

NHTSA's Compatibility Research Program

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NHTSA Crashworthiness Research



Overview

Test Program Overview

Vehicle to Barrier Test Program

- Status, schedule, and updates

Vehicle to Vehicle Test Program

- Status, schedule, and updates

Full width deformable barrier testing

- Planned for this summer

Testing Goals

Test vehicles of similar mass and varying compatibility characteristics

- Include rigid barrier testing with 125 mm load cells
- Same target vehicle for all VTB tests

Evaluate if VTB compatibility measures relate to reduced VTV partner injury measures

18 VTV tests, 7 VTB tests

- 3 bullet vehicle pairs (SUV, pickup, mini van)
- 3 Test procedures
 - Front-Front collinear full overlap
 - Front-Front collinear 50% overlap
 - Front-Side FMVSS 214 configuration

Vehicle Selection Criteria

For each bullet vehicle class

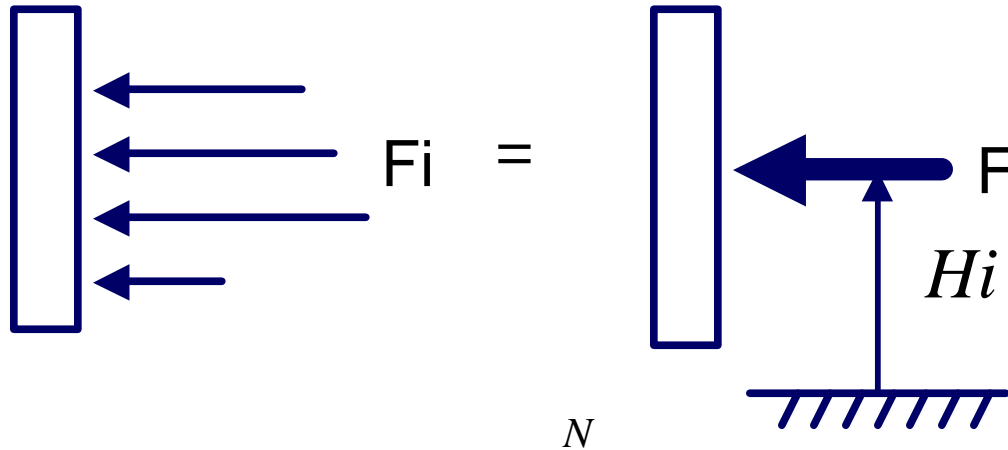
- Similar size and mass
- High / Low AHOF from NCAP testing
- High / Low initial stiffness

Target vehicle was selected to have:

- Representative compatibility measures
- Good safety ratings
- Side curtain airbags

Average Height of Force

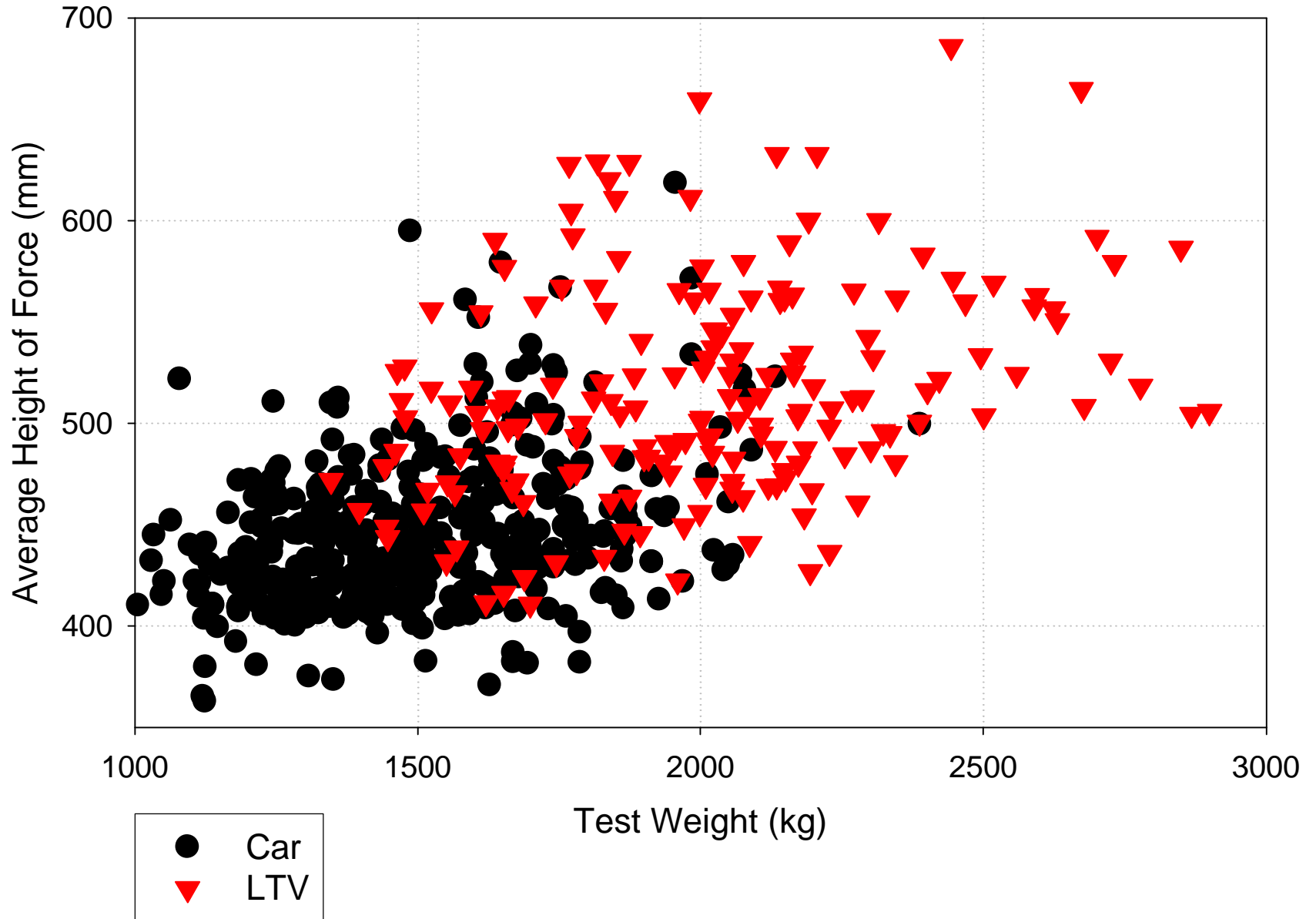
Compute the effective height of the applied force on the barrier face



