



Transporting Children Safely

Sled Buck Committee
Update

June 22, 2022

Funding for this project provided through the HRSA MCH EMS
State Partnership Grant and the New Jersey EMSC Program

NAEMSO Proposes Publishing Three Unique SAE Test Methods

Downloaded from SAE International by Gene Hill, Friday, April 14, 2017



SURFACE VEHICLE RECOMMENDED PRACTICE

JXXXX™
Issued

Supine Pediatric Patient Transport Device Dynamic Test

RATIONALE

This SAE Recommended Practice was developed by members of the SAE Truck Crashworthiness Committee in support of the ambulance industry's need to apply science to the design and testing of the ambulance substructure to support the safe mounting of SAE J3027 compliant filter retention devices or systems used in the ambulance patient compartment. The Recommended Practice was validated collaboratively by industry and government partners through extensive testing funded and managed by the National Institute for Occupational Safety and Health, the Department of Homeland Security and the Ambulance Manufacturers Division of the NHTSA. Input loading for the dynamic testing was generated using the vehicle specific crash pulses described in SAE J2917, SAE J2956, and SAE J2994, respectively. An independent analysis of the testing methodology and resulting data was performed by government and private members of the automotive testing community.

1. SCOPE

This SAE Recommended Practice describes the dynamic and static testing procedures required to evaluate the integrity of the ambulance substructure, to support the safe mounting of an SAE J3027 compliant filter retention device or system, when exposed to a frontal, side or rear impact (i.e., a crash impact). Its purpose is to provide manufacturers, ambulance builders, and end-users with testing procedures and, where appropriate, acceptance criteria that to a great extent ensure the ambulance substructure meets the same performance criteria across the industry. Prospective manufacturers or vendors have the option of performing either dynamic testing or static testing. Descriptions of the test set-up, test instrumentation, photographic/video coverage, test fixture, and performance metrics are included.

2. REFERENCE

2.1 Applicable

The following shall apply: event of collision has been observed.

2.2 SAE Publications

Available and Canada

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

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Seated Pediatric Patient Transport Device Dynamic Test

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2.2 SAE Publications

Available from and Canada)

SAE J211-1

SAE J211-2

SAE J211-3

SAE J211-4

SAE J211-5

SAE J211-6

SAE J211-7

SAE J211-8

SAE J211-9



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SURFACE VEHICLE RECOMMENDED PRACTICE

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Neonatal Patient Transport Device Dynamic Test

RATIONALE

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2.2 SAE Publications

Available and Canada

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211

SAE J211



Supine Pediatric Patients

Seated Pediatric Patients

Neonatal Patients



Sled Buck Development and Testing

Figure 1: FMVSS 213 Test Buck



Sled Buck used to test all child car seats in US.

