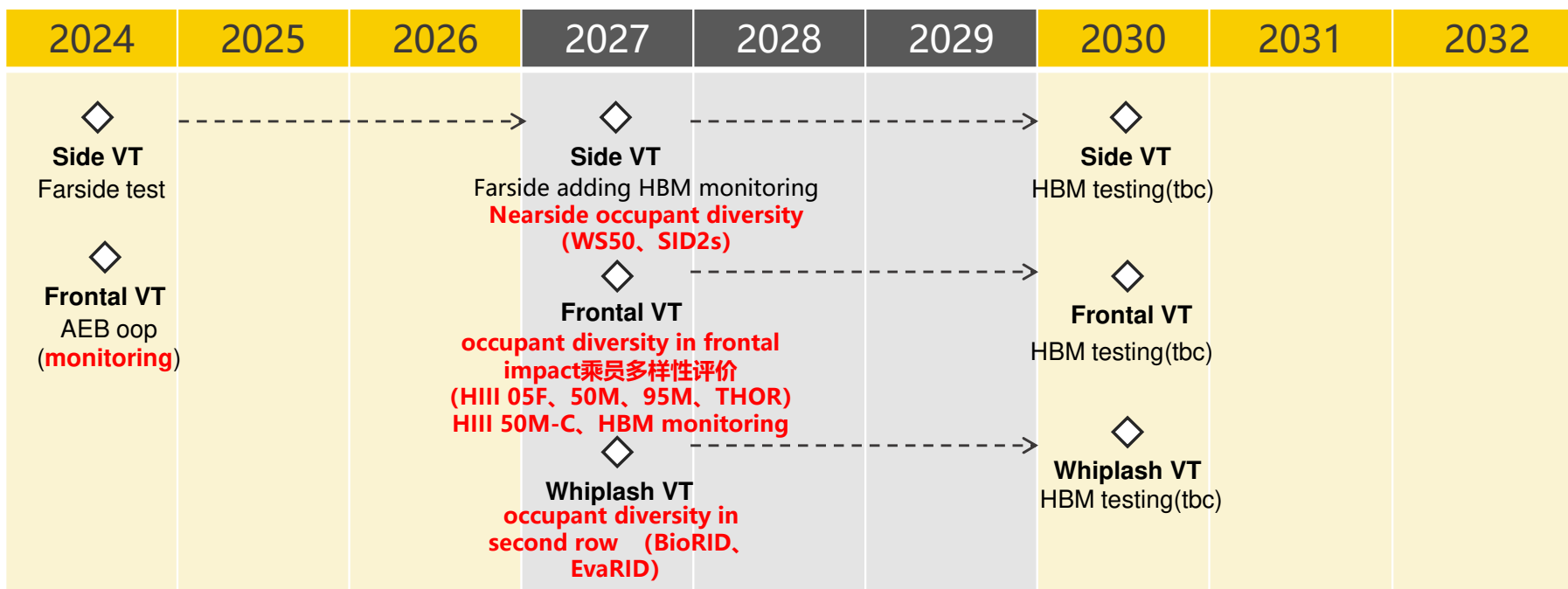


## **C-NCAP虚拟测评内容与ISO SCORES**

## **C-NCAP Virtual Testing Content and ISO SCORES**

# C-NCAP 虚拟测评路线图

## C-NCAP virtual testing roadmap



# Definition of Far side

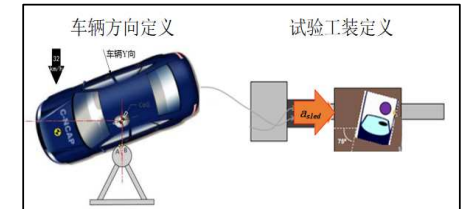
## working condition

	waveform	dummy	Seat position
1	32pole*75°	WorldSID 50th	Consistent with the hardware pole collision
2	32pole*75°	WorldSID 50th	Based on condition 1, adjust to the highest level
3	32pole*90°	WorldSID 50th	Same working condition 1
4	32pole*90°	WorldSID 50th	Same working condition 2
5	32pole*60°	WorldSID 50th	Same working condition 1
6	32pole*60°	WorldSID 50th	Same working condition 2
7	32pole*75°	Sid2s	Design Position If the design position is at the highest, adjust it to the middle position
8	32pole*75°	Sid2s	Based on working condition 7, adjust to the highest level

