



JetJack[®]

Modular Transporter

INNOVATIVE HANDLING AND PROCESSING SOLUTIONS FOR THE AIRCRAFT DISASSEMBLY, DISMANTLING & RECYCLING INDUSTRY



Who is ThorMech:

ThorMech is an engineering company specialising in the design, development, manufacture & delivery of bespoke automated solutions, specifically tailored to the handling and recycling of large payload applications within the aviation, energy and construction sectors.

Our expertise spans right across industry from Oil & Gas, Recycling, Mining and Industrial Automation right through to MedTech and AgriTech.

For us, great design is about seamlessly marrying the various problems encountered within the marketplace with the best possible customised solutions that utilise the best technology and hardware available in the marketplace today.

With our own in-house design and engineering team we have the capabilities to deliver a complete and bespoke engineering solution that works flawlessly for your business.

Our mission is to deliver the optimum solution for each customer, accompanied by an outstanding customer service from the initial enquiry right through to concept and design, specification, installation & validation.

1

Design:

- In-house design team utilising the most up to date design solutions in the marketplace to date.
- Development of concept designs right through to full detailed design
- We utilise such software as:
 - Inventor, Nastran, SolidWorks, Plant 3D.
 - ACAD Mechanical, ACAD Electrical, Navisworks

2

Development:

- Conceptualisation and delivery of concepts into working solutions.
- Prototype development and test bed evaluations.
- Customised project implementation plans specific to customer requirements.

3

Automated Solutions:

- Wide range of resources and skills employed within the company enabling us to provide:
 - Mechanical Design
 - System integration
 - Robotic solutions
 - Control systems design

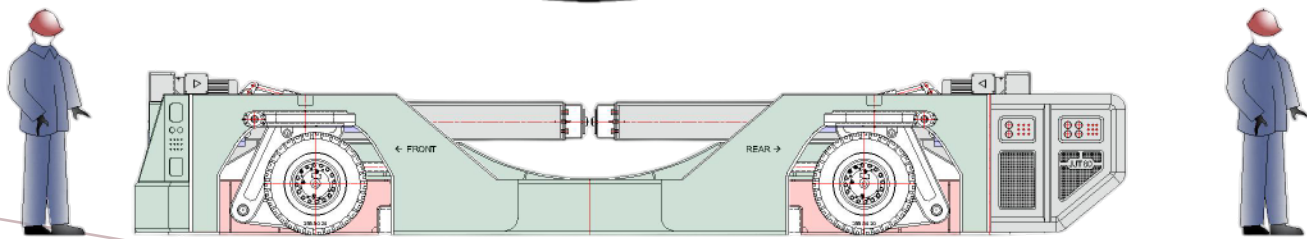
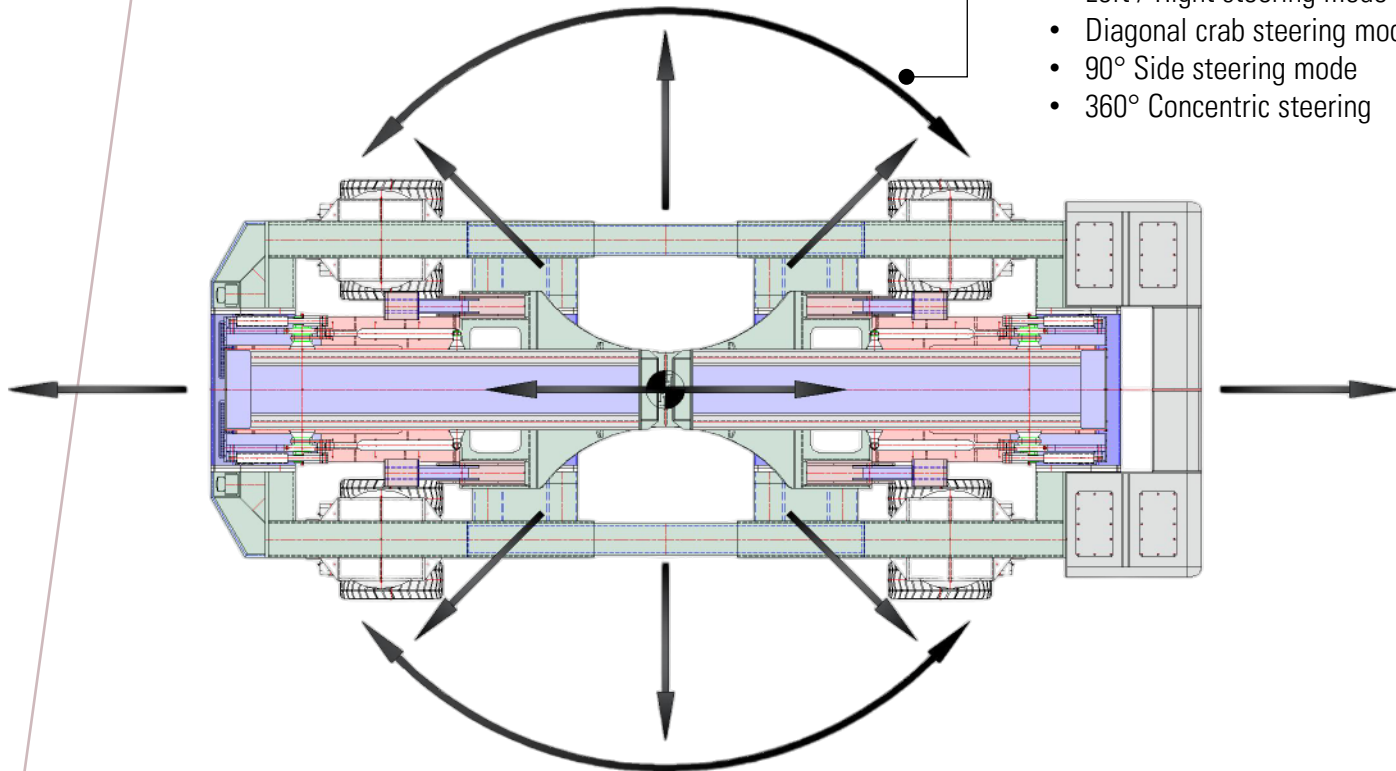


INTRODUCTION TO THE JETJACK MODULAR TRANSPORTER:

