

FISH OUT OF WATER



Issues and Options in Moving Heavy
Vehicles Around Deck

Jeff Koch - University of Hawaii

ISSUES?

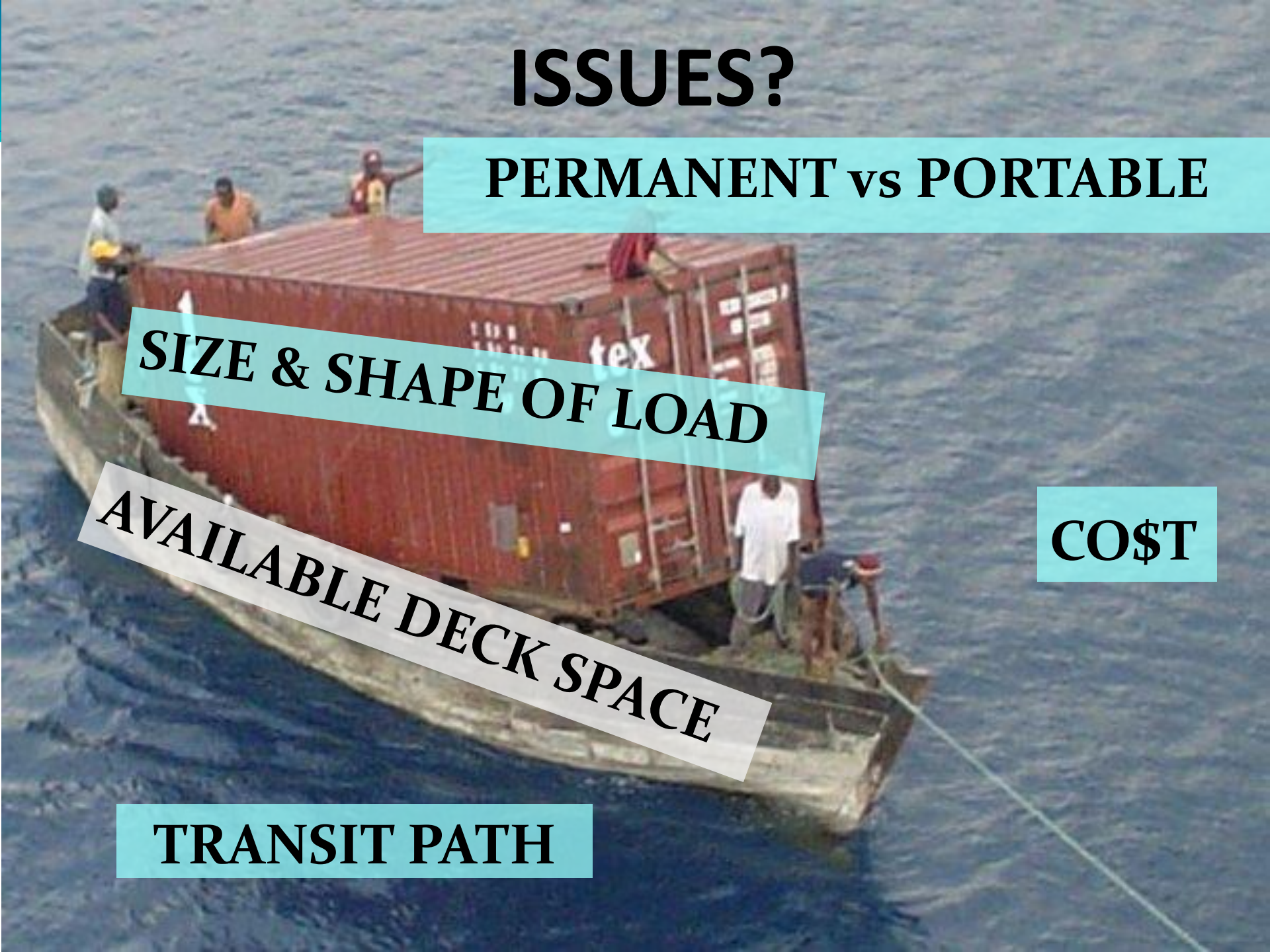
PERMANENT vs PORTABLE

SIZE & SHAPE OF LOAD

AVAILABLE DECK SPACE

COST

TRANSIT PATH



ISSUES



VESSEL STABILITY

ISSUES

DURABILITY AND MAINTENANCE



ISSUES

LABOR

A historical black and white photograph showing a long line of men pulling a massive stone block on a ramp. The men are positioned in a single file, each holding a rope that is attached to the block. The block is being moved up a steep, sandy incline. The word "LABOR" is overlaid in large, bold, black letters across the middle of the image, tilted to follow the angle of the ramp. The background is a vast, open landscape under a bright sky.