## Waveform conversion

condition	Conversion factor
75°	1.035
90°	1.000
(base waveform)	
60°	1.155

( angle fixed )



WS50 Arm Sleeveless

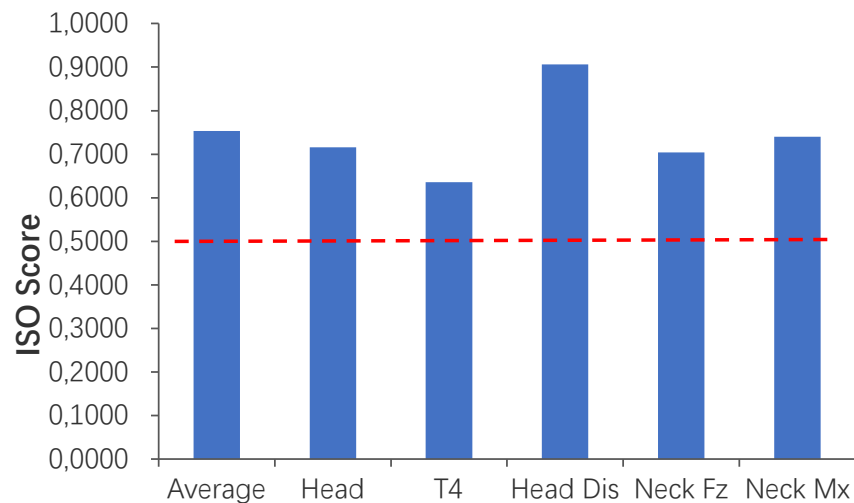


SID2S arm is located on the side of the airbag

## Farside virtual testing in 2024 C-NCAP

- 64 models recently tested, most of them can meet the requirements of VTC Validation;
- Calculate the average ISO scores of key parts, head acceleration is over 0.7, head displacement is over 0.9, chest acceleration is over 0.6, Neck Fz and Neck Mx are over 0.5;

### The completed test **64** models

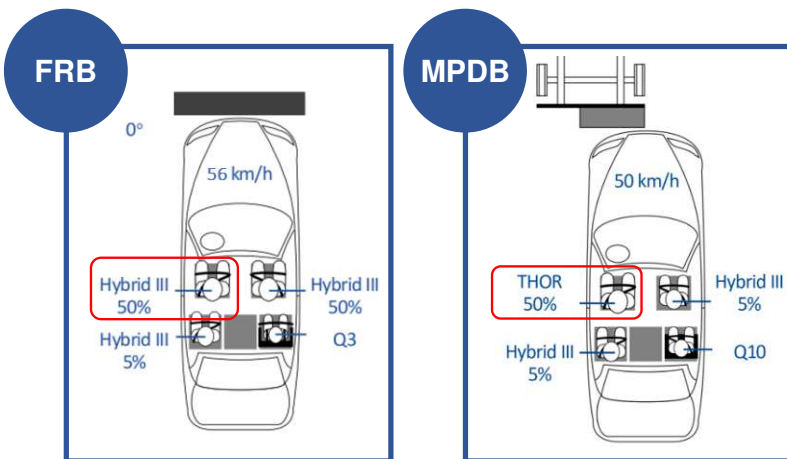


ISO Requirement		
Head excursion	> 0.75	> 0.7 (average)
Head acceleration		
Chest (T4)		
Neck Fz	> 0.5	
Neck Mx	> 0.5	