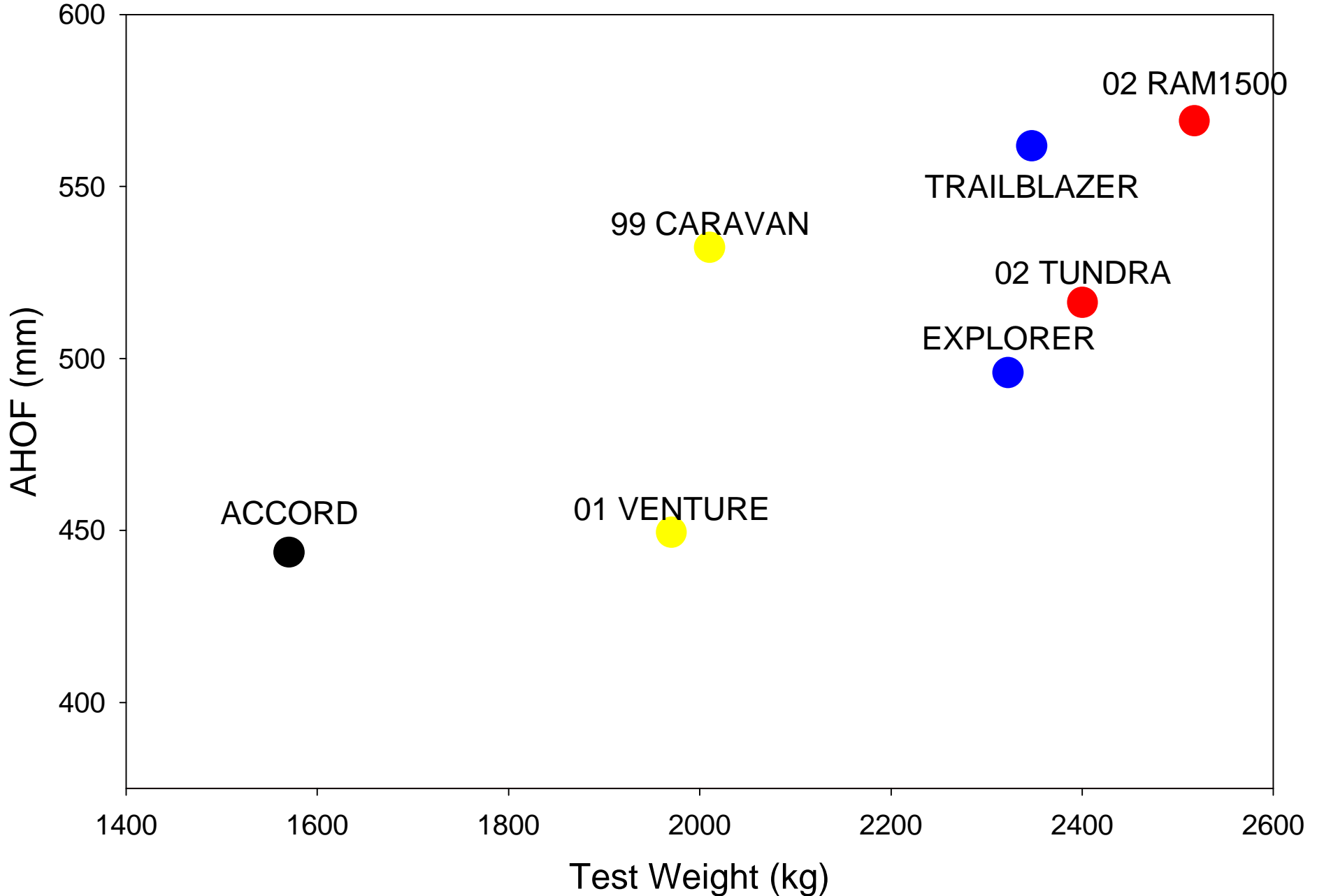
$$\text{Average Height Of Force} = \frac{\sum_{i=1}^N F_i H_i}{\sum_{i=1}^N F_i}$$

Distribution of NCAP Test Results

Test Data 1982 to 2002



Selected Test Vehicles



Initial Stiffness

The initial slope of the Force-Deflection profile varies considerably between LTV's and passenger cars