Patient Cot Sled Buck



- Original cot sled buck
- Fixed 15 degree fowler

Sled Buck Committee Members

- **Manufacturers:**

- Ferno
- Stryker
- Calspan
- International Biomedical

- **Test Labs**

- Calspan
- CAPE
- MGA Research

- **Practitioners**

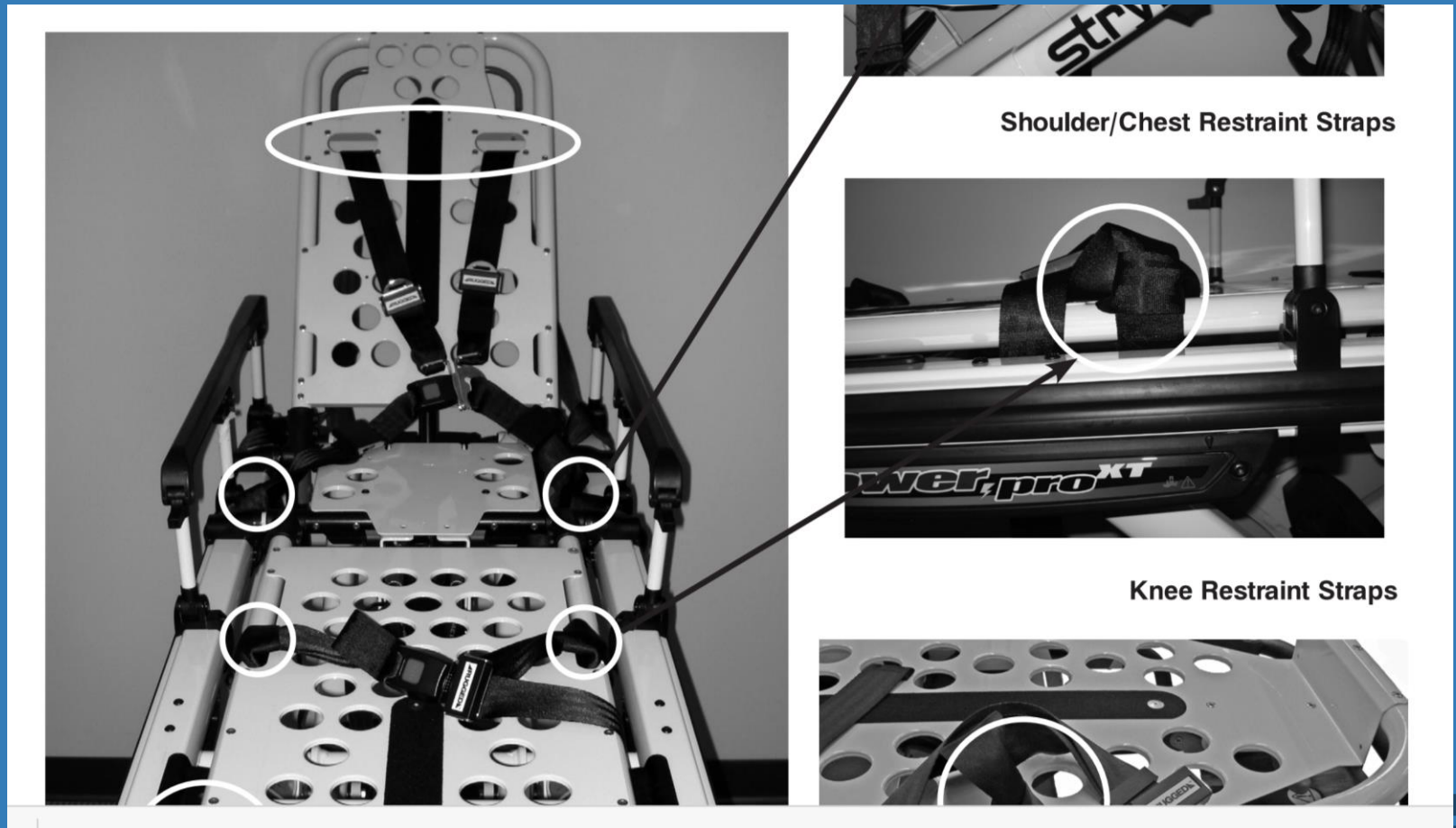
- Dr. Marilyn Bull, Riley Children's Hospital
- Cathy Richards, RN, BSN, EMT-P, MCCN
WVU Children's
- Cyndy Wright-Johnson, MSN RN, MIEMSS



Committee Design Goals

- Does not inhibit innovation
- Built to accommodate all products on market today
- Accommodate Stryker and Ferno pads and restraints
- Adjustable fowler angle from flat to 90 degrees
- Gas Strut considered consumable
- Option to test with a rigid or adjustable backrest

Creating Hardpoints and Restraint Access Points



Screenshot pulled from Stryker Operation/Maintenance Manual:

Project

- Primary objective was to test the strength and functionality of the sled buck
- Wanted to test the sled buck with fowler flat and elevated
 - Ran three tests with a flat fowler and six with fowler at 15 degrees (this matches the angle used in cot test: J3027)
- We were most concerned with the ability of the buck to manage the loads when using the gas strut
- We replaced the gas strut for each of the 6 elevated tests

Sled Buck: Post-Test Photos



Sled Buck: Post-Test Photos



Sled Buck: Post-Test Photos



Testing Decisions

- Ferno Kangoofix with a 7 lb child dummy and a 50th percentile adult dummy – approx. 170 lbs.
 - Fowler set at 15 degrees with a gas strut and Ferno cot pad and adult restraints
- Quantum ACR sized for a 78 lb. child dummy
 - Fowler set at 15 degrees with a gas strut and Ferno cot pad
- International Biomedical with 7 lb. and 2.2 lb. dummies
 - Flat cot, with Int-Bio interface plate attached to outer rails no cot pad

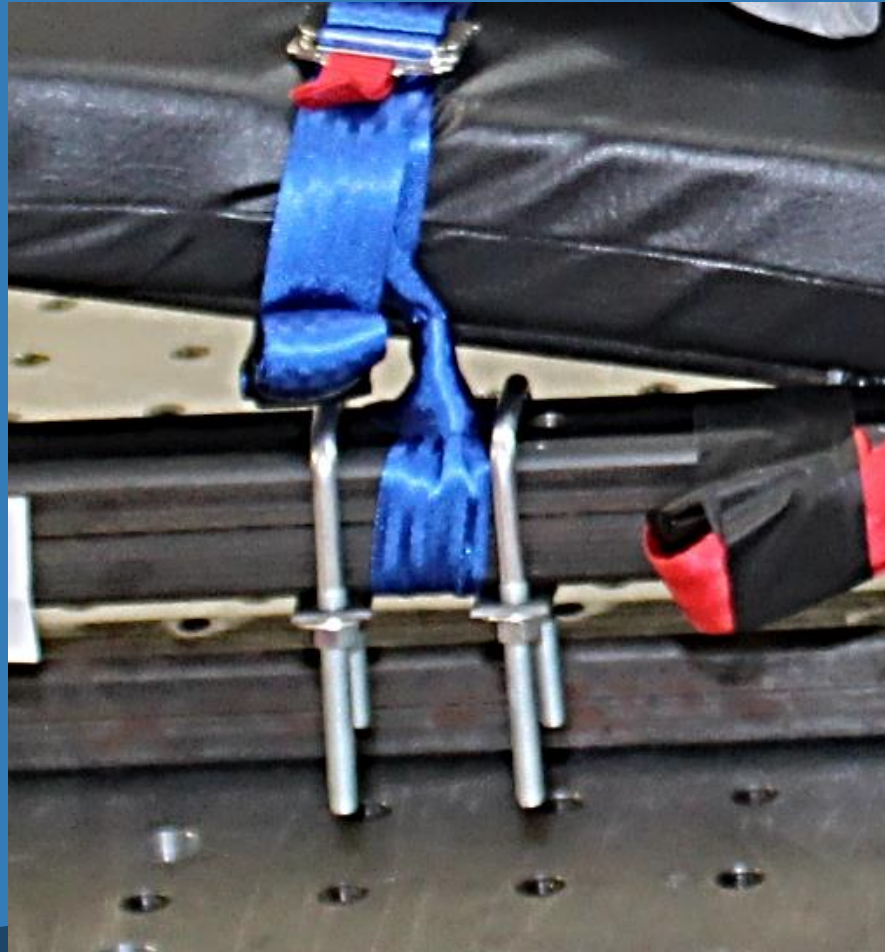
***** All dummies were uninstrumented**



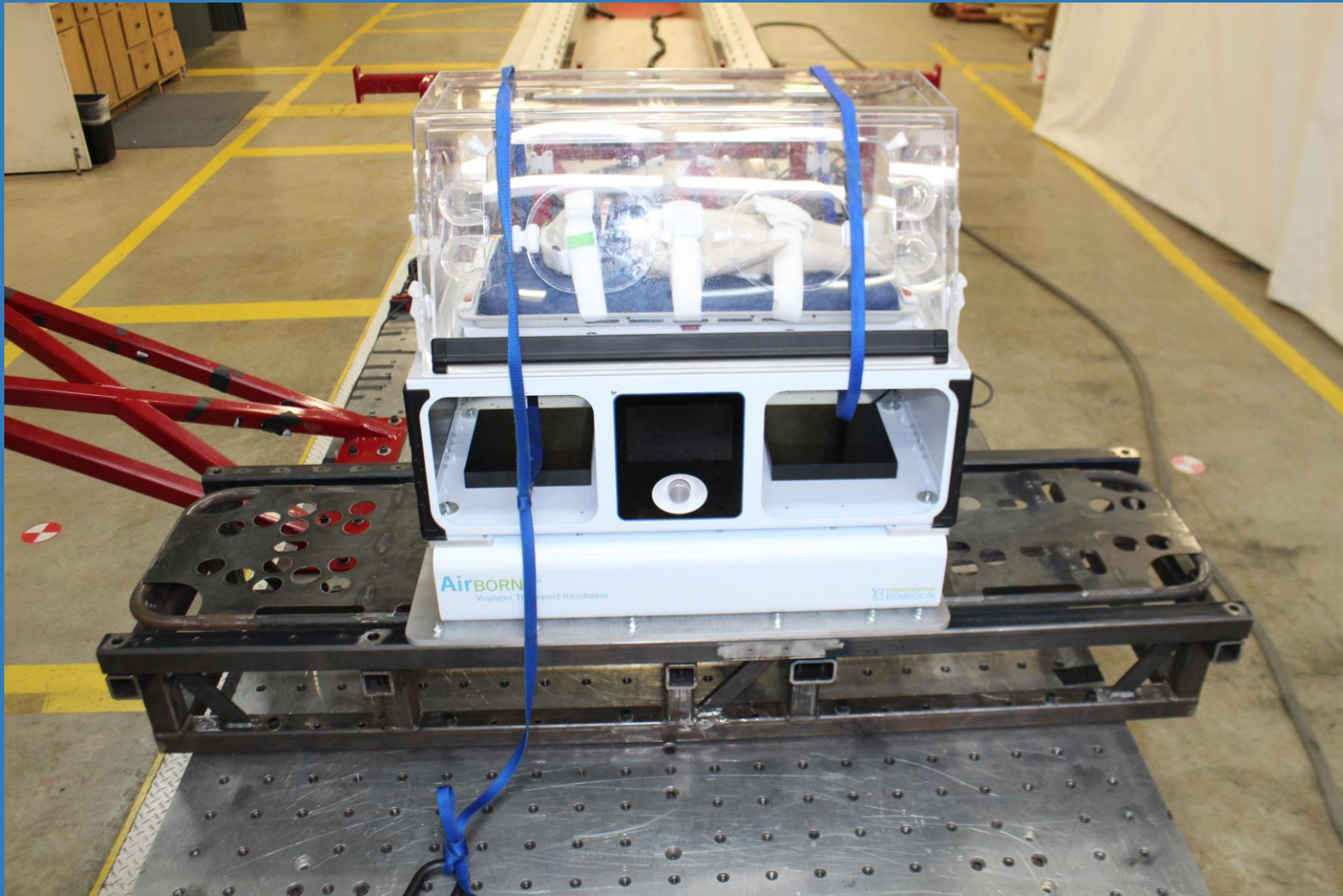
Quantum ACR 78 lb. Child Patient



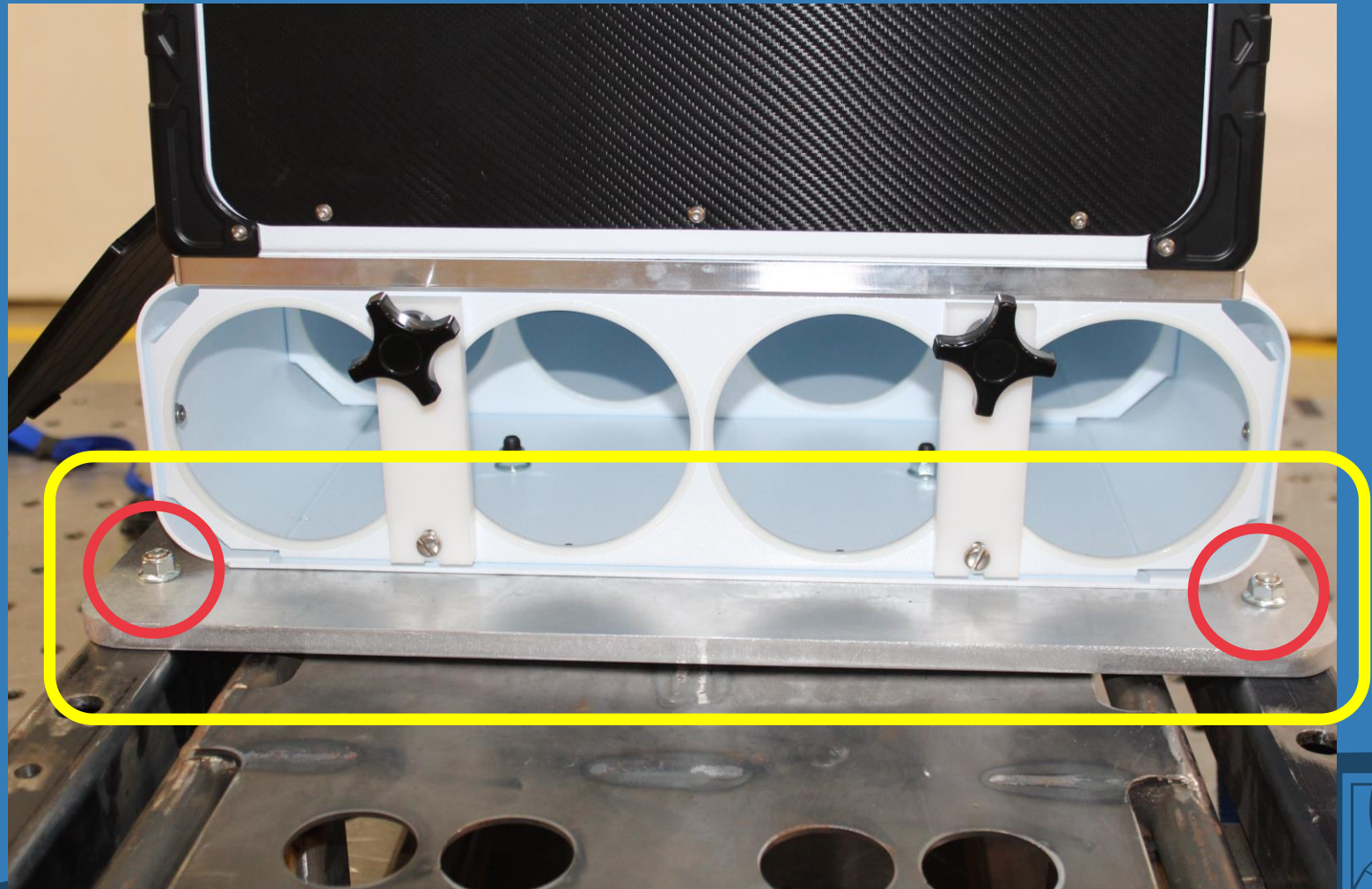
U Bolts to Prevent Restraint Slide



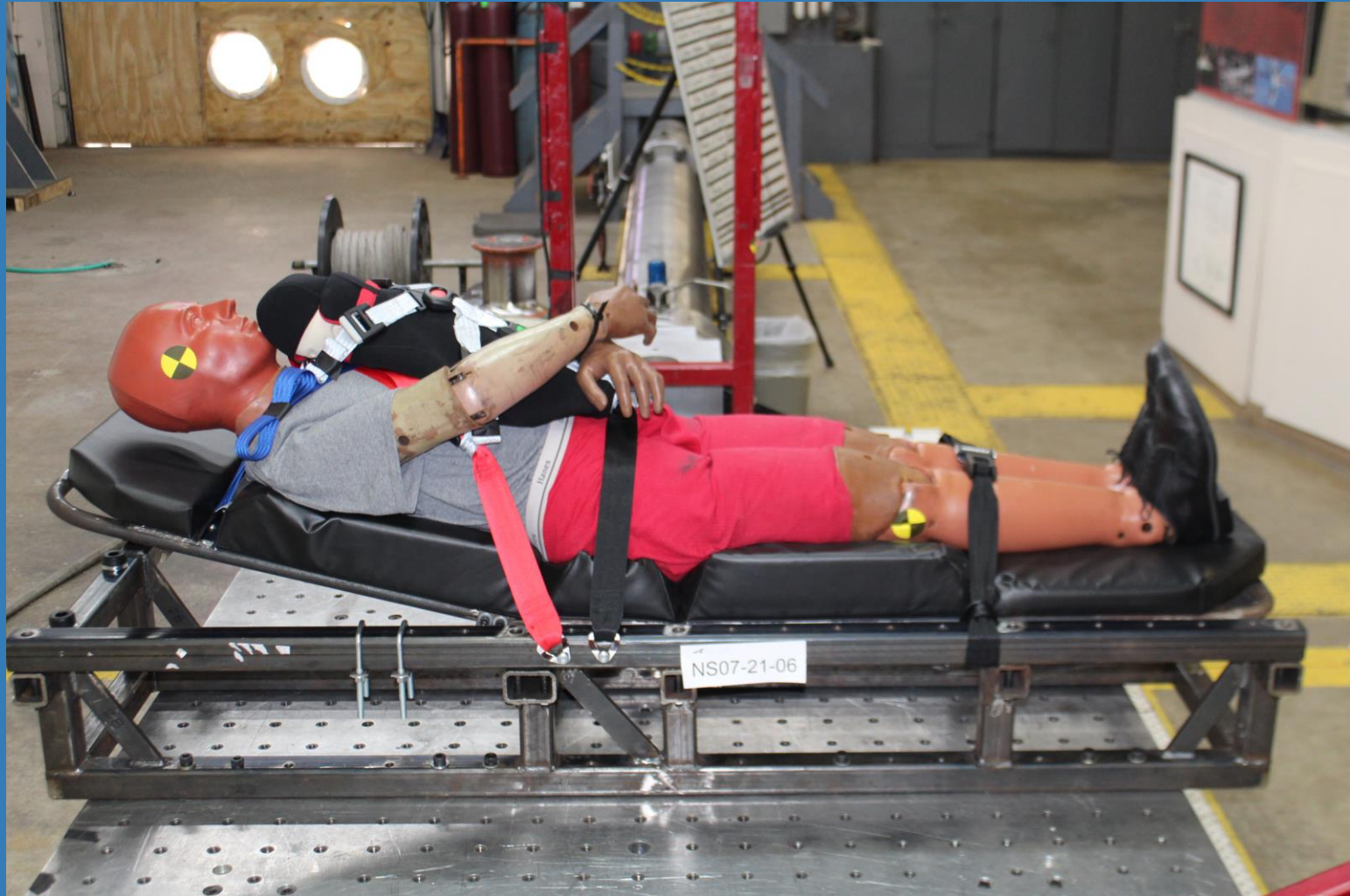
International Biomedical – Flat Sled Buck Fowler Angle