# Active and passive OOP Virtual testing

## Load case

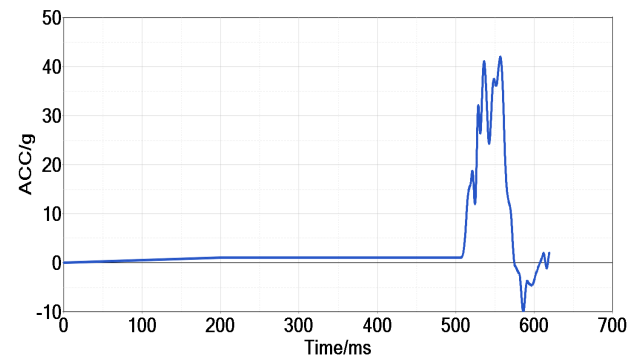
- FRB and MPDB
- Driver protection



## Waveform

- AEB standard waveform and collision waveform integrated input

### AEB+crash



## Testing

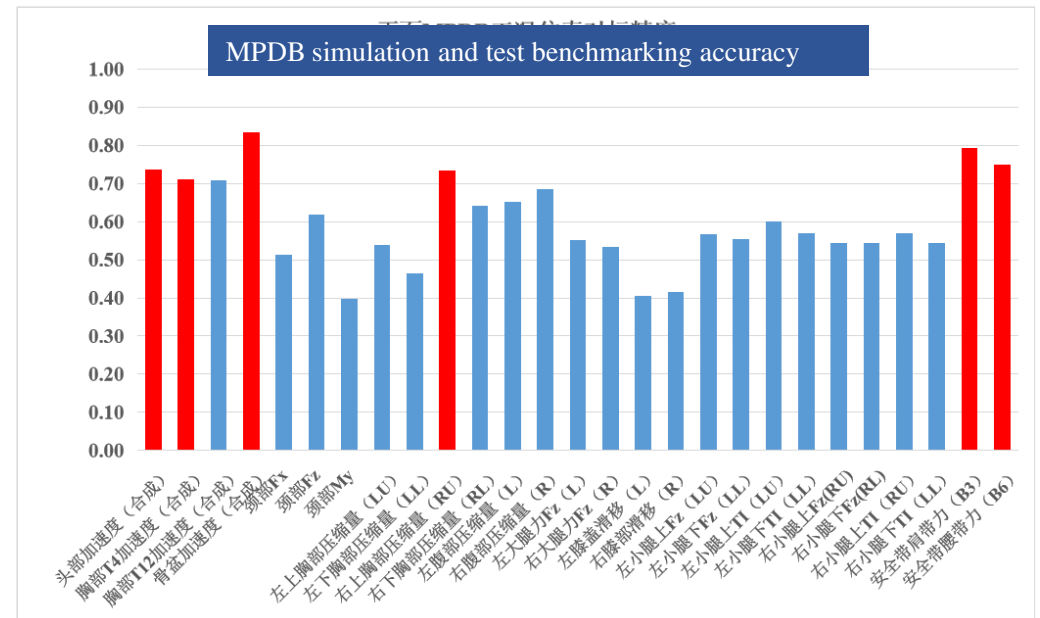
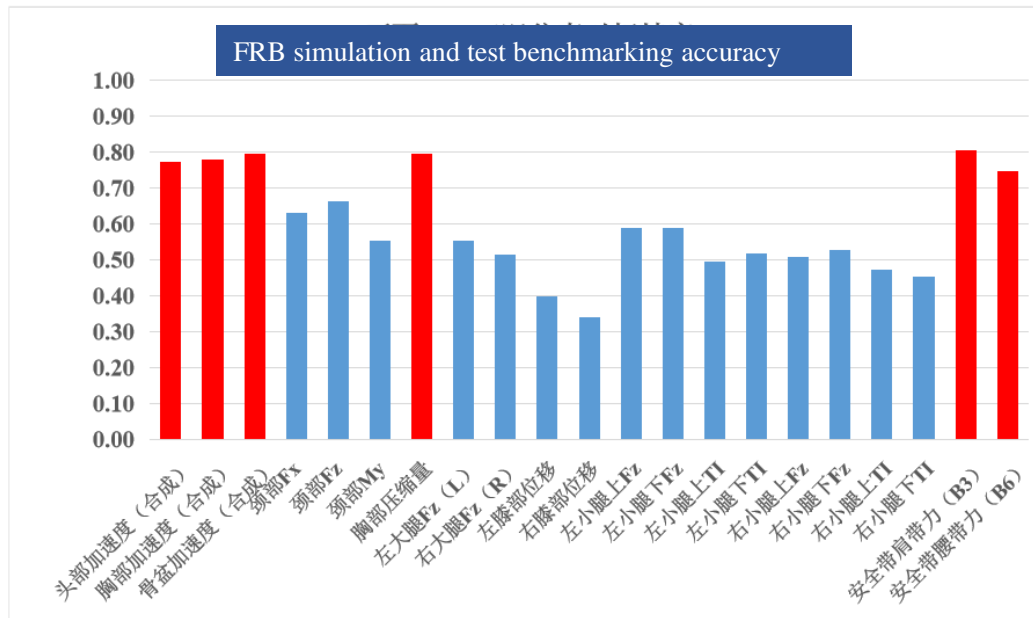
- Injury to the upper body of the THOR dummy