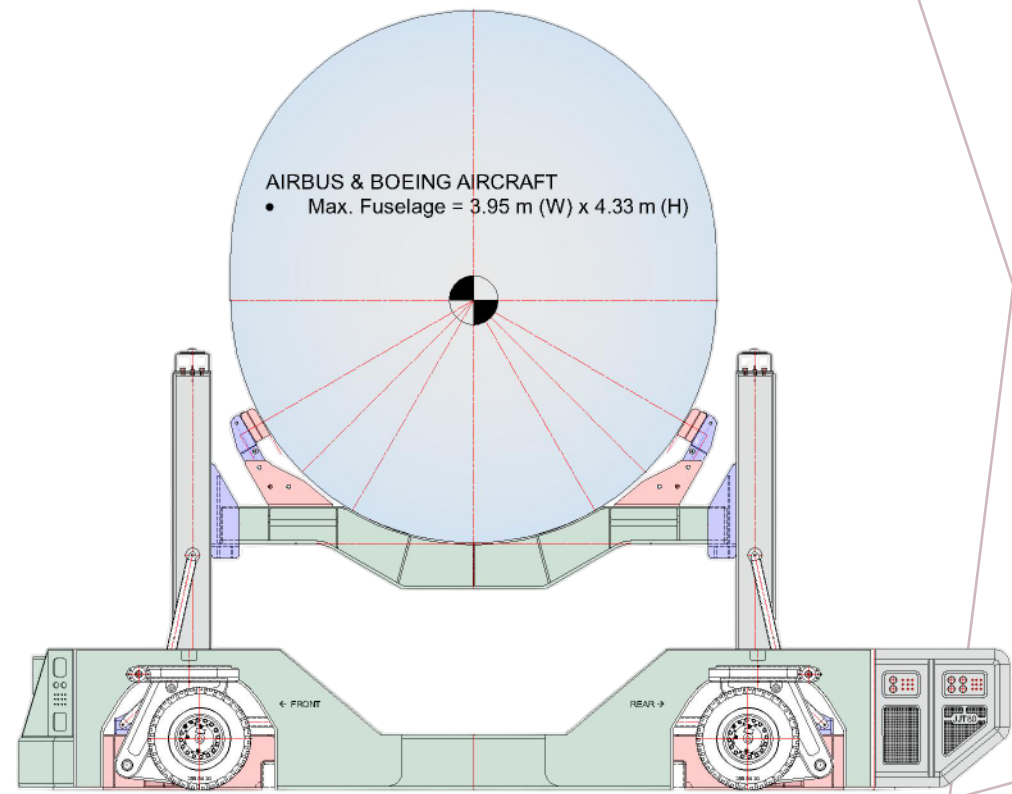
Introduction to the JetJack modular transporter:

- **JetJack® Steering Modes:**
 - Left / Right steering mode
 - Diagonal crab steering mode
 - 90° Side steering mode
 - 360° Concentric steering

Sample view of the JJ-4040NB



JetJack Folded Transportation Mode:



JetJack Payload Jacking Mode:

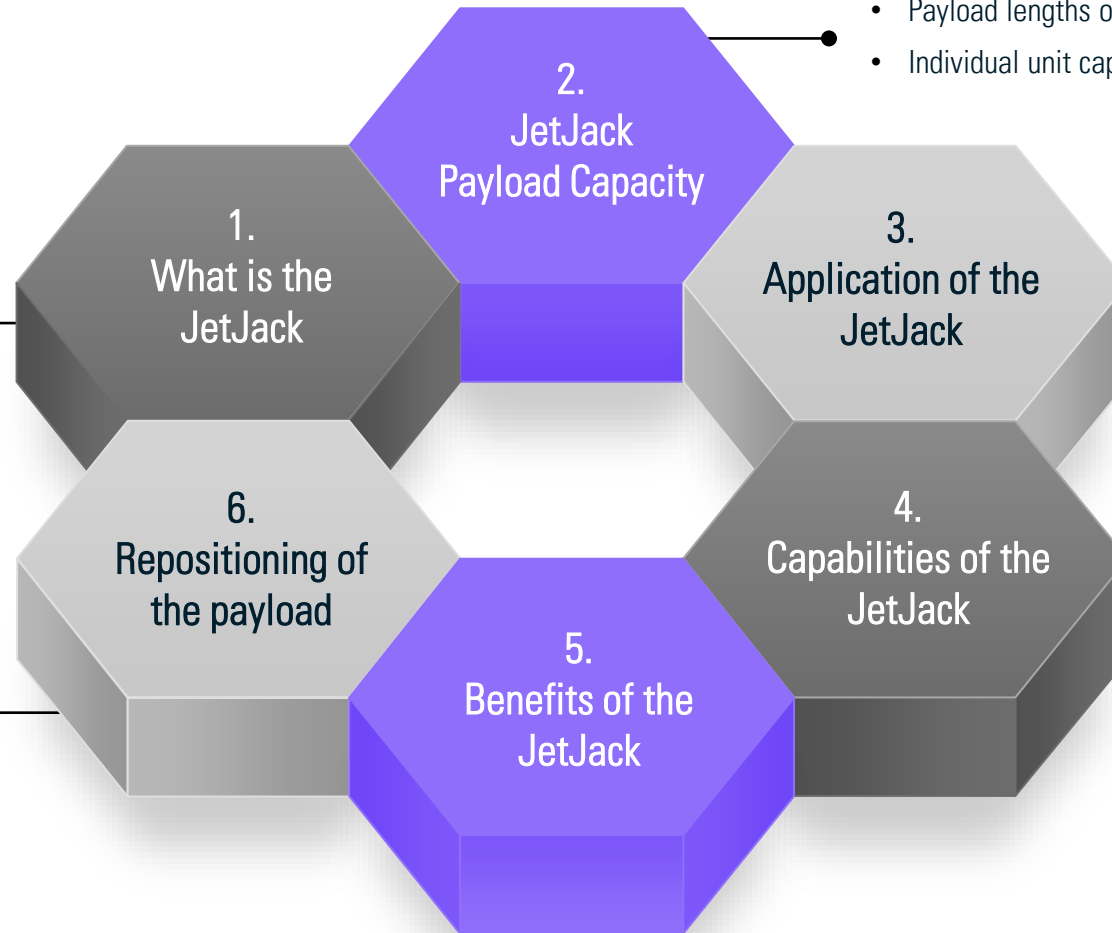
Introduction to the JetJack modular transporter:

What is the JetJack:

- Heavy duty, extended height, jacking, manipulating & transportation system.
- Suited for large payload applications with varying cross-section profiles.
- Wireless remote-controlled operation.
- Payloads are handled in a safe, fully controlled manner with minimal numbers of operating staff required.

Repositioning of the payload:

- The JetJack's unique design allows for any payload to be:
- Re-engaged multiple times and moved to other locations.
 - No requirement for any other support equipment.



JetJack payload capacity:

- Payload weights from 25t – 240t.
- Payload lengths of up to +100m.
- Individual unit capacity from 12.5t – 120t.

Application of the JetJack:

- Specialised jacking & transportation machine.
- Designed to engage with payloads from the underside with minimal clearances.
- Ability to jack & transport large payloads of varying lengths & widths on the one platform.

Capabilities of the JetJack:

- In one complete process, without separation of the payload from the JetJack:
- Each payload can be jacked up from the underside to a height of (+3.5m).
- Payloads can be locked out at any height for safe operations carried out beneath.
- Payloads can be lowered to a height of (± 450 mm).
- Payloads can then be transported over long distances and set down into final position (± 450 mm) off the ground.

Saves: Time, Space & Money

Creates: Safe, Tidy & Controlled Work Environments

Allows: Quicker Jacking, Strip Down & Movement of Aircraft

BASIC OPERATING PRINCIPLES:

Setup of JetJack beneath Payload:

- A set of 2x JetJack's are driven to central positions beneath the payload using their own remote control & self-drive capabilities.
- The lifting jacks are then automatically locked out into an operational setup position using the onboard control system.
- The transportation unit is then lowered through its independent suspension units to a grounded lockout position.