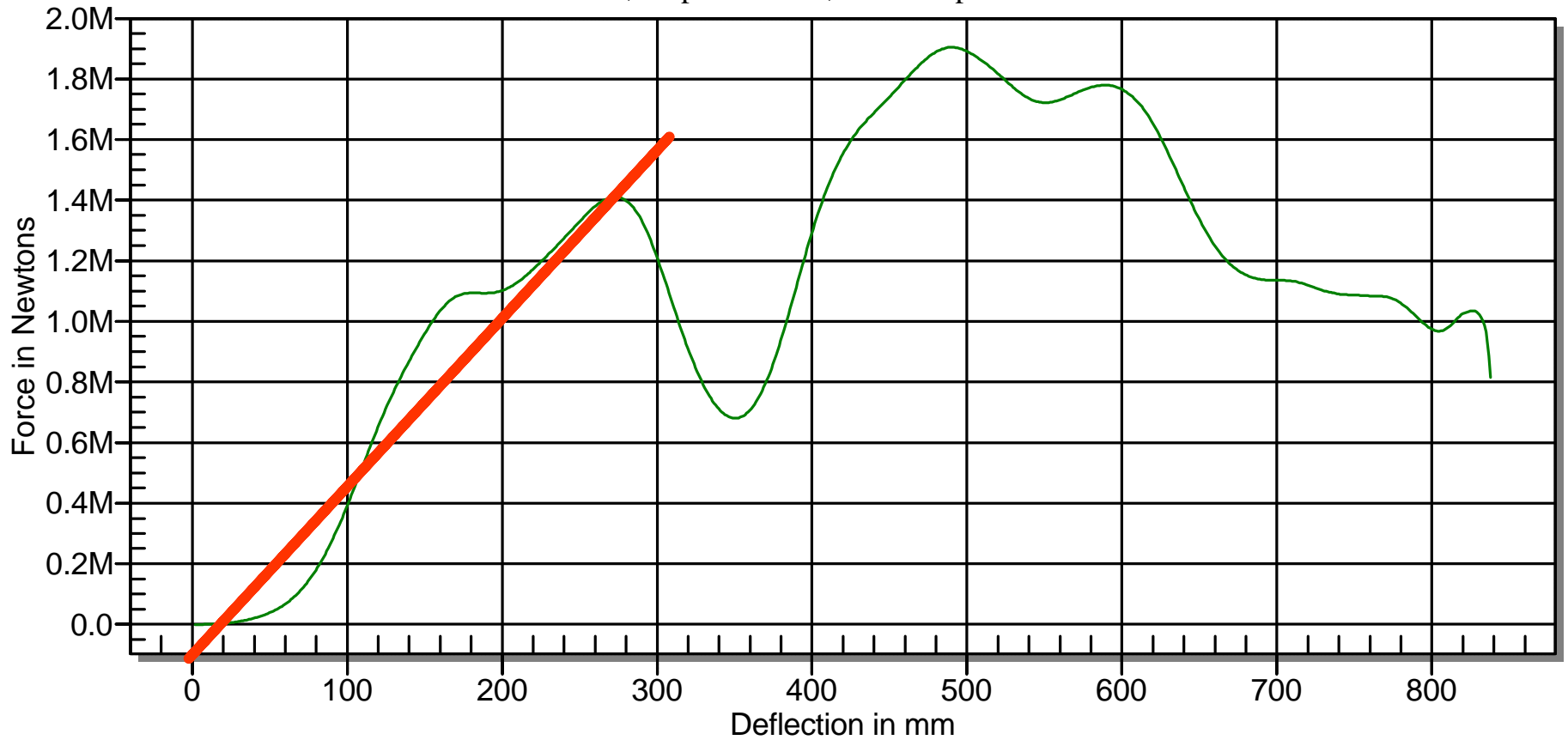
- May be significant for side impact

Linear fits estimated from force deflection data

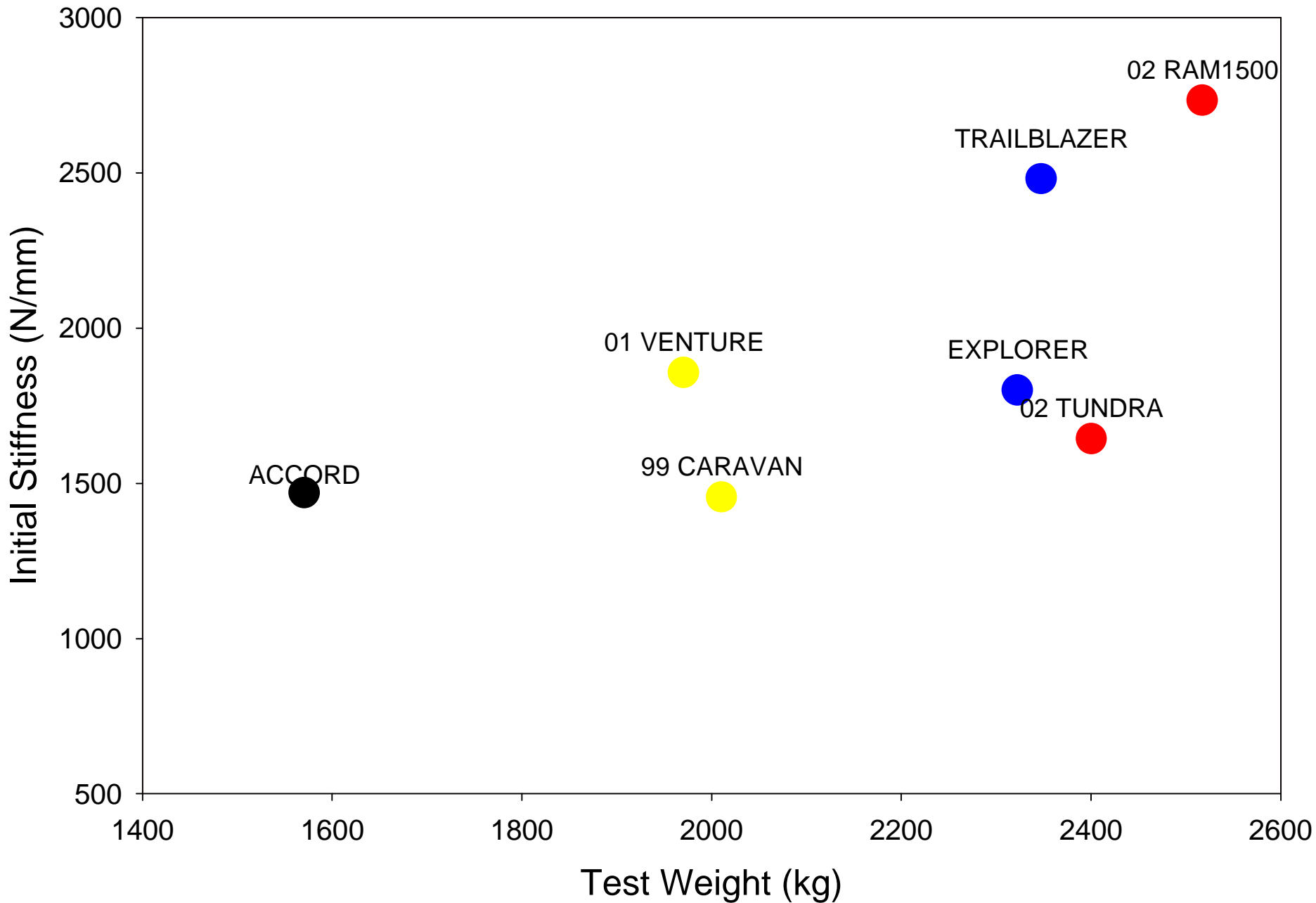
- Must have $R^2 > 0.95$
- Start with 1st 200 mm of deflection
- Fit for > 150 mm of deflection
- Use longest linear fit that meets criteria

Test 3553, 2001 CHEVROLET SUBURBAN

R2 0.950, Slope = 5445.7, Y Intercept = -73270.0



Selected Test Vehicles



Vehicle Selections

- 2002 Ford Explorer and 2002 Chevrolet Trailblazer
- 2002 Toyota Tundra and 2002 Dodge Ram 1500
- 1999 Dodge Grand Caravan and 2001 Chevrolet Venture
- Passenger car for target vehicle
 - 2004 Honda Accord, 4 door

