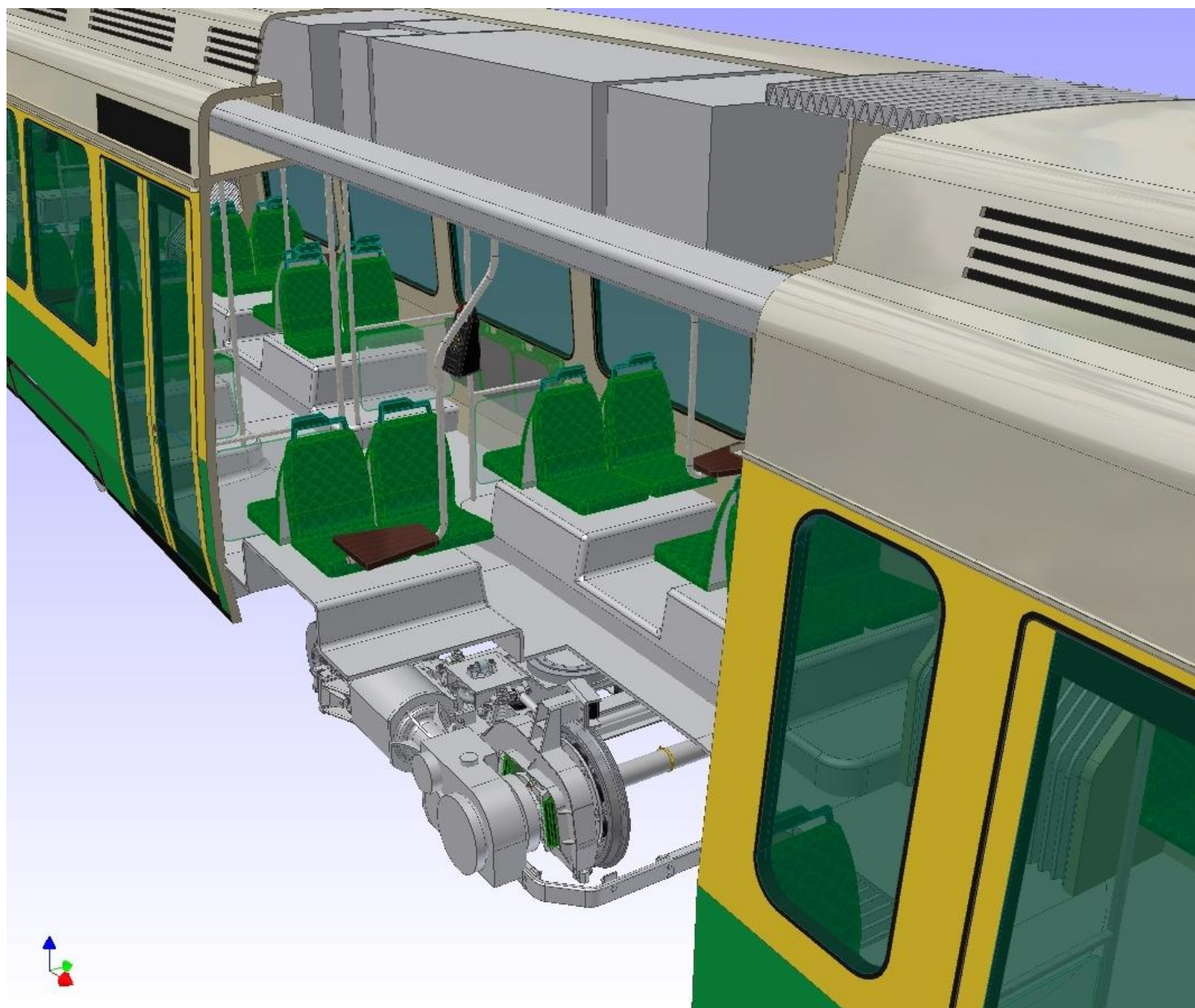


# DOOR-RAMPS & RAISED SEATING



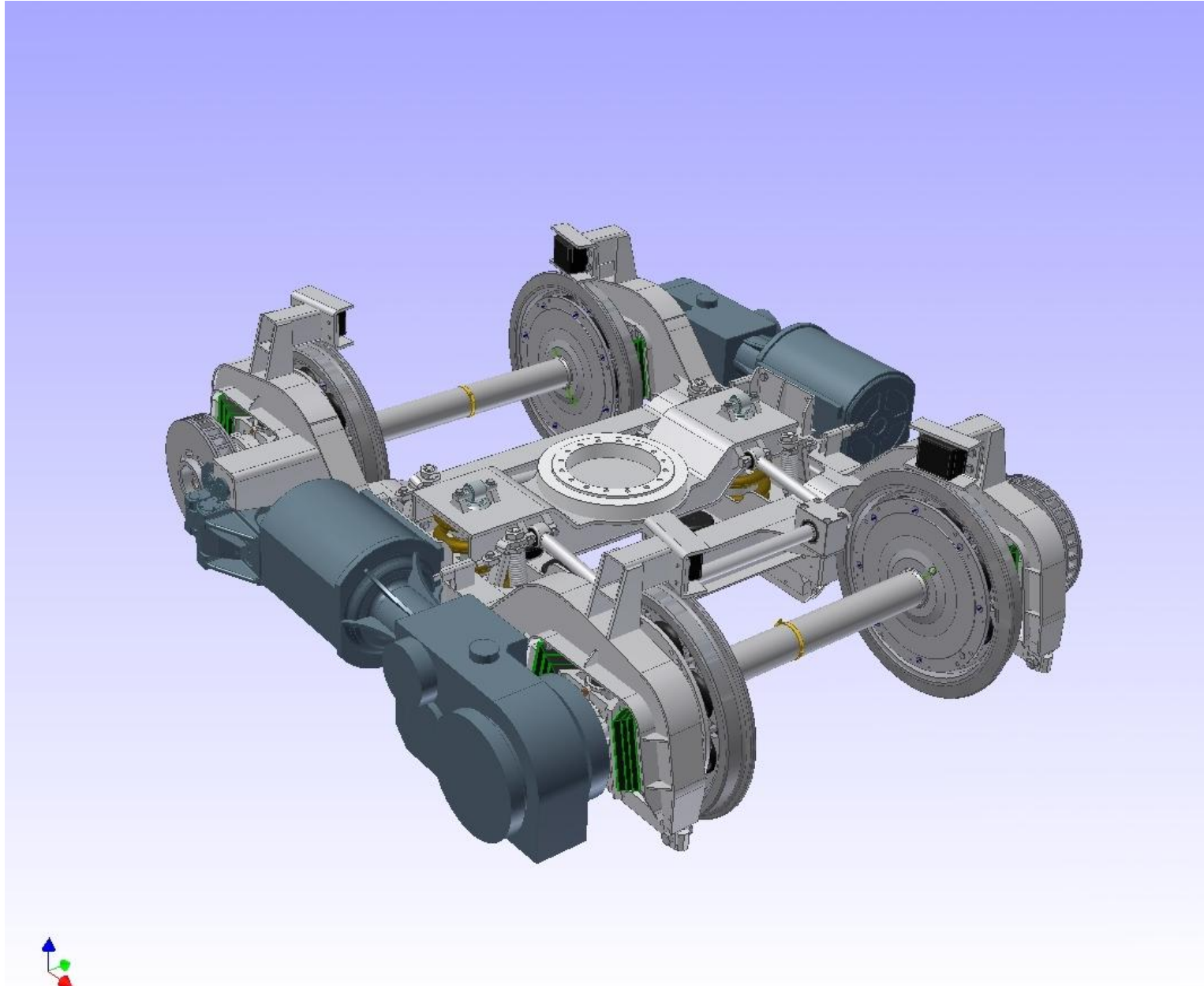


# WHY RAISED SEATING?

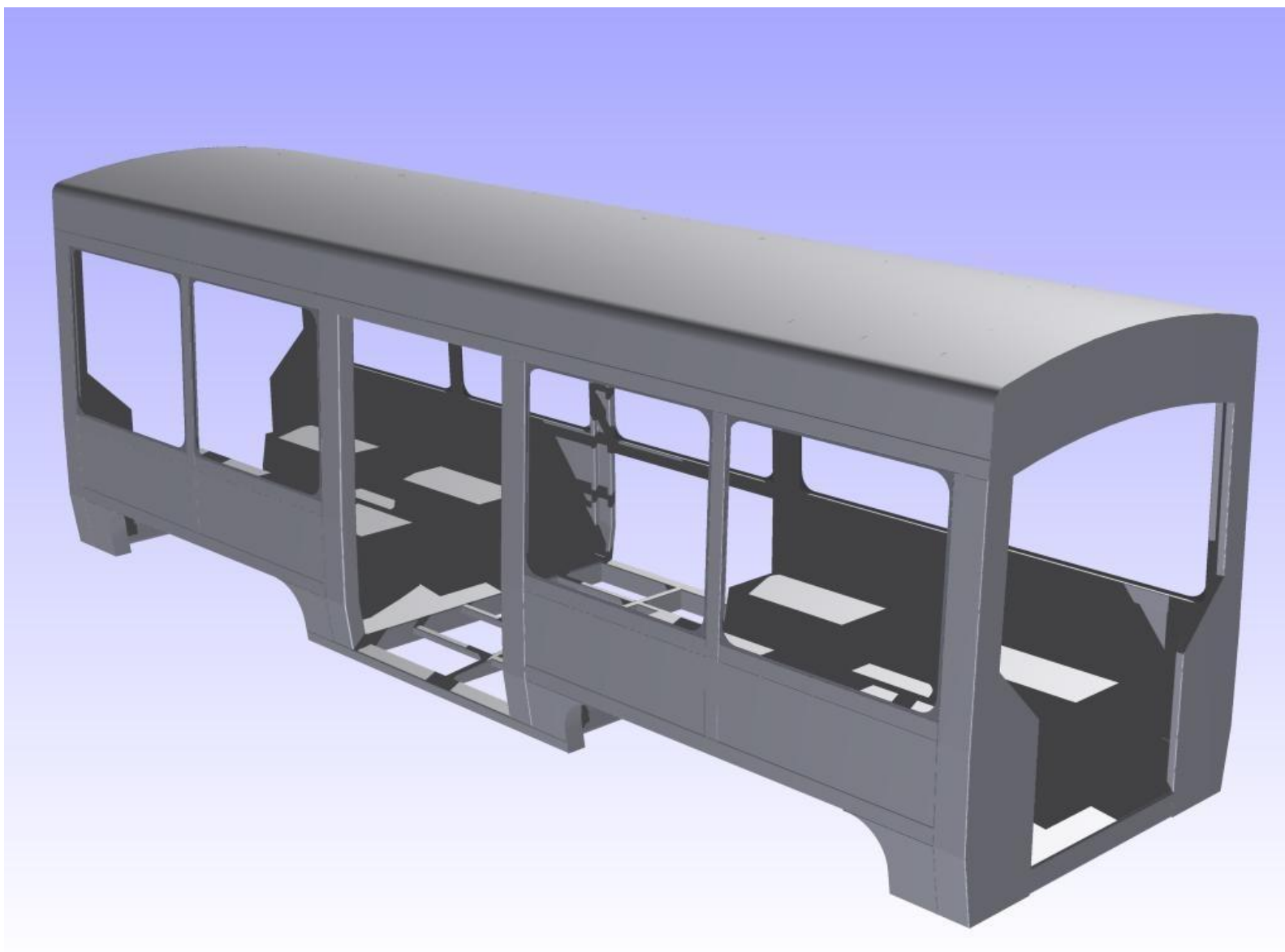


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# PIVOTING BOGGIE WITH AXLES