Control & operation of the JetJack:

- Control of the 2x JetJack's are then switched over to 1x remote control unit to be controlled by 1x designated person.
- Both JetJack units are now capable of being controlled in sync using the onboard control system to within $\pm 4\text{mm}$ of each other.
- Both JetJack units from this point on are capable of being controlled in sync utilising numerous steering and operational modes.

Engagement & weighing of payload:

- Under the control of 1x person, the JetJack's will automatically jack to within 50mm of the underside of the payload and stop.
- Switched to a weighing mode, the JetJack's will then slowly engage the payload and proceed to take a weight measurement.
- If the weight measurement is within limits, the lifting procedure will then be allowed to commence.

Jacking & lowering of payload:

- Payloads can then be safely jacked from the underside up to a height of (+3.5m) depending on the model of JetJack.
- The onboard auto. safety lockout system allows for personnel to safely work beneath the payload at any required height.
- Following any works carried out, the payload can then be lowered to a height of ($\pm 450\text{mm}$).

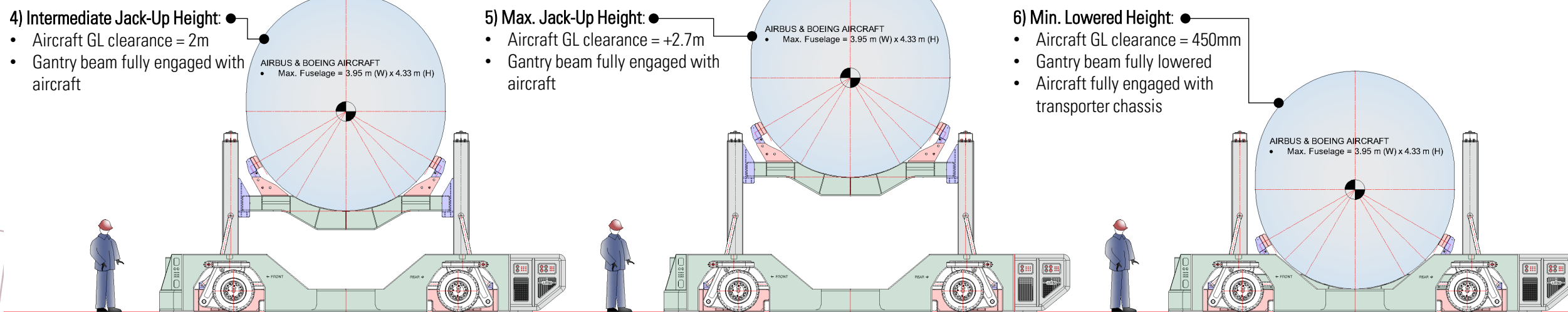
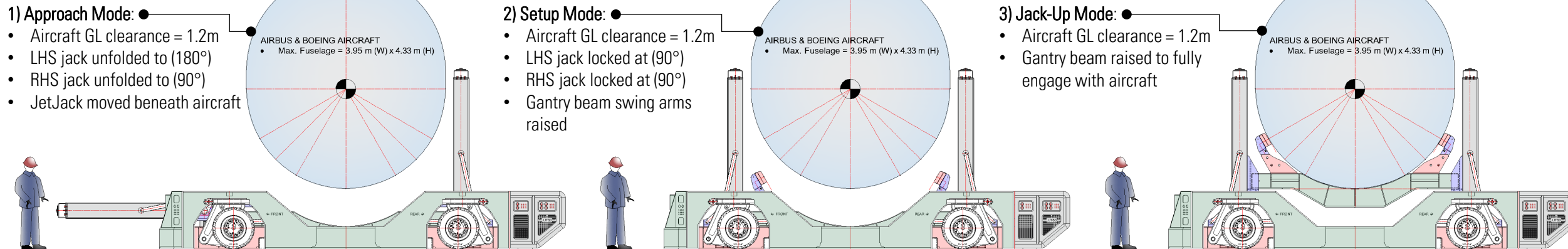
Movement & transportation of payload:

- Once lowered onto the transportation module the payload can then be moved or transported to any location on site.
- Equipped with numerous steering modes, the payload can be moved or rotated in any direction required.
- The payload can be offloaded from the JetJack's at any stage and the JetJack's driven away from beneath the payload.

Re-engagement of payload at any location:

- The JetJack's unique design allows for any payload to be re-engaged multiple times and moved to other locations without the need for other support equipment.
- All of the above steps are controlled from a safe distance using a remote control.

Application of the JetJack: (Sequence of operation)

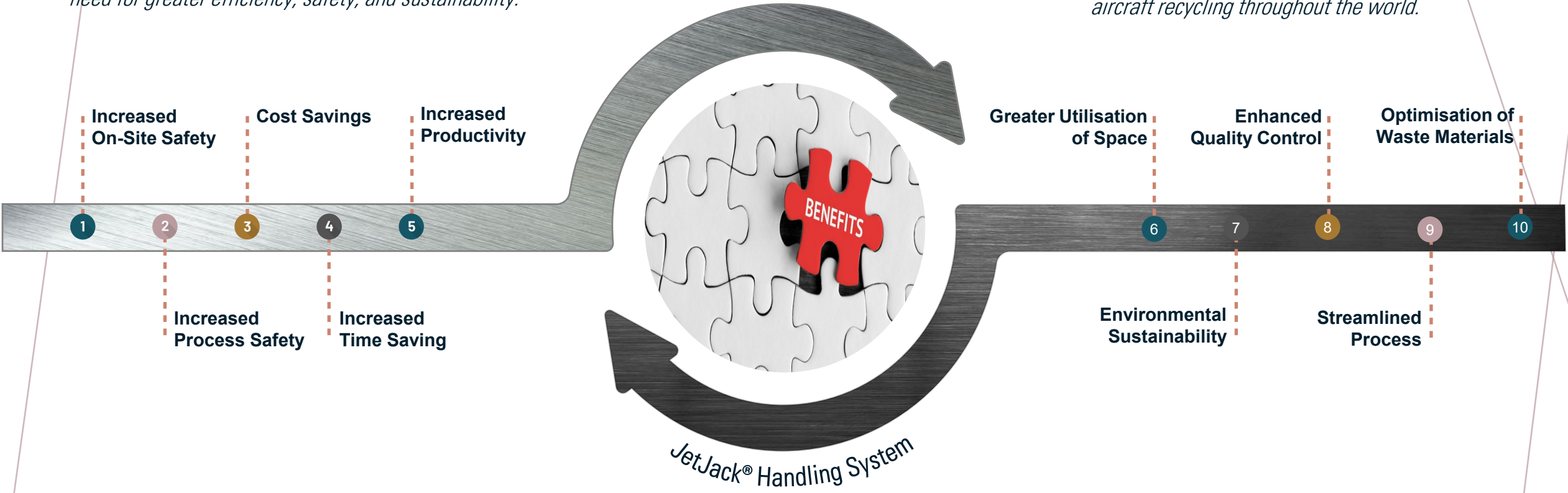


Benefits of using the JetJack handling system:

The evolution of aircraft recycling solutions reflects an ongoing need for greater efficiency, safety, and sustainability.

ThorMech's innovative solutions play a crucial role in this evolution, offering advanced technologies that meet the complex demands of aircraft recycling throughout the world.