Vehicle to Barrier Program

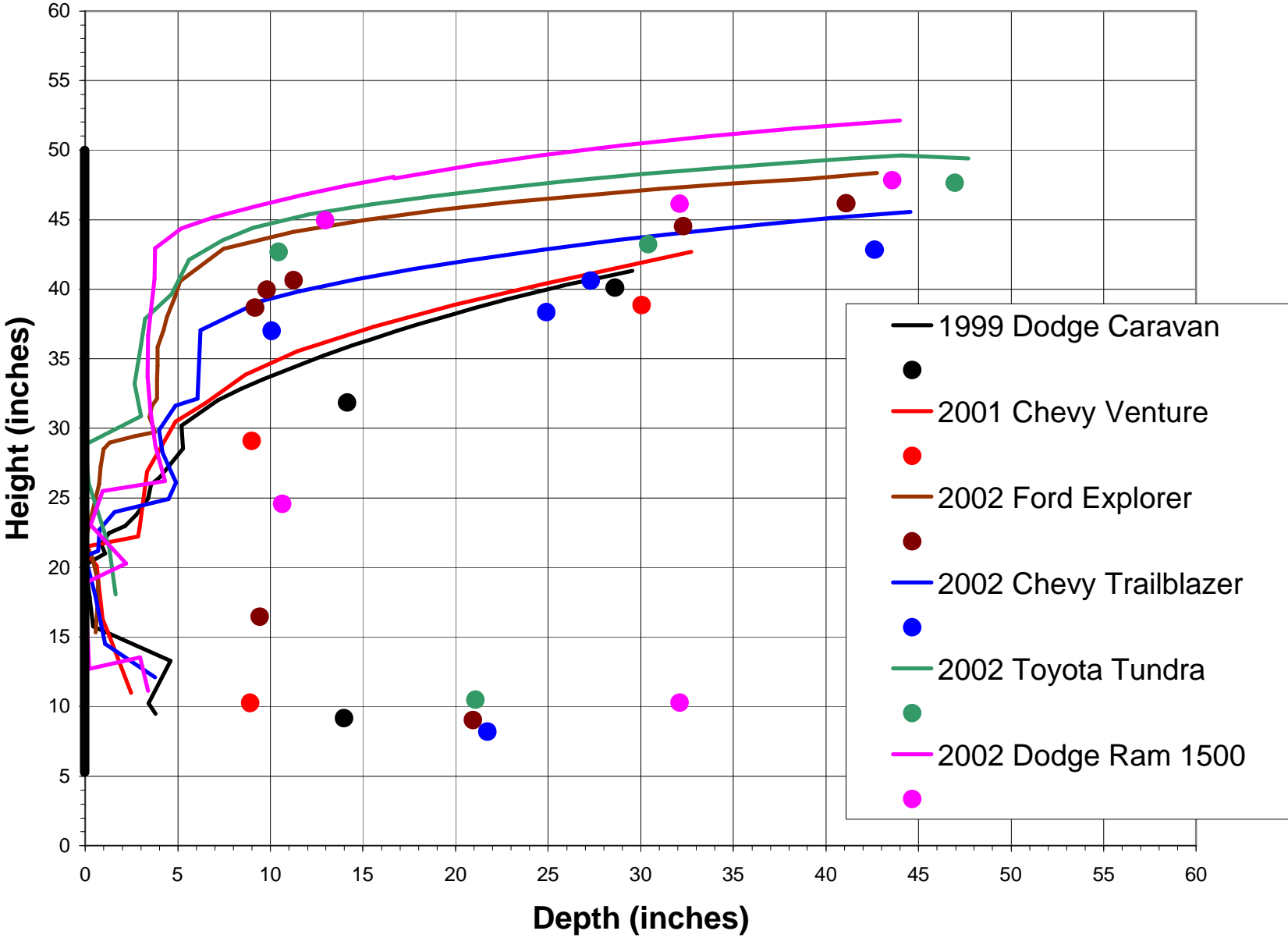
NHTSA has purchased 2 high resolution load cell barriers

- 8 by 16 array of 125 mm load cells
- Negotiations are underway with first vendor involving load cell calibrations
- 125 mm ground clearance
- Additional partial row of 6 load cells were added to accommodate larger vehicles
 - Originally purchased as spares

Alignment with Dodge Ram Pickup



Profile Overlays



Status of Vehicle to Barrier Testing

Completed all 6 of 7 VTB tests

- Initial data checks look good
- Peak force on a load cell around 170 kN
- Additional Concorde test for calibration

Engineering evaluation underway

- To be complete this summer
- Comparison to NCAP results (4 by 9 barrier)
 - Evaluate increased measurement resolution

Vehicle-to-Vehicle Test Schedule

Testing began in April and should complete in August

- Tests conducted at MGA Research
- Agency review is planned for September
- Compare injury and intrusion for the struck vehicle
 - Does the higher / stiffer vehicle generate increased consequences for collision partner ?





13 Apr 2004 14:39 • Frame 1 • TO: -27 • 1,000 fps





15 Apr 2004 14:59 • Frame: 1 • T0: -30 • 1,000 fps

V to V Test Status

2 full frontal tests complete (33%)

2 50% offset tests complete (33%)