ISSUES

**POSITION
CONTROL**

OPTION: TRACK SYSTEMS

A steam locomotive is crossing a wooden trestle bridge over a valley. The locomotive is emitting a large plume of white steam. The bridge is made of dark wood and has a sign that says "WIDE" on it. The background shows a hazy, mountainous landscape under a blue sky.

GENERALLY HIGHER COST

HIGHER LEVEL OF CONTROL

FAVOR LINEAR PATH

**INSTALLATION CAN
BE CHALLENGING**

TRACK SYSTEMS – ROLLERS VS GLIDES

ROLL RESISTANCE VS MOTION ARREST

ROLLERS – WHEELS AND/OR BEARINGS

- LOW FRICTION – EASIER TO MOVE
- SMALLER CONTACT SURFACE – HIGH PSI
- FAVORS COMPLEX PATHS
- HIGHER MAINTENANCE – DAMAGE PRONE

GLIDES – BAR STOCK AND SADDLE

- LARGER CONTACT AREA
- HIGHER FRICTION = HARDER TO MOVE
- LOWER MAINTENANCE

**HEAVY
DUTY
TRACK**

RV - ATLANTIS



LIGHT DUTY ROLLER TRACK

NOT RECOMMENDED FOR VESSELS PRONE TO ROLLING



V-GROOVE AND ANGLE STOCK

WHEEL CAPTURE (CHANNEL STRUT)