### monitoring



# Benchmarking Accuracy Statistics

- Conduct frontal collision occupant injury simulation benchmarking according to ISO18571, and collect 30 vehicle model benchmarking data within the working group for statistical analysis;
- In frontal collision occupant injuries, the accuracy of head, chest, and seat belt force calibration is relatively high (ISO tolerance limit  $\geq 0.7$ ), and the accuracy of lower legs is generally biased;

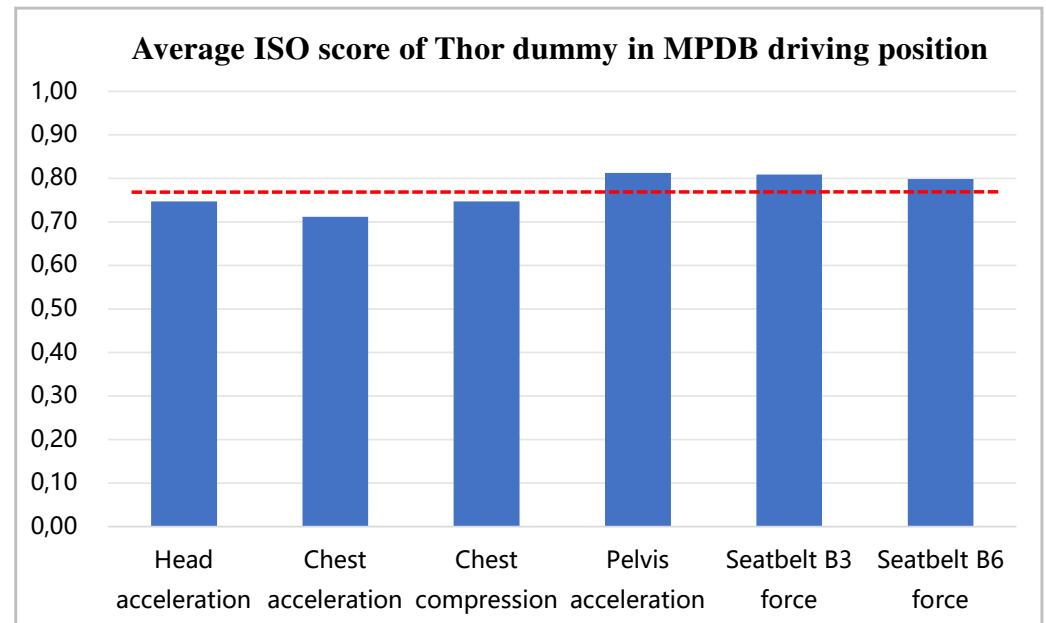
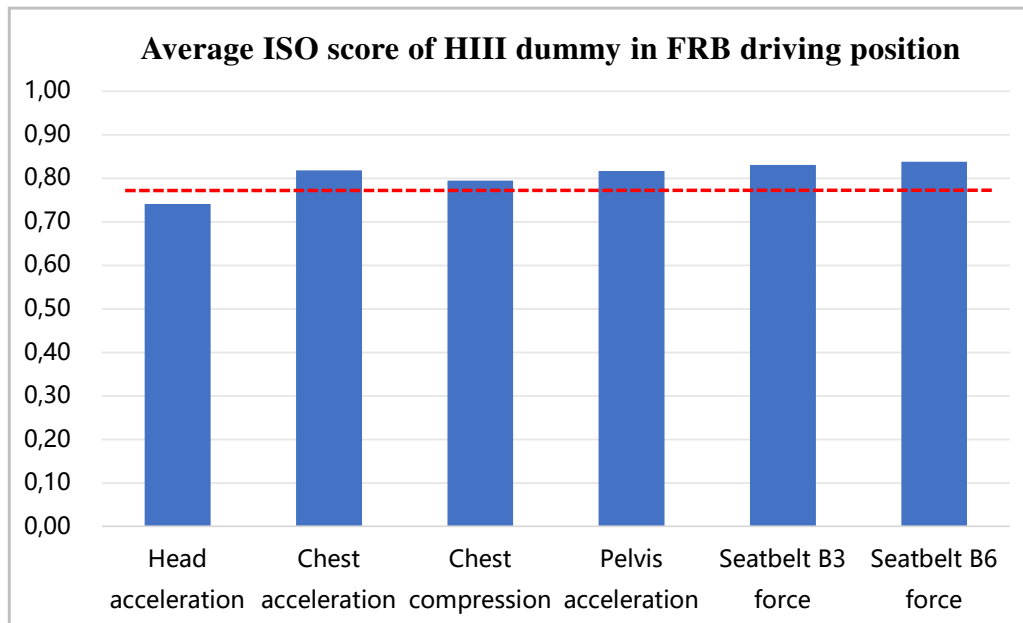