Side impact tests to begin in June

Testing should complete in August

FWDB Testing

4 1996 Chrysler Concorde vehicles

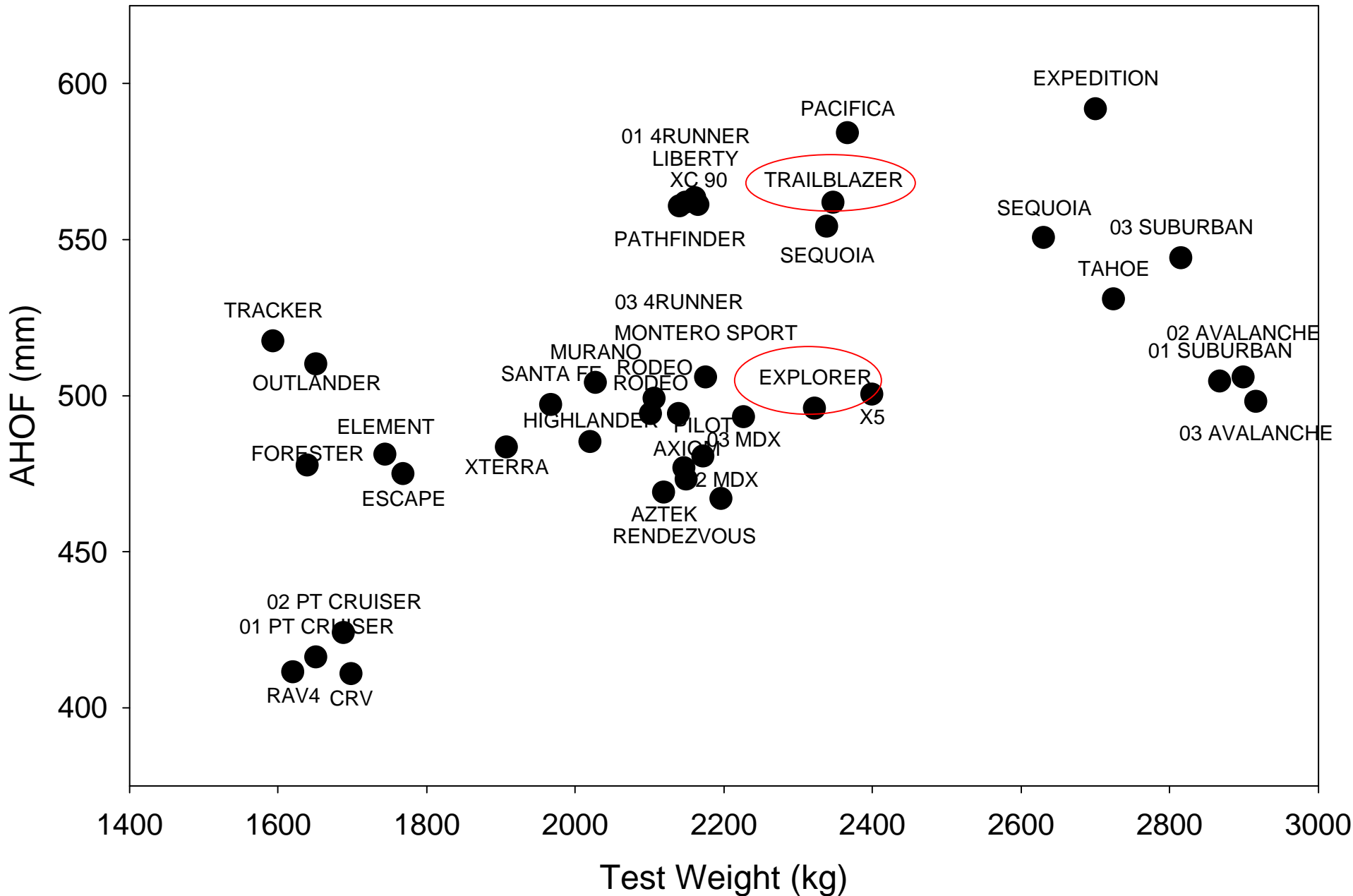
- 1 was used for first rigid barrier test
- Repeat test with deformable face
 - 1000 mm height
- Reproducibility testing
 - Depends upon resolution of 1st LC procurement
 - Repeat rigid and deformable test

2 Ford Taurus vehicles

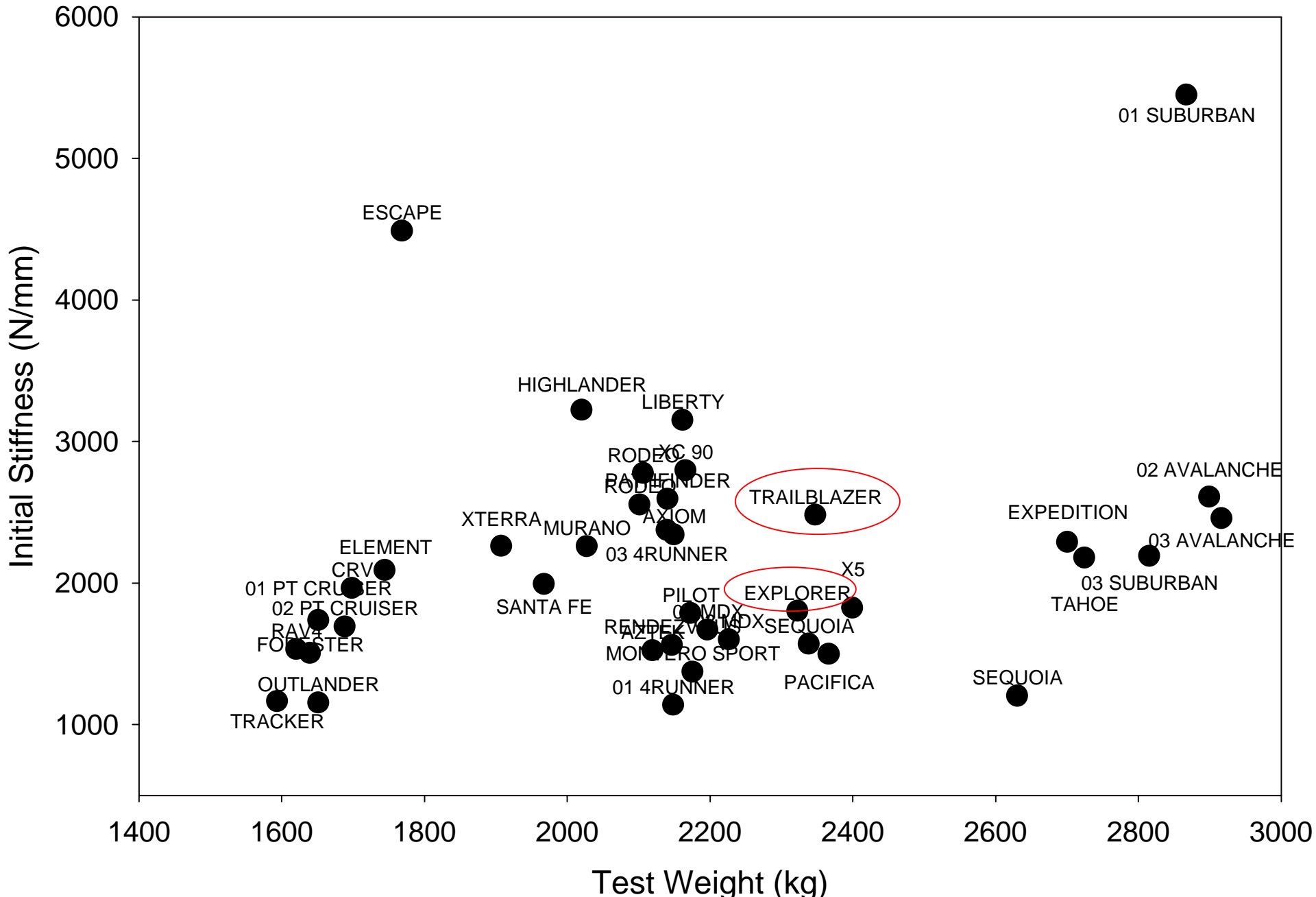
- Evaluate deformable face manufacturers
- Planned for FY 2005