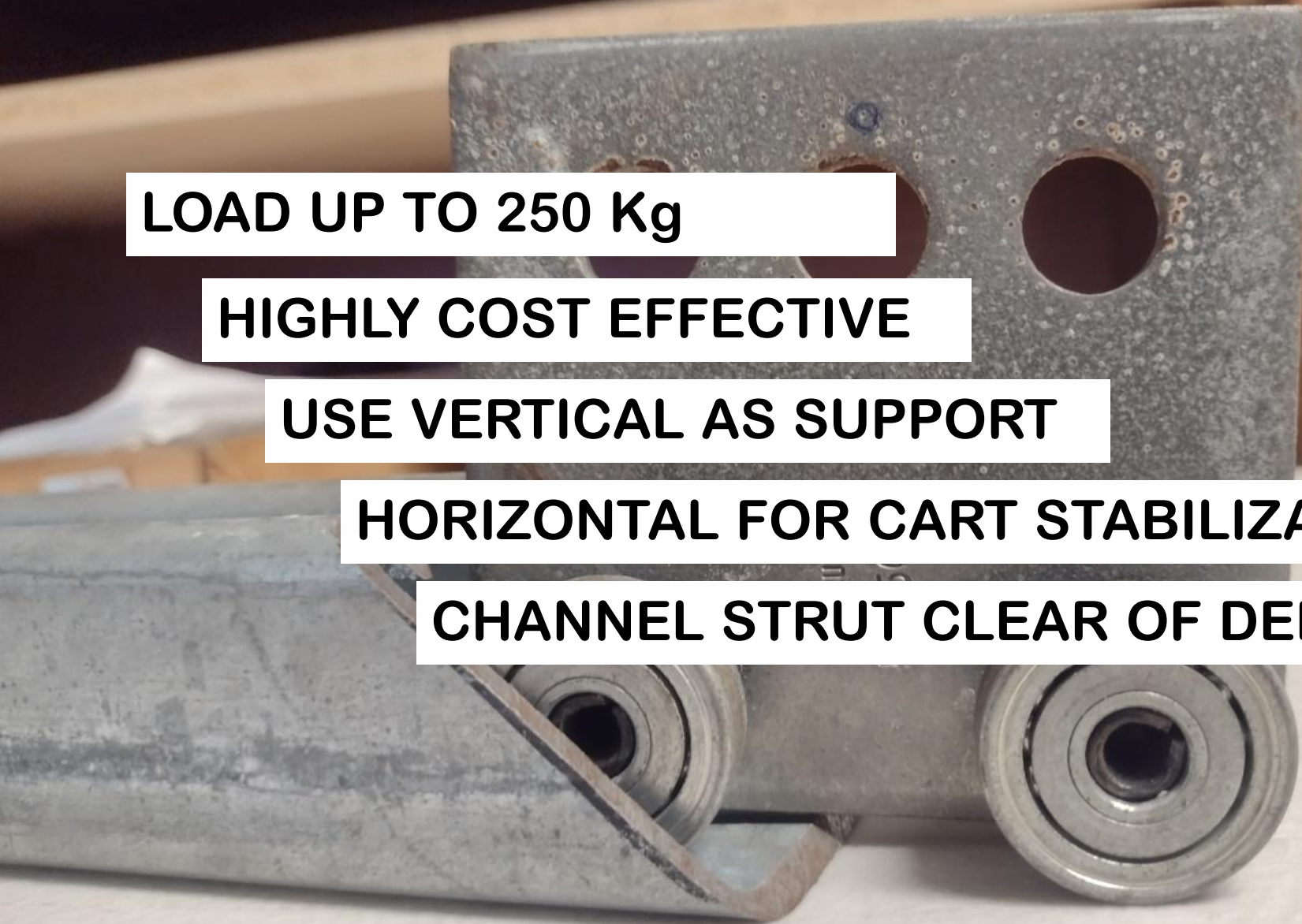
LOAD UP TO 250 Kg

HIGHLY COST EFFECTIVE

USE VERTICAL AS SUPPORT

HORIZONTAL FOR CART STABILIZATION

CHANNEL STRUT CLEAR OF DEBRIS



HEAVY DUTY GLIDES - KOK



SIMPLE AND COST EFFECTIVE

IDEAL FOR VERY HIGH LOADS (14 TON +)

CHAIN AND HYDRAULIC DRIVE

PERMANENT IMPEDIMENT TO OTHER OPS

MEDIUM DUTY GLIDE – KILO MOANA

MacGyver – GLIDE AND CART SYSTEM

1.0: DELRIN RAILS, WIRE ROPE WINCH & PULLEY

2.0: MODIFIED
CHAIN HOIST

3.0 EXTERNAL
TUGGER

3.5 MOVE
TUGGER INSIDE

4.0 STAINLESS RAILS



TRACKLESS SYSTEMS

A yellow and black amphibious aircraft is shown on a body of water. The aircraft has a high-wing configuration and a canopy. The background shows a forested shoreline.

MOBILIZATION IS USUALLY A LOT EASIER

PREFERABLE FOR COMPLEX
PATHS

DECK IS (MOSTLY) FREE OF OBSTRUCTIONS

CONTROL CAN BE AN ISSUE

- GENERALLY LESS PRECISE
- USUALLY ON WHEELS (HIGHER MAINTENANCE)
- FAVOR CALMER CONDITIONS
- ADDITIONAL SECURING IS REQUIRED

**TRACKLESS
Gold Standard**



30 DEGREE SLOPE

SELF PROPELLED

BELLY PACK CONTROLLED

SUB OPS –

CO\$\$\$\$\$\$T?