The injury values marked in red are: head acceleration, chest acceleration, pelvic acceleration, chest pressure, safety belt shoulder belt force, and waist belt force

## Monitoring of frontal impact virtual testing in 2024 C-NCAP

- ❑ 15 models recently tested, most of them can meet the requirements of VTC Validation (ISO Score > 0.7) ;
- ❑ Average ISO scores of key parts in frontal impact are all over 0.7, and the ISO scores of head acceleration and chest acceleration are relatively low.

### The completed test 15 models



乘员保护

Occupant Protection

正面刚性壁障碰撞  
Full width Frontal Impact

正面50%MPDB碰撞  
MPDB Frontal Impact

侧面壁障碰撞  
AE-MDB Side Impact

侧面柱碰撞  
Pole Side Impact

侧面远端乘员保护  
Farside

儿童保护静态评价  
Static Assessment of Child

鞭打试验  
Whiplash

电动汽车刮底试验  
EV Bottom-Scraping Test

主被动离位乘员保护  
OOP occupant protection

加分项  
Bonus Items

正面碰撞乘员  
多样性保护

Protection of  
occupant  
diversity in  
frontal impact



侧面碰撞乘员  
多样性保护

Protection of  
occupant  
diversity in  
side impact



鞭打工况乘员  
多样性保护

Protection of  
occupant  
diversity in  
whiplash

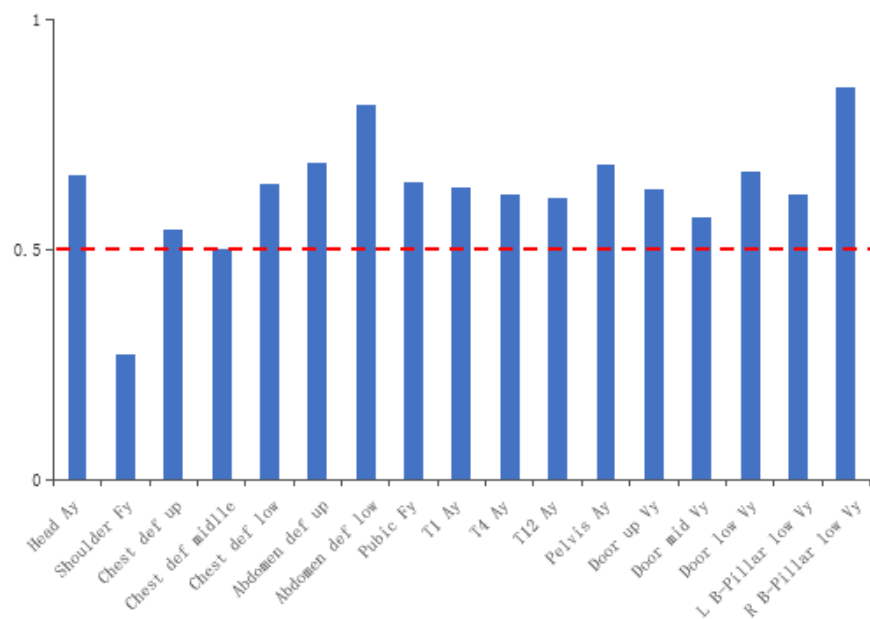


解决传统碰撞试验对乘员多样性评价不足的问题

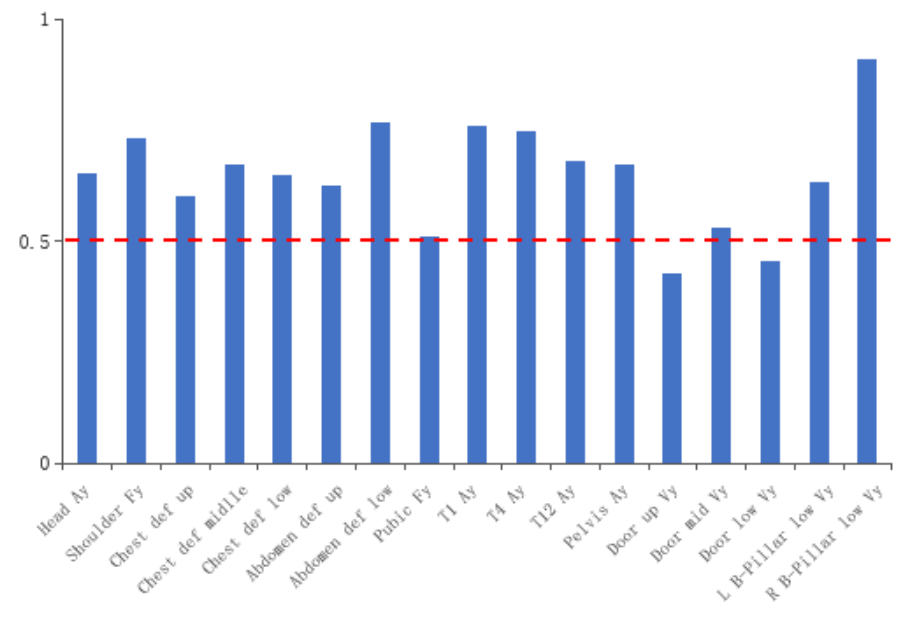
Address the inadequacy of traditional crash tests in evaluating occupant diversity.

## 虚拟仿真模型精度研究-侧面工况 Research on Model Accuracy-Side Impact

- 综合分析8家车企的12款车型侧碰及柱碰数据，考虑选取腹部下压缩量及代表人体运动趋势的加速度指标验证模型精度，增加车身结构精度验证。 Statistical analysis of 12 vehicle models from 8 OEM. Consider using Abdomen displacement and acceleration indicators that represent human motion trends to validate the accuracy of the model.