Extra Slides

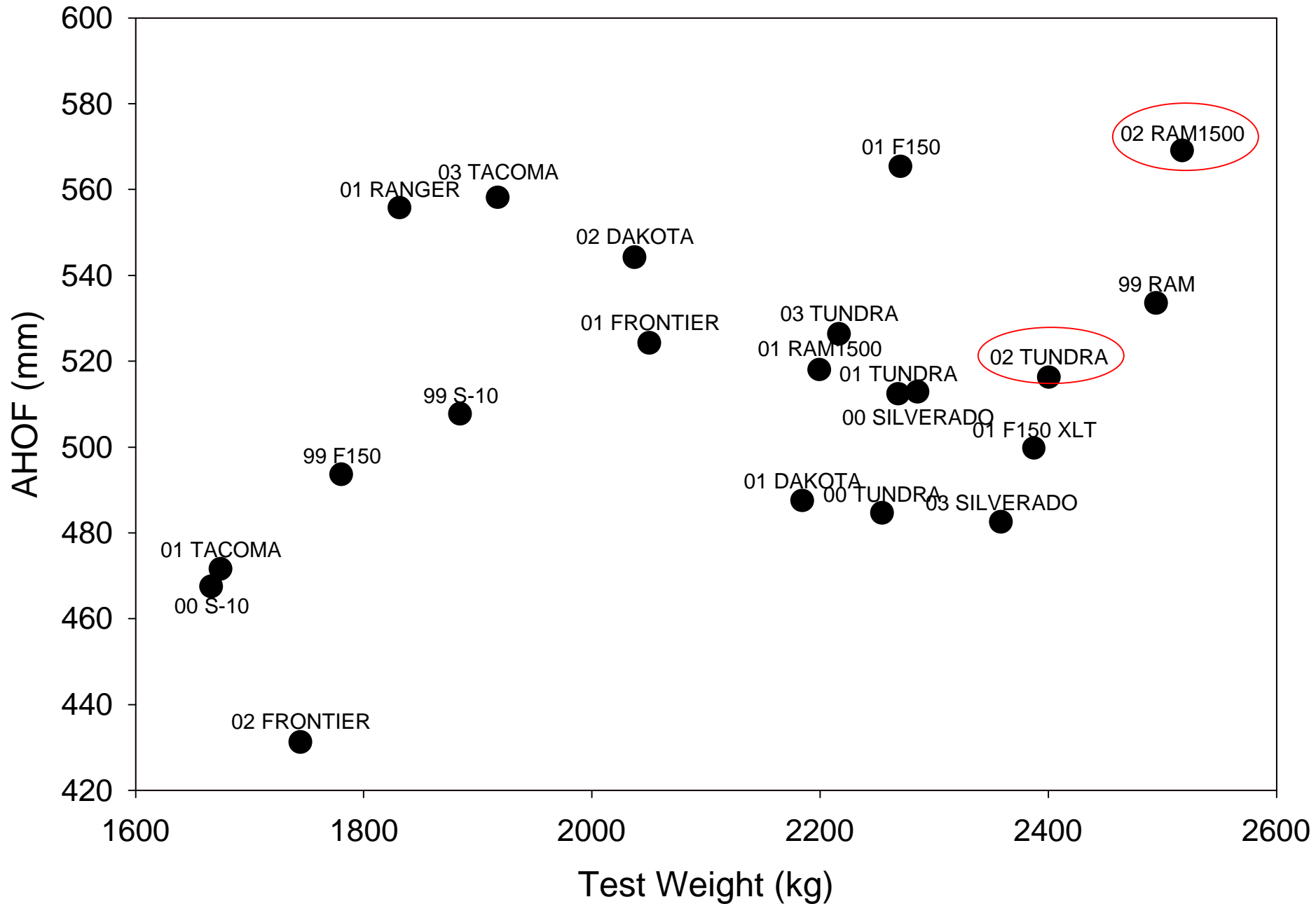
Sport Utility Vehicles MY >= 2000



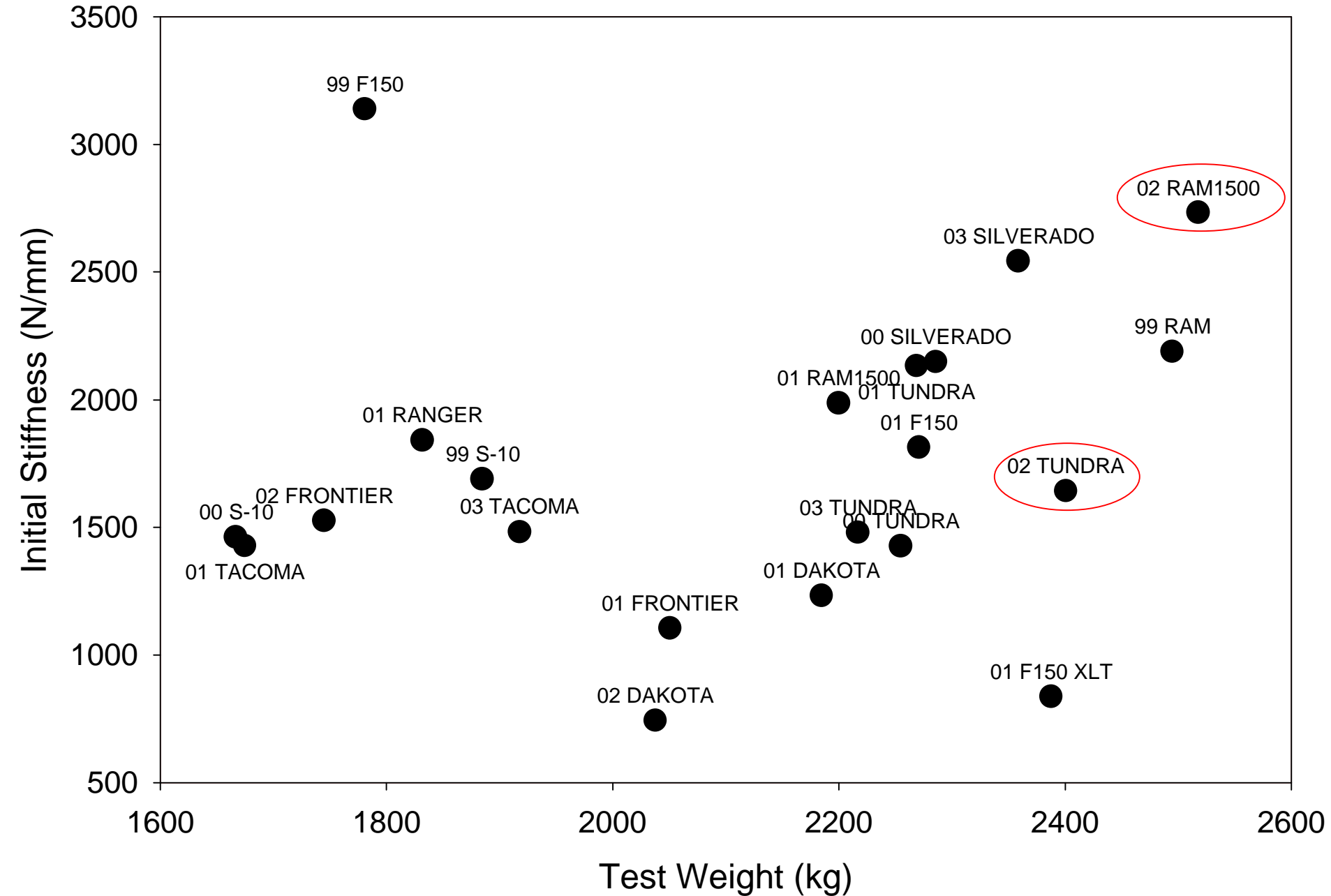