OceanXplorer

TRACKLESS – BARGAIN BASEMENT

MOBILIZATION IS NOT HUGELY COMPLEX

GRAVITY ENHANCED BRAKING SYSTEM

RELIABLE PROPULSION SYSTEM

“POSITIONING” TURNTABLE
IS A HUGE GAME CHANGER

\$500

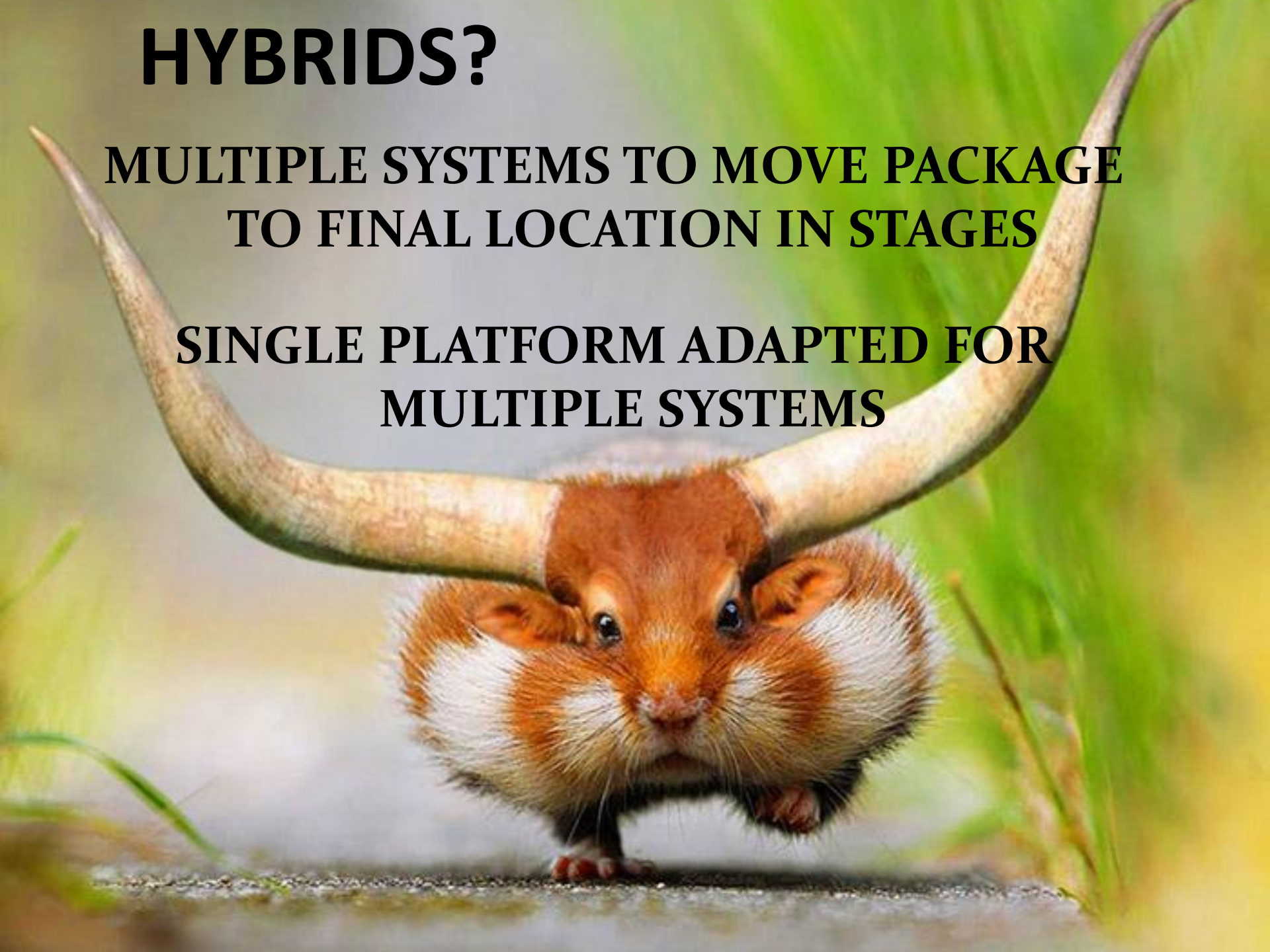
CAPACITIES
450 – 2700Kg



HYBRIDS?