International Biomedical – Product Specific Mounting Plate



Ferno Kangoofix with 7 lb. Infant and 170 lb. Adult





 Calspan

NS07-21-06



Buckle and Post Restraint Attachment



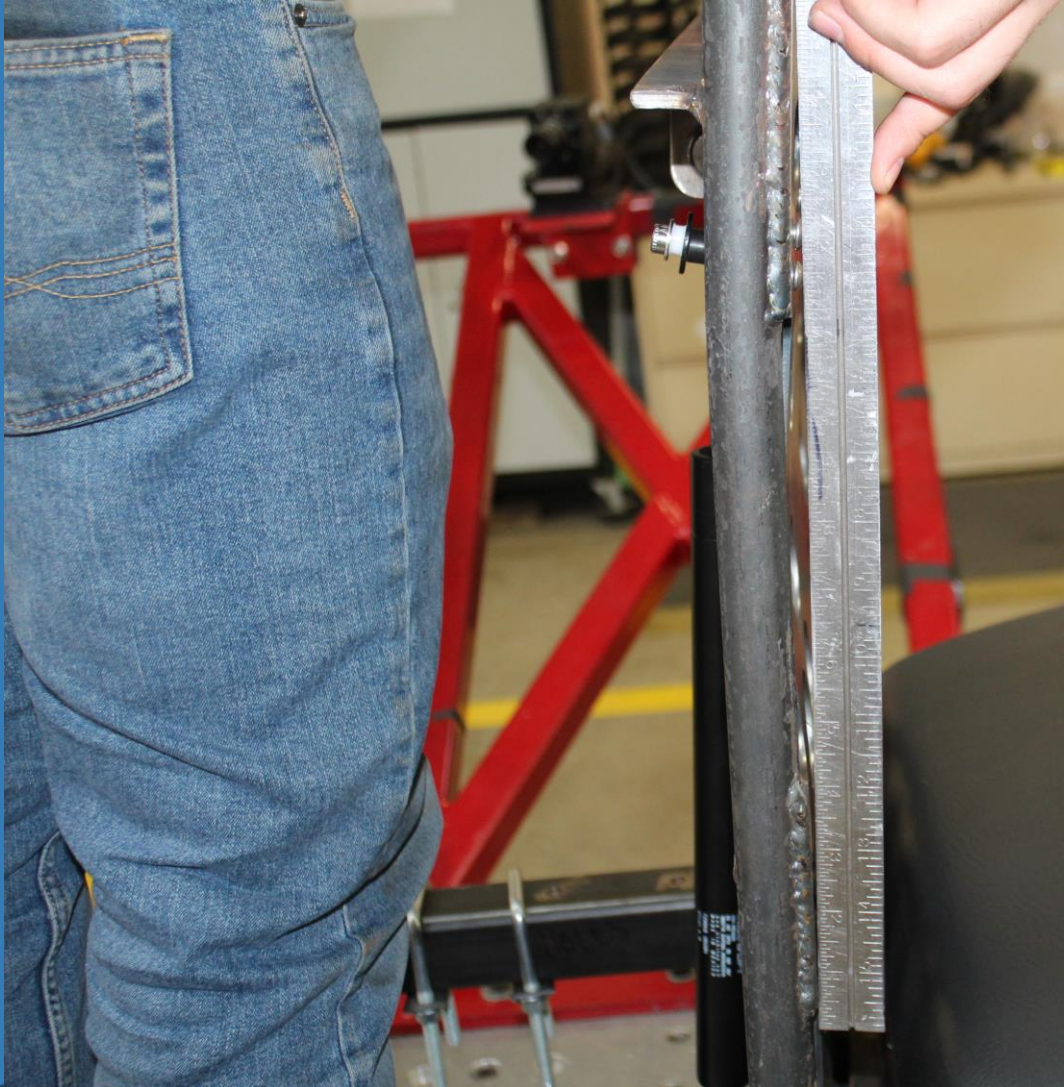
Looped Restraint Attachment



Sled Buck Post-Test Observations



Damage to Sled Buck



Sled buck backrest or fowler was bowed after frontal impact test due to weight of 50th percentile male ATD. Calspan strengthened and added supports in this area.