Sport Utility Vehicles MY \geq 2000



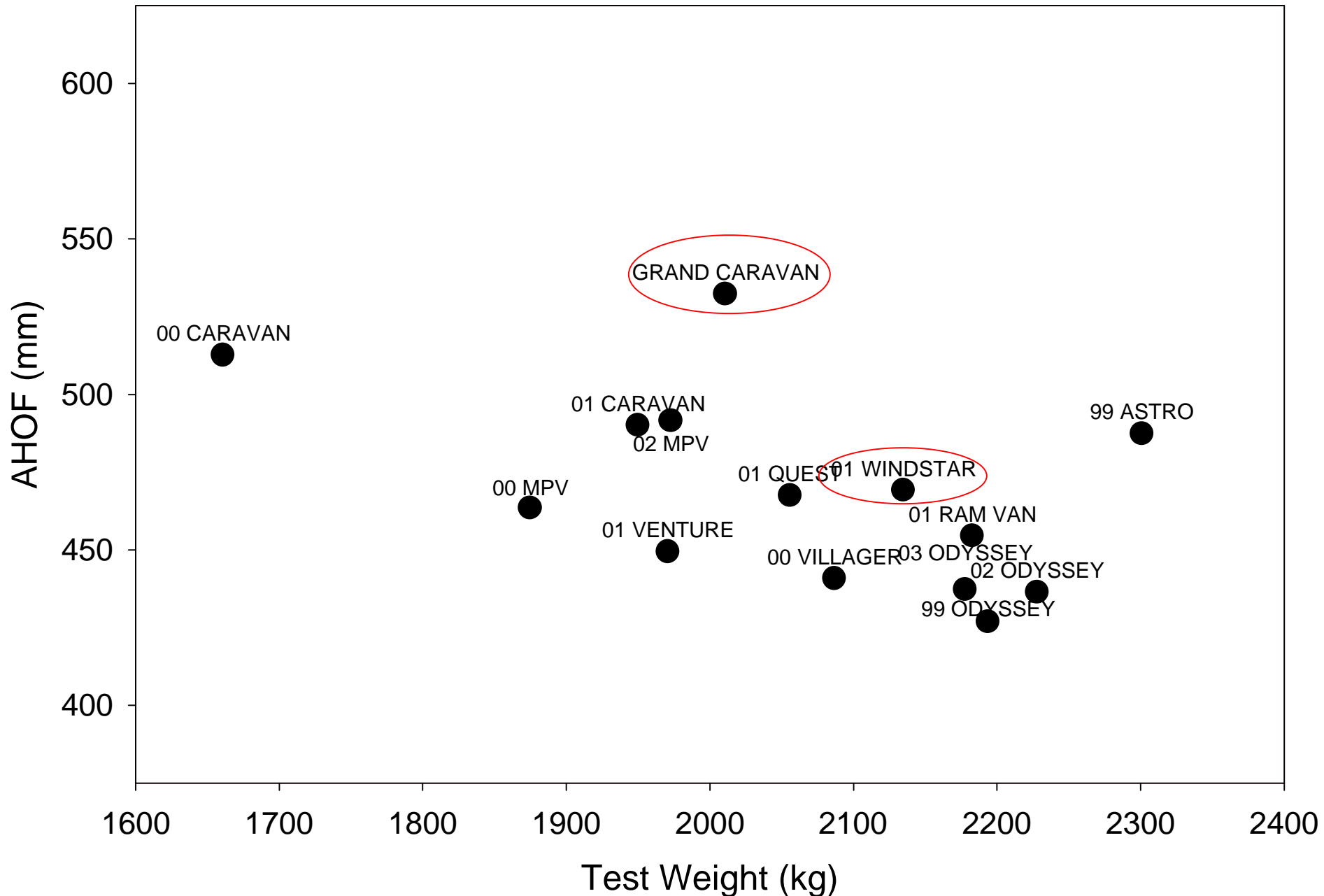
Pickup Trucks MY >= 1999



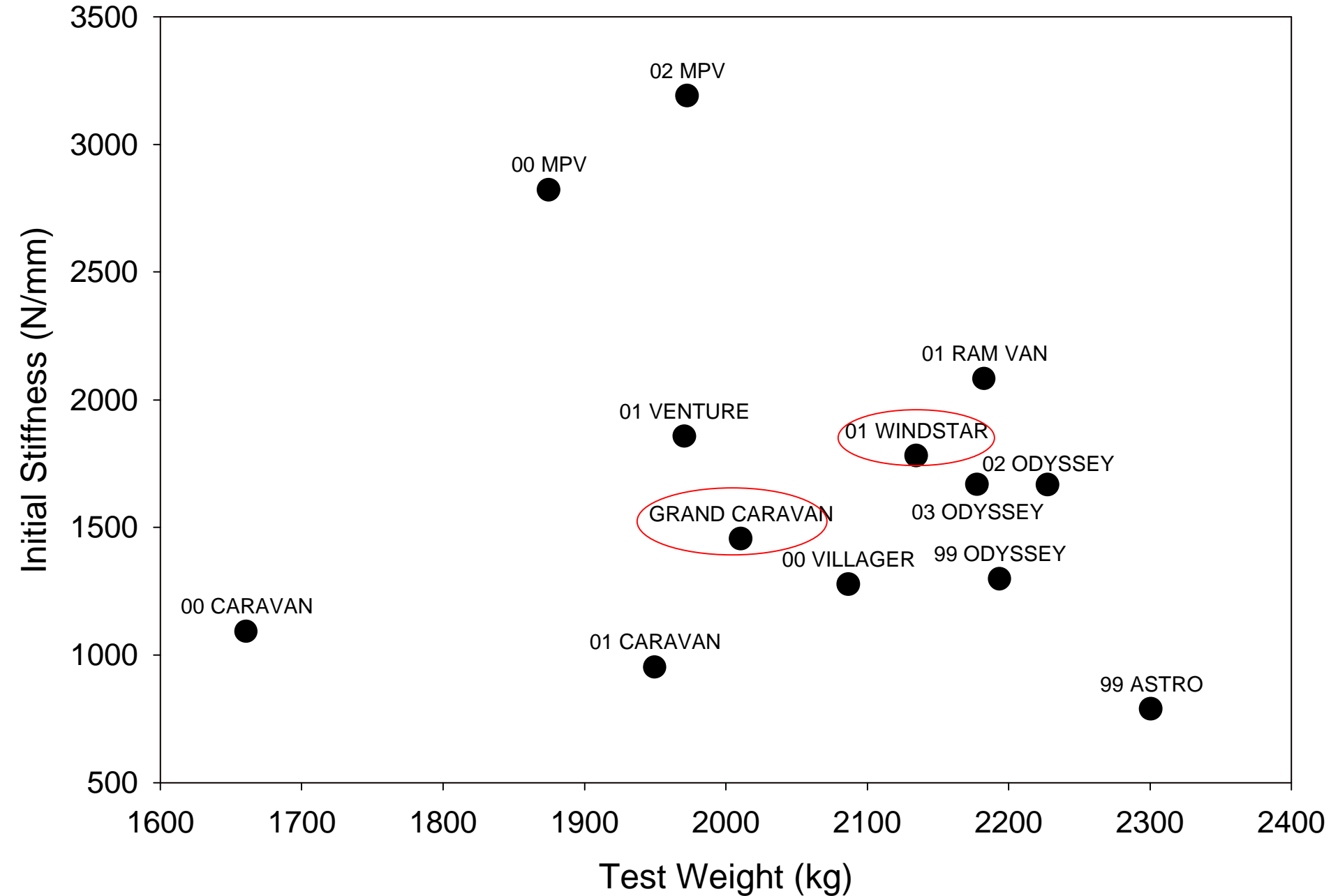