**MULTIPLE SYSTEMS TO MOVE PACKAGE
TO FINAL LOCATION IN STAGES**

**SINGLE PLATFORM ADAPTED FOR
MULTIPLE SYSTEMS**



TRACKLESS CART

FORK LIFTING
POCKETS

COMMERCIALLY AVAILABLE INDUSTRIAL SUPPLY

JACK SCREW BRAKE



ALUMINUM BOX STOCK FITS FORK POCKET

LIMIT BUMPERS



BOAT TRAILER ROLLERS WITH BOLT AND CHAIN LINKS

TRACK SYSTEM CART

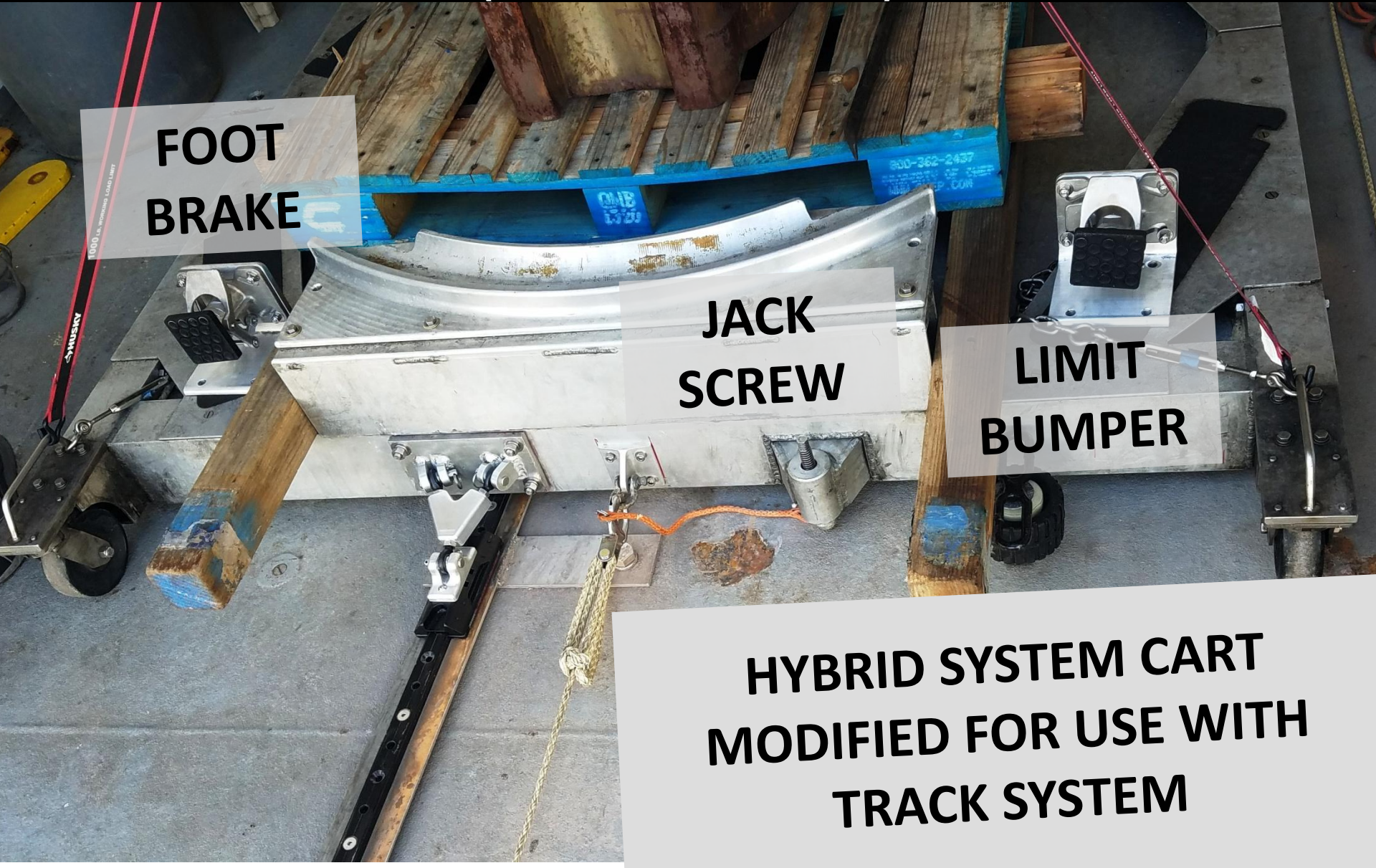
(EARLY LOAD TEST)