Sled Buck Design Changes: Strengthen Center of Fowler

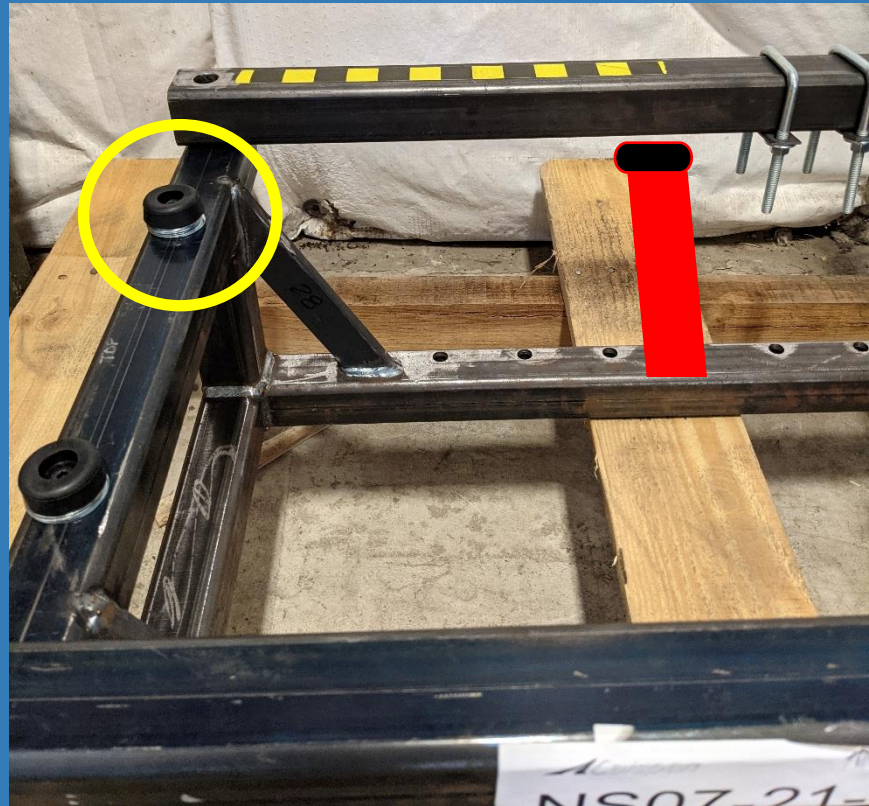
Add two
vertical ribs to
stiffener the
back of the
fowler or
backrest



Sled Buck Design Changes: Support Fowler Outer Frame

Add two standoffs
made of 2x2x1/4
square tube

Rubber bumpers on
standoffs will be
used to stop
rotation, and prevent
fowler from bending
in the middle



Sled Buck Design Changes: Support Fowler Outer Frame

The new posts and bumpers will provide support to the sides of fowler in the future just as is shown at the head end of fowler during this testing



Sled Buck Design Changes: Ferno Buckle and Post Rail Mounts

Created
removable piece
from half-round
to mount belt
clips on rails



Sled Buck Design Changes: Buckle and Post Shoulder Mount

**Add counter bored
section to support
clip shaft**



Sled Buck Design Changes: Gas Strut Change

- Recommend we increase gas strut force from 600N to 800N to increase fowler support, and more closely replicate real cots (strut force to fowler weight)
- Potentially use bloc-o-lift-692255

https://stabilus.jwftechnologies.com/products/product_variants/2957-locking-gas-spring-bloc-o-lift-692255



Questions and Contacts



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