Pickup Trucks MY \geq 1999



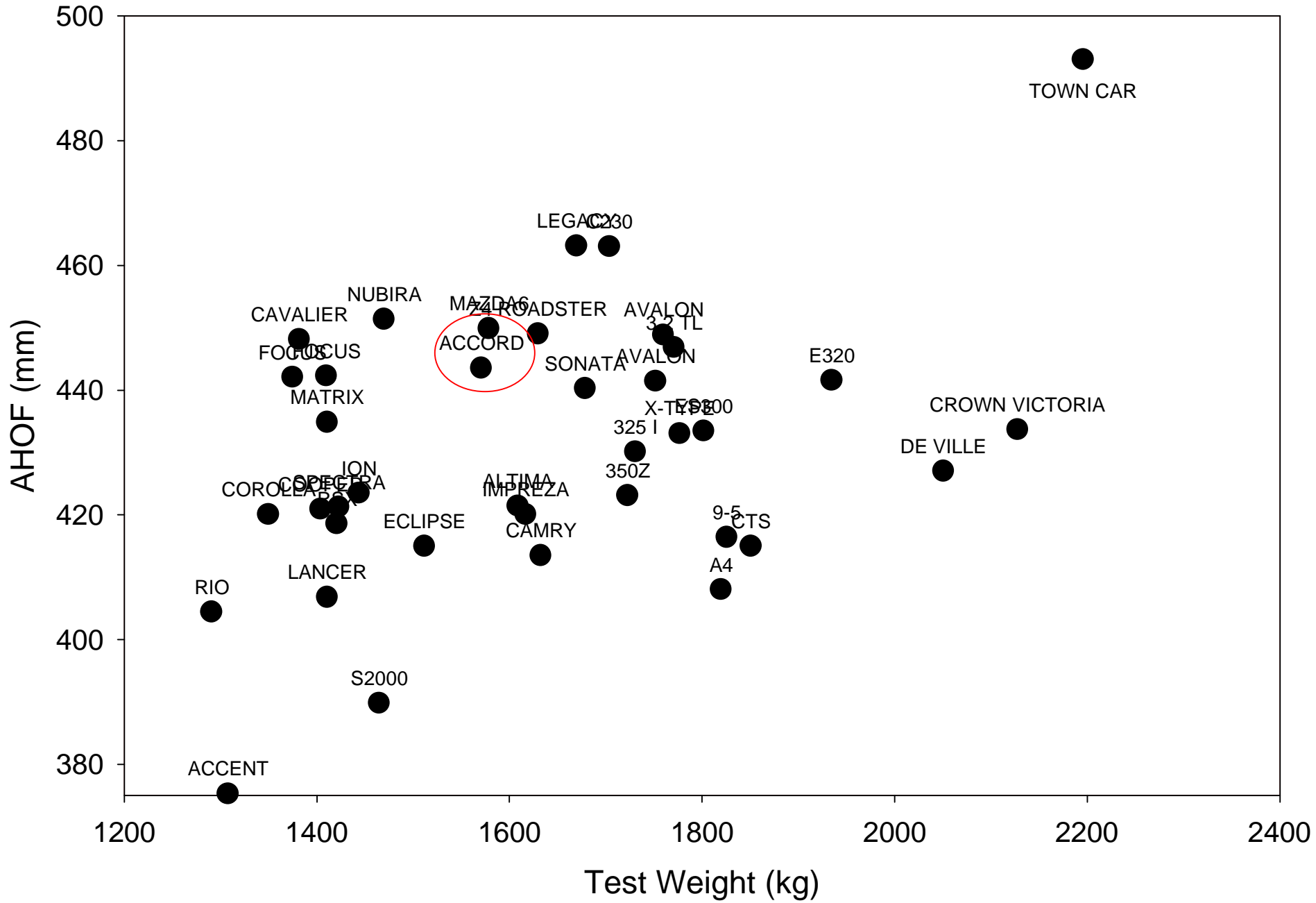
Vans MY \geq 1999



Vans MY >= 1999



Cars MY >= 2002



Cars MY >= 1999