Key Benefits



As a leading developer, of customised automated mechanical, processing & recycling equipment, we leverage these innovations to provide top-tier solutions to the industry, ensuring organisations remain at the forefront of the industry

By staying informed about the latest advancements and continuously adapting to new technologies, businesses can optimise their operations and maintain a competitive edge in the ever-evolving aircraft recycling arena.

JetJack general specifications:

- JetJack payload capacity / set = 25t – 240t
 - JetJack individual unit capacity = 12.5t – 120t
 - Payload max. jacking height = 3.5m (Customisable)
 - Payload min. lowered height = 450mm
 - Lifting speed = 300mm/min
 - Lifting balance across all jacking surfaces = ± 4 mm
 - Automatic lockout of lifting jacks
 - Load sensing feedback
 - Payload weighing, handling and monitoring system
 - Payload data logging and even logging
 - Gantry beam payload adjusting clamps
 - Minimum frame height of aircraft approach side (Depending on model) = ± 1.14 m – ± 1.5 m
 - Self-driven (As standard) or Towable
 - Independent self-levelling suspension system
 - Suspension jacking stroke = 600mm
 - Industrial tyres = Super Elastic solid
- Multi-directional dynamic steering control
 - Left / Right steering mode
 - Diagonal crab steering mode
 - 90° Side steering mode
 - 360° Concentric steering
 - Travel speed double selection = 0-1.5 km/h or 0-3 km/h
 - Powerpack = Diesel, Hybrid or Electric
 - Gradeability under full load = 5% to 8%
 - Wireless or wired remote control
 - SPMT mode configuration
 - Articulated auxiliary equipment attachments:
 - Tele-boom, man-baskets, hydraulic cutters,
 - Suction heads, cutting heads, drilling heads
 - Wire saw, rotational manipulators,
 - Scanning & mapping systems
 - Articulated auxiliary equipment attachments:



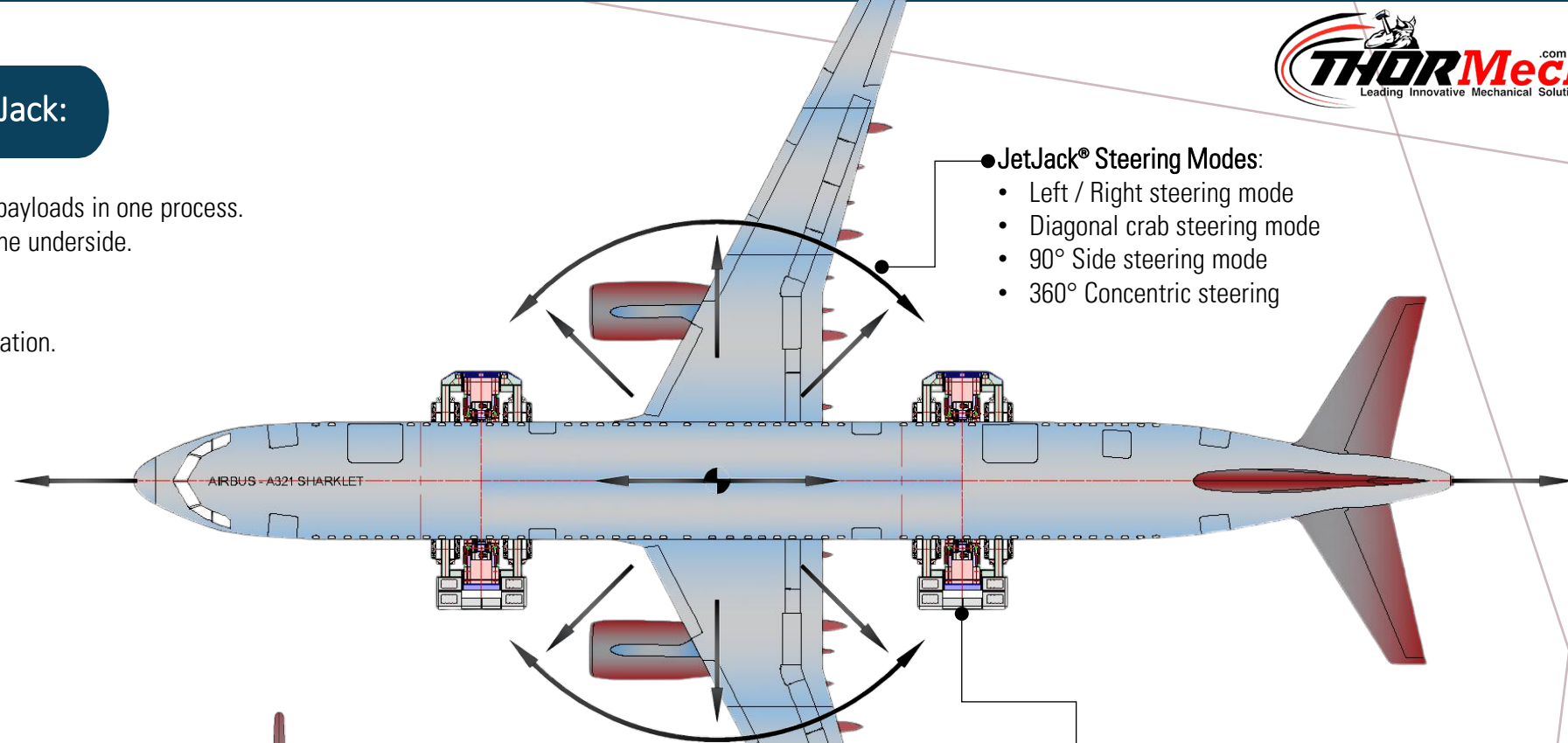
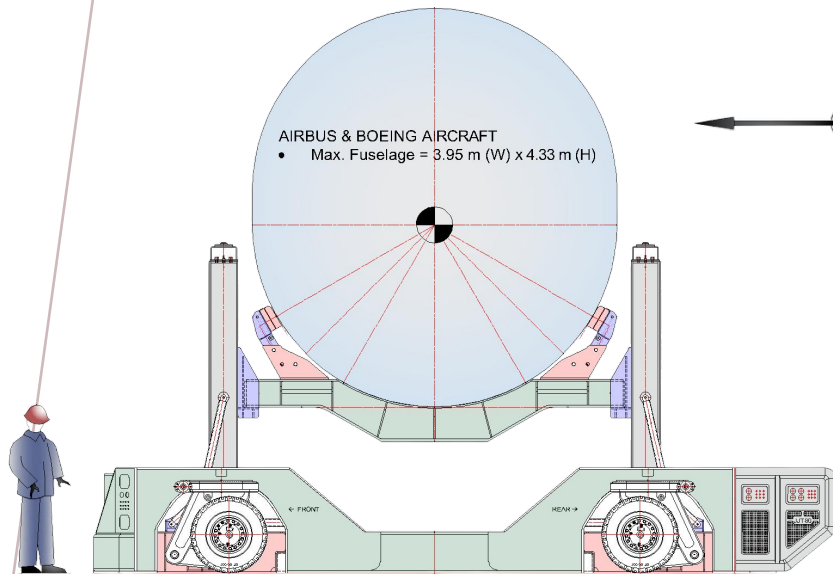


NARROW BODY AIRCRAFT APPLICATION:

Narrow Body (NB) Application of the JetJack:

- 1) Combined jacking & transportation of aircraft & large payloads in one process.
- 2) Jacking & lowering of aircraft & large payloads from the underside.
- 3) Manipulation of aircraft & large payloads.
- 4) Auxiliary processing & handling systems.
- 5) JetJack can be configured into an SPMT mode of operation.