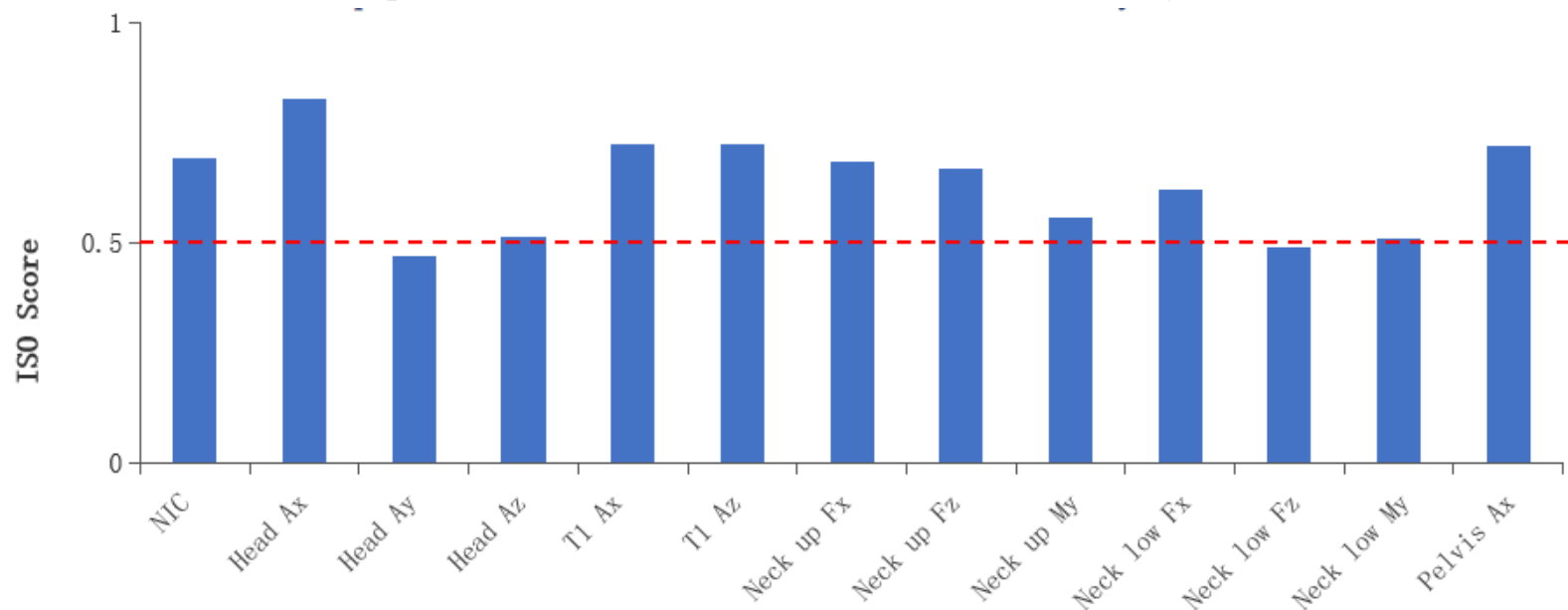
侧面壁障碰撞模型精度统计  
MDB ISO Score statistics



侧面柱碰撞模型精度统计  
Pole ISO Score statistics

## 虚拟仿真模型精度研究-鞭打工况 Research on Model Accuracy-Whiplash

- 分析5家车企的8车型数据，NIC、头部、胸部及髋部X向加速度精度较高，弯矩及下颈部指标精度较低，考虑选取代表人体运动趋势的加速度及上颈部指标验证模型精度。 Statistical analysis of 8 vehicle models from 5 OEM. The accuracy of NIC and X-direction acceleration is high, but the accuracy of moment and lower neck index is low. Consider using upper neck acceleration and indicators that represent human motion trends to validate the accuracy of the model.



鞭打工况模型精度统计  
Whiplash ISO Score statistics

# The necessity of virtual testing

03

## HBM application

Diversified and multi size human models are gradually applied to passive working conditions and active passive confluent working conditions

01

## Supplement and expansion

The supplementary and extended working conditions of physical tests are evaluated using the virtual testings, the existing physical experiments only evaluate typical working conditions and dummies, which cannot meet the requirements of real traffic accidents

02

## Active and passive confluent conditions

1. Active and passive working conditions that cannot be met by existing physical test equipment;
2. Deep confluent of active and passive scenarios