# TRADITIONAL STEEL CAR-BODY



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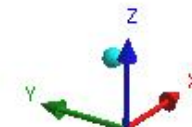
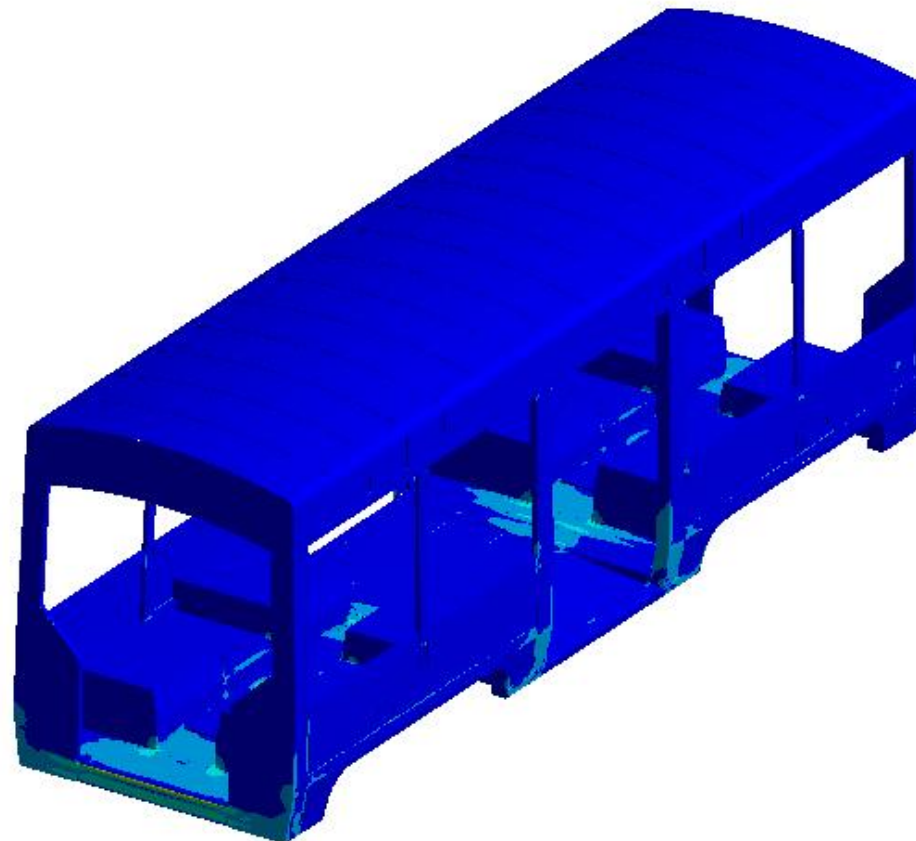
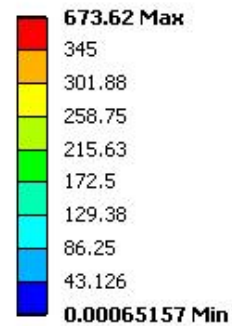


# FLEXIBLE COMPONENT CONNECTIONS = LOW STRESSES

ANSYS  
v11

## Equivalent Stress

Type: Equivalent (von-Mises) Stress  
11-02-2008 18:19





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MLNRV 2010  
ARCHITECTURE & DESIGN  
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16.01.2008



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