AIRBUS & BOEING AIRCRAFT
 • Max. Fuselage = 3.95 m (W) x 4.33 m (H)

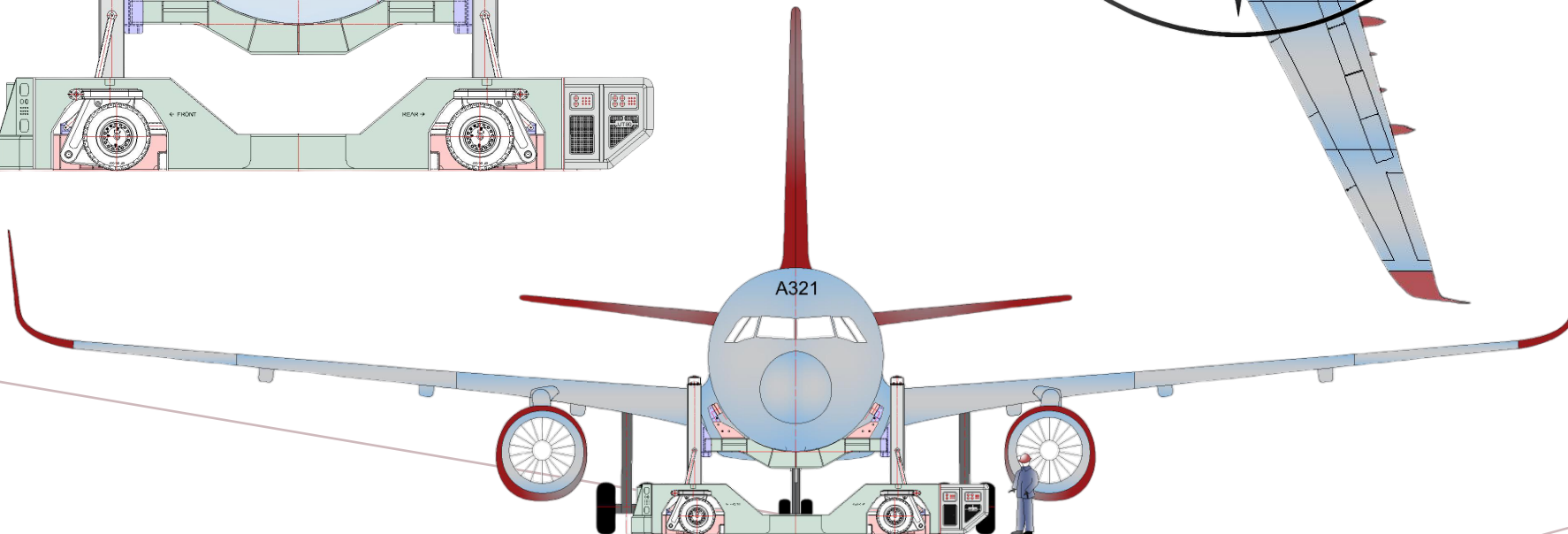


● JetJack® Steering Modes:

- Left / Right steering mode
- Diagonal crab steering mode
- 90° Side steering mode
- 360° Concentric steering

● JetJack® Range - Technical Specifications:

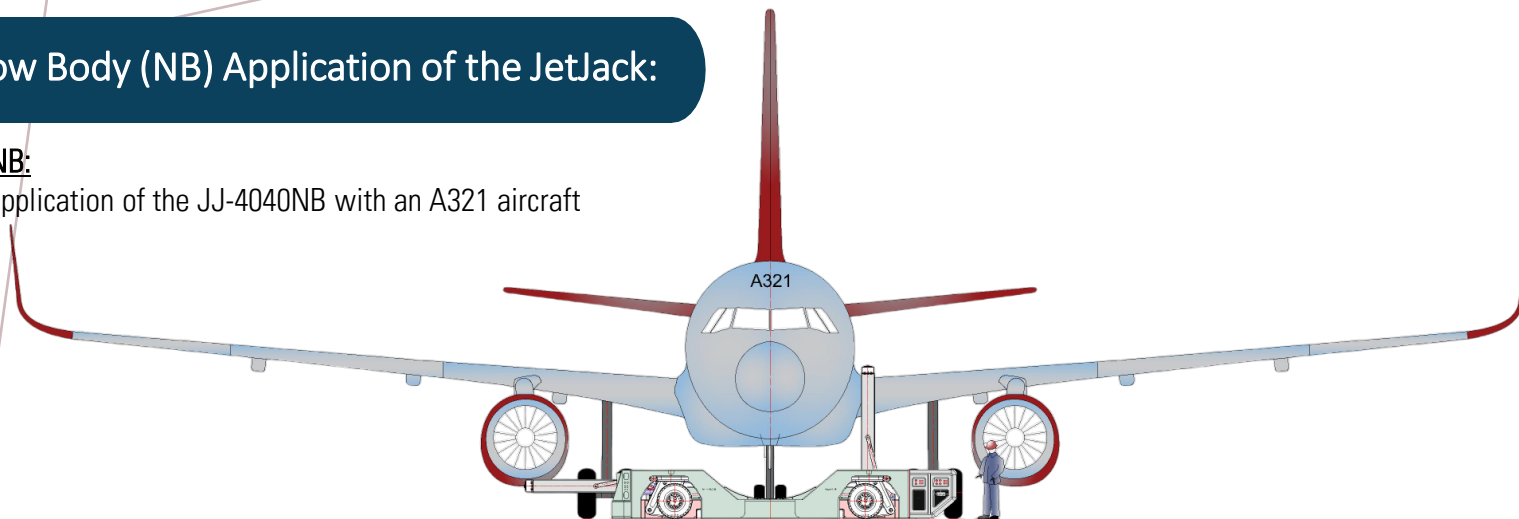
- Payload Capacity Per Machine = 25t - 120t
- Min. Unfolded Height = 1.14m
- Max. Payload Raised Height = +3,500mm
- Min. Payload Lowered Height = ±450mm
- Electric Hydraulic or Diesel Hydraulic
- PLC Control
- Wireless or wired Remote-control
- Self-propelled or Towing configuration
- Multi-directional operational
- Multiple steering mode



Narrow Body (NB) Application of the JetJack:

JJ-4040NB:

Sample application of the JJ-4040NB with an A321 aircraft

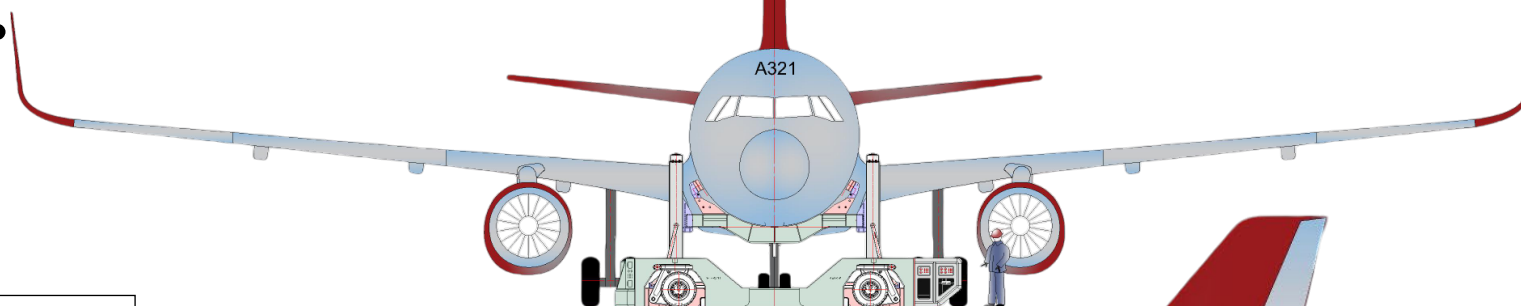


1) JETJACK SETUP POSITION:

- JetJack in the unfolded approach mode
- JetJack centrally positioned beneath the aircraft

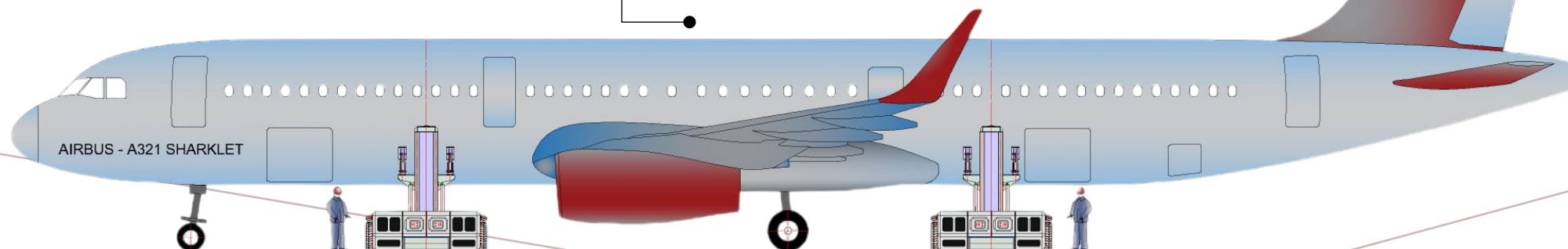
2) JETJACK ENGAGEMENT WITH AIRCRAFT #1:

- Operational position with lifting jacks locked out at 90° to chassis
- Gantry beam in the raised position and fully engaged with the aircraft
- Removal of all landing gear, engine cowlings and wings can commence



3) JETJACK ENGAGEMENT WITH AIRCRAFT #2:

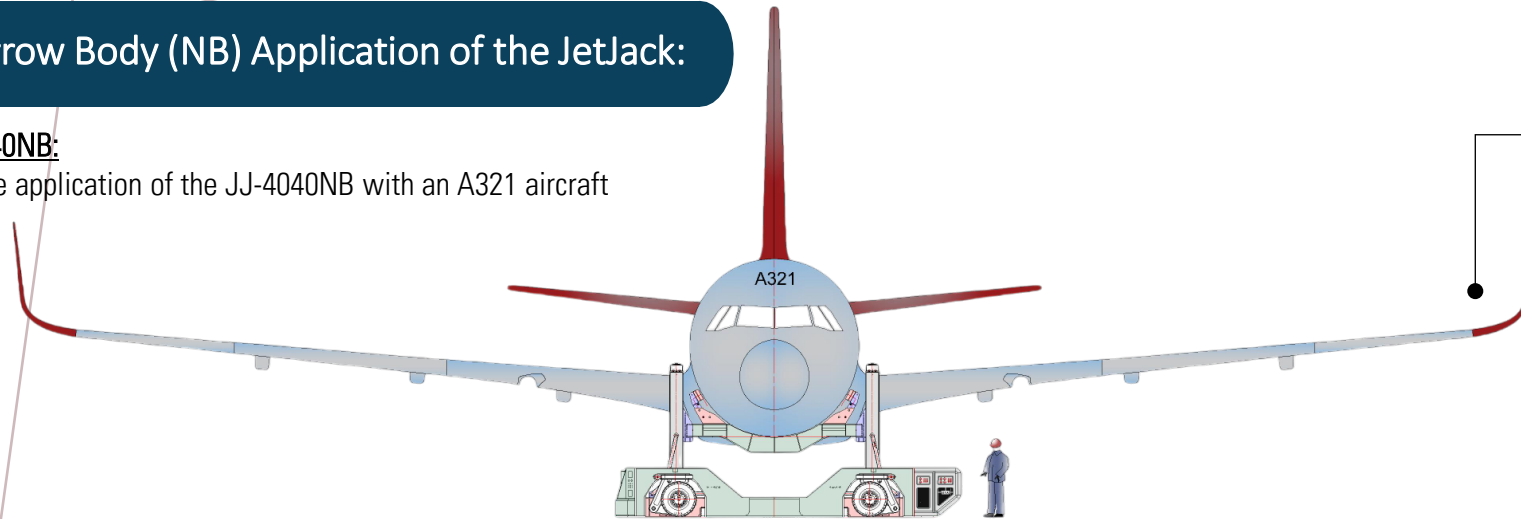
- Operational position with lifting jack assemblies locked out at 90° to chassis
- Automatic levelling control between front & rear jack assembly
- Gantry beam in the raised position and fully engaged with the aircraft



Narrow Body (NB) Application of the JetJack:

JJ-4040NB:

Sample application of the JJ-4040NB with an A321 aircraft

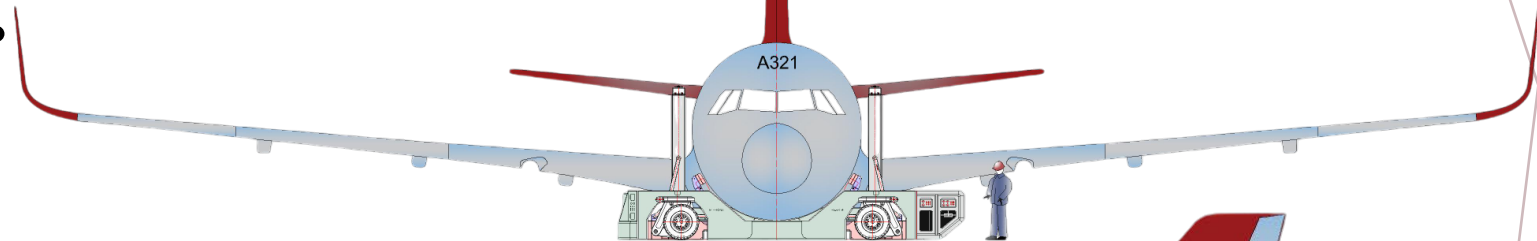


4) REMOVAL OF COMPONENTS:

- Operational position with lifting jacks locked out at 90° to chassis
- Gantry beam in the raised position and fully engaged with aircraft
- Removal of all landing gear & engine cowlings has been completed