FOOT
BRAKE

JACK
SCREW

LIMIT
BUMPER

HYBRID SYSTEM CART
MODIFIED FOR USE WITH
TRACK SYSTEM



SPINNAKER TRAVELER CAR

MULTIPLE BALL JOINTS TO RIDE OVER UNEVEN DECK

WISHBONE FOR LATERAL STRENGTH

PULL PINS FOR EASY CONVERSION TO TRACKLESS

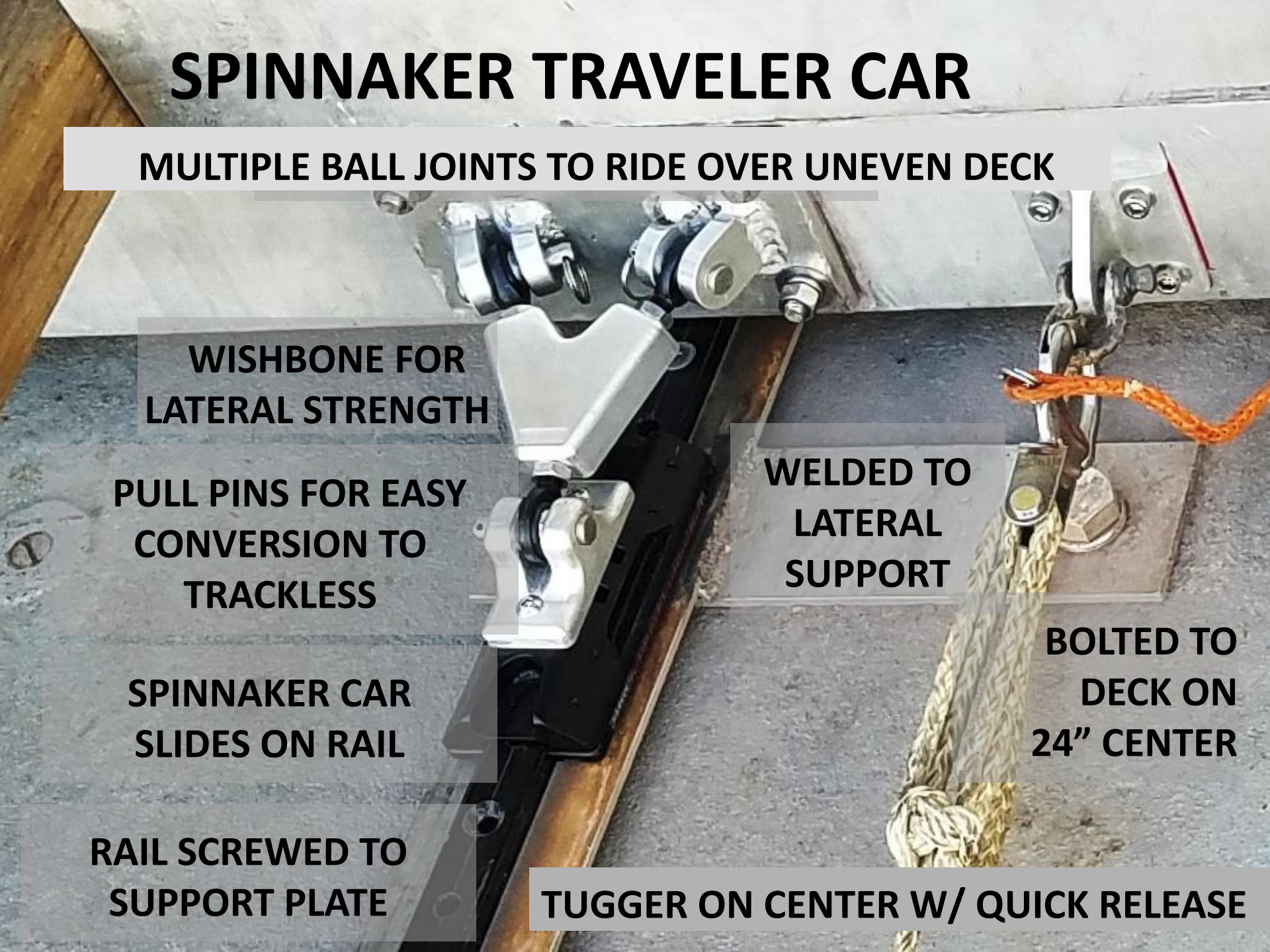
SPINNAKER CAR SLIDES ON RAIL

RAIL SCREWED TO SUPPORT PLATE

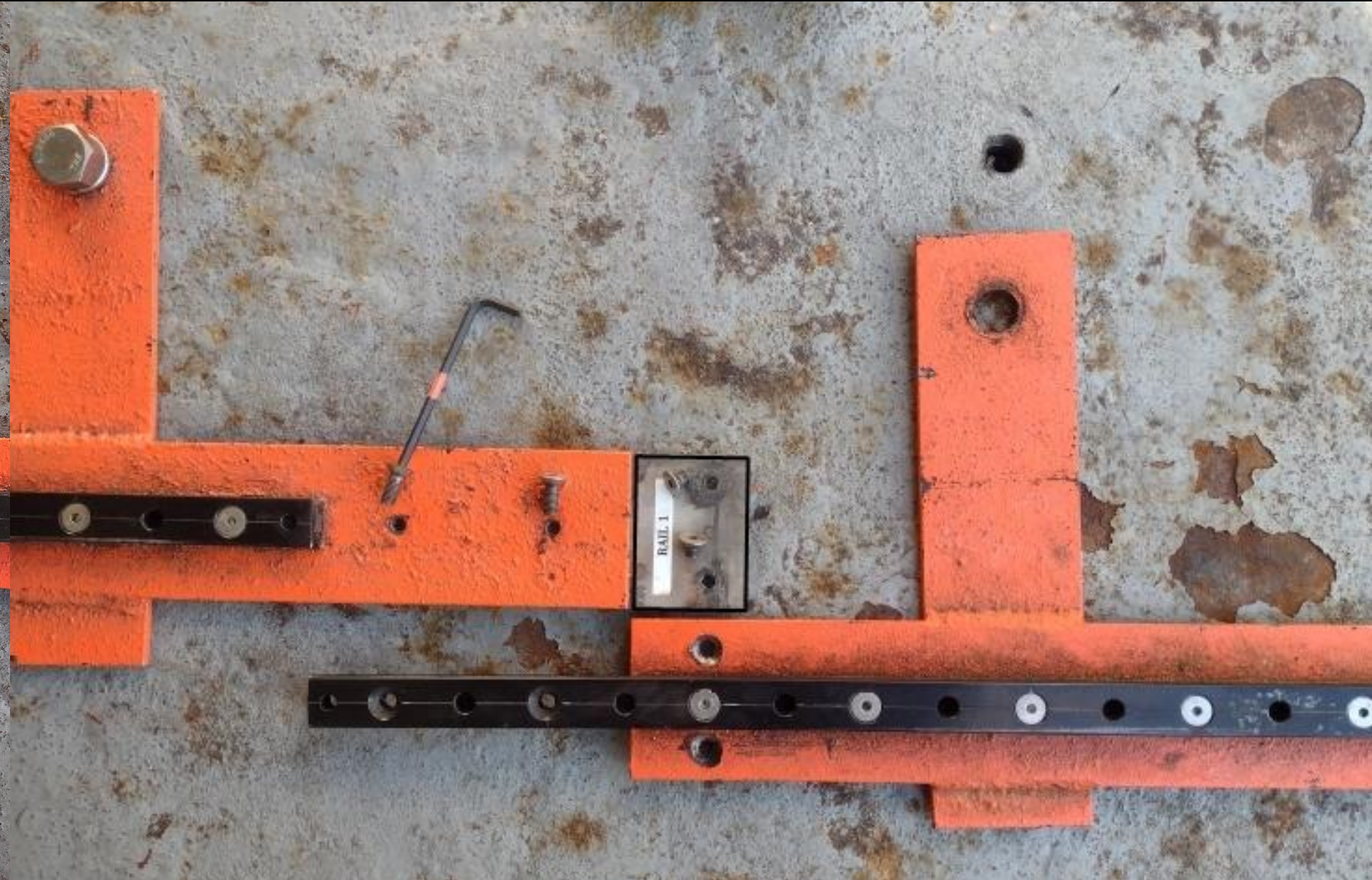
WELDED TO LATERAL SUPPORT

BOLTED TO DECK ON 24" CENTER

TUGGER ON CENTER W/ QUICK RELEASE



JOINING TRACK SECTIONS



PULLING IT ALL TOGETHER

**TRACK CONSTRUCTED IN
4 SEPARATE SECTIONS
THAT ARE
HAND CARRIED ABOARD
DURING MOBILIZATION**




STACKING VEHICLES




1ST VEHICLE IS
LIFTED OFF OF
CART AND
UP TO
A FRAME

THEN CART IS
REMOVED
FROM TRACK
AND STOWED

THANKS!

- 
- Jim Holik - NSF
 - Alice Doyle - RVTEC
 - John Calderwood - SCRIPPS
 - Steve Price - Hawaii URL
 - Webb Pinner - OceanXplorer
 - Allison Heater - WHOI

A collection of 15 stylized, 3D human figures in various colors (purple, blue, cyan, green, yellow, orange, red, pink) are arranged in a circle, each sitting on a small, matching-colored chair. They are all facing towards the center of the circle. In the center of the circle is a semi-transparent grey rectangular box containing the text "OPEN SPACE" in bold, black, sans-serif capital letters.

**OPEN
SPACE**