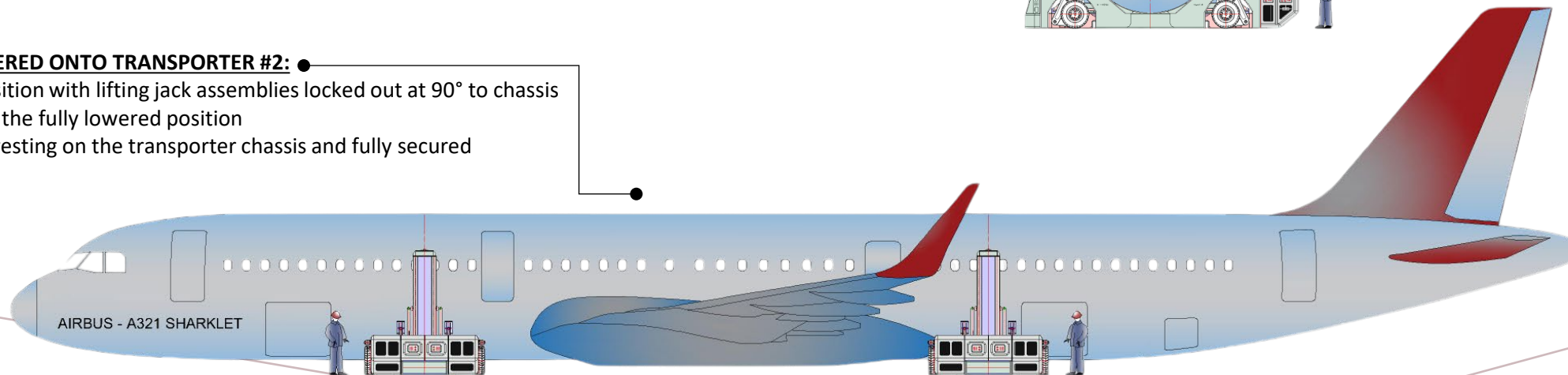
5) AIRCRAFT LOWERED ONTO TRANSPORTER #1:

- Operational position with lifting jacks locked out at 90° to chassis
- Automatic levelling control between front & rear jack assembly
- Gantry beam in the fully lowered position
- Aircraft is now resting on the transporter chassis and fully secured



6) AIRCRAFT LOWERED ONTO TRANSPORTER #2:

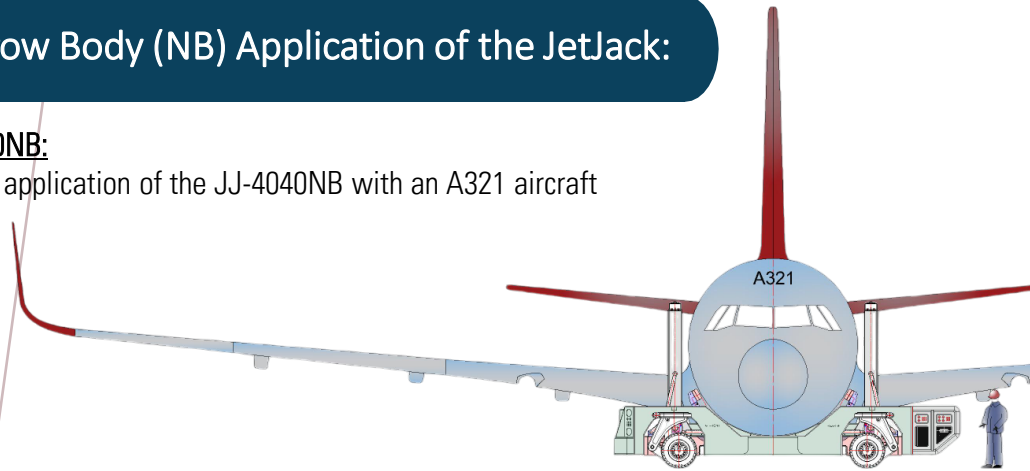
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Narrow Body (NB) Application of the JetJack:

JJ-4040NB:

Sample application of the JJ-4040NB with an A321 aircraft

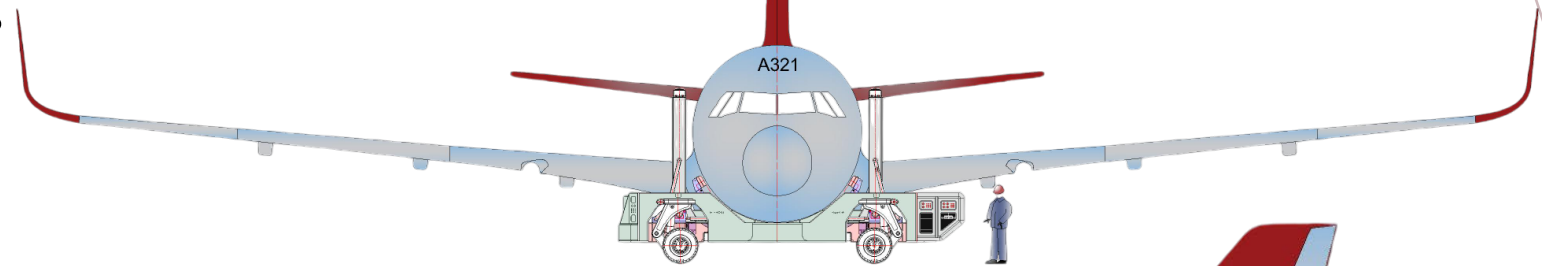


7) TRANSPORTER MODE WITH +300mm JACKING STROKE:

- Gantry beam in the fully lowered position
- Aircraft resting on the transporter chassis and fully secured
- Chassis raised to +300mm using its pendular suspension system
- Automatic levelling control between front & rear transporter

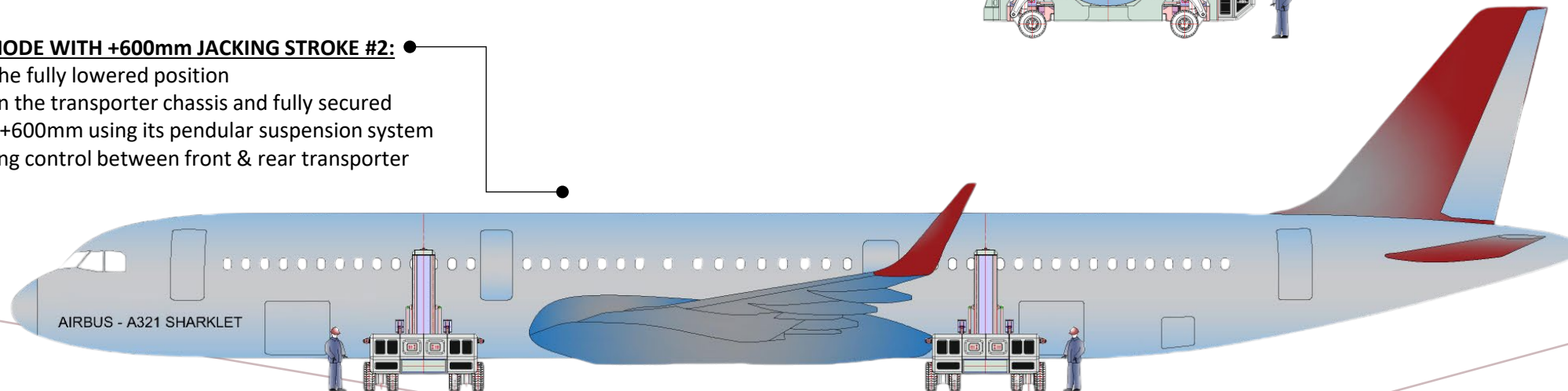
8) TRANSPORTER MODE WITH +600mm JACKING STROKE #1:

- Gantry beam in the fully lowered position
- Aircraft resting on the transporter chassis and fully secured
- Chassis raised to +600mm using its pendular suspension system
- Automatic levelling control between front & rear transporter



9) TRANSPORTER MODE WITH +600mm JACKING STROKE #2:

- Gantry beam in the fully lowered position
- Aircraft resting on the transporter chassis and fully secured
- Chassis raised to +600mm using its pendular suspension system
- Automatic levelling control between front & rear transporter



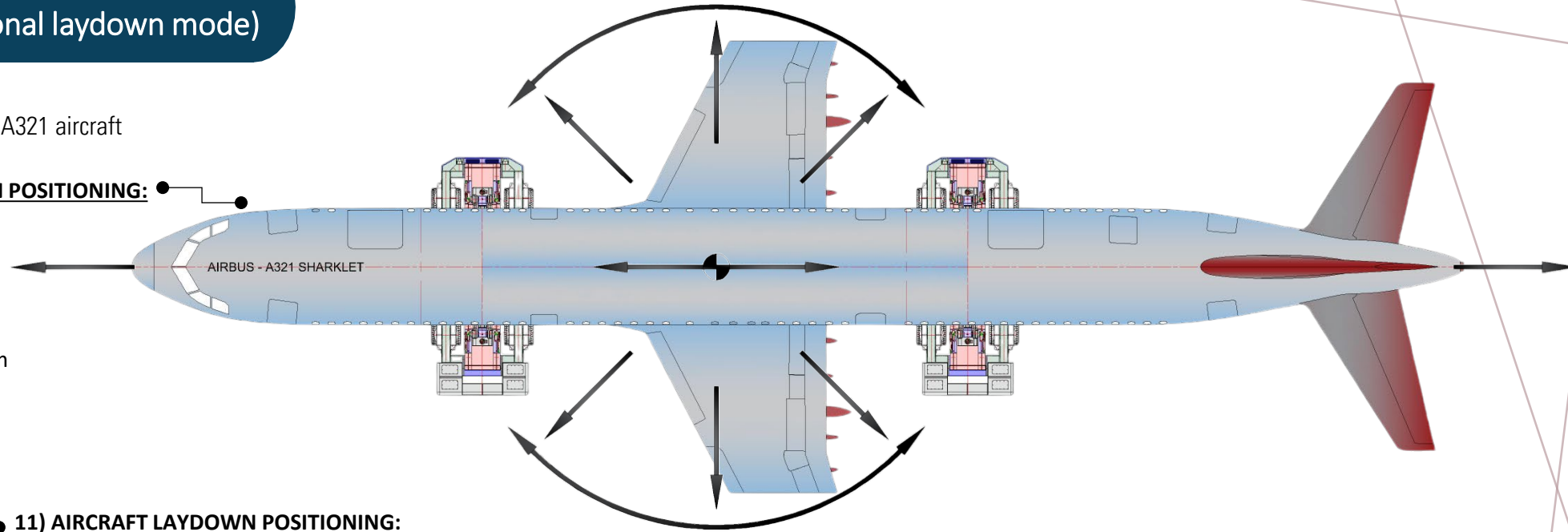
Narrow Body (NB) Application of the JetJack: (Transportation mode & directional laydown mode)

JJ-4040NB:

Sample application of the JJ-4040NB with an A321 aircraft

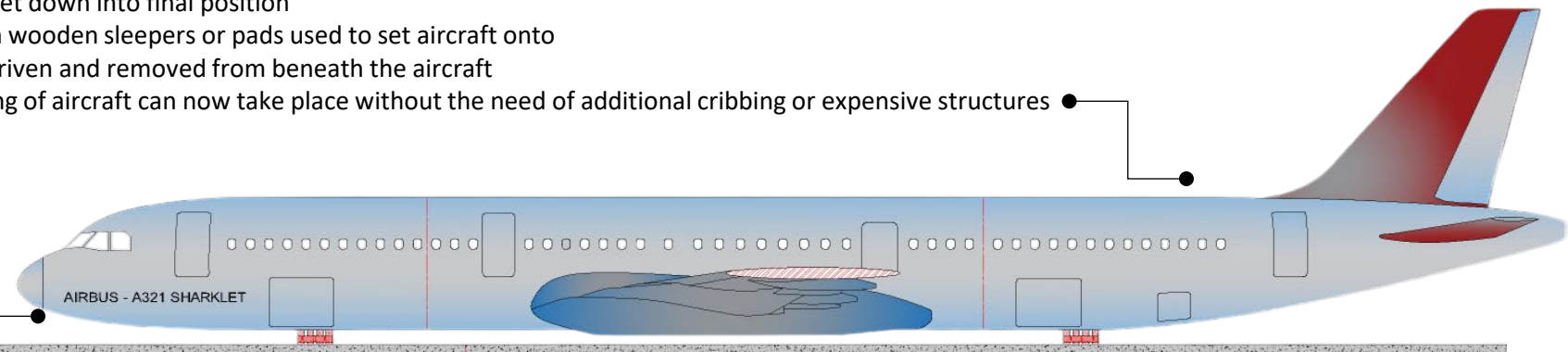
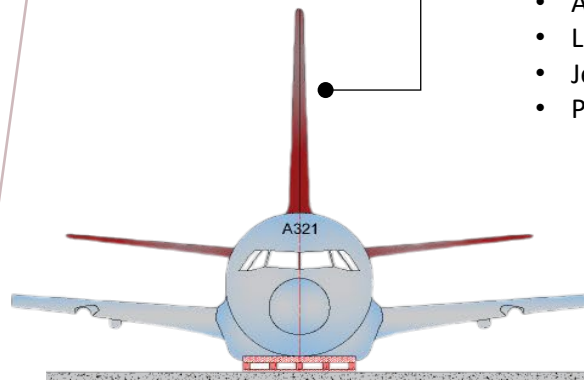
10) AIRCRAFT MOVEMENT FOR LAYDOWN POSITIONING:

- Forward & reverse
- Left / Right steering mode
- Diagonal crab steering mode
- 90° Side steering mode
- 360° Concentric steering
- Transporter Jacking stroke of 0 – 600mm



11) AIRCRAFT LAYDOWN POSITIONING:

- Aircraft set down into final position
- Low-tech wooden sleepers or pads used to set aircraft onto
- JetJack driven and removed from beneath the aircraft
- Processing of aircraft can now take place without the need of additional cribbing or expensive structures



12) RE-ENGAGEMENT OF AIRCRAFT:

- The JetJack's unique design allows for any payload to be re-engaged multiple times and moved to other locations without the need for any other support equipment (Self driven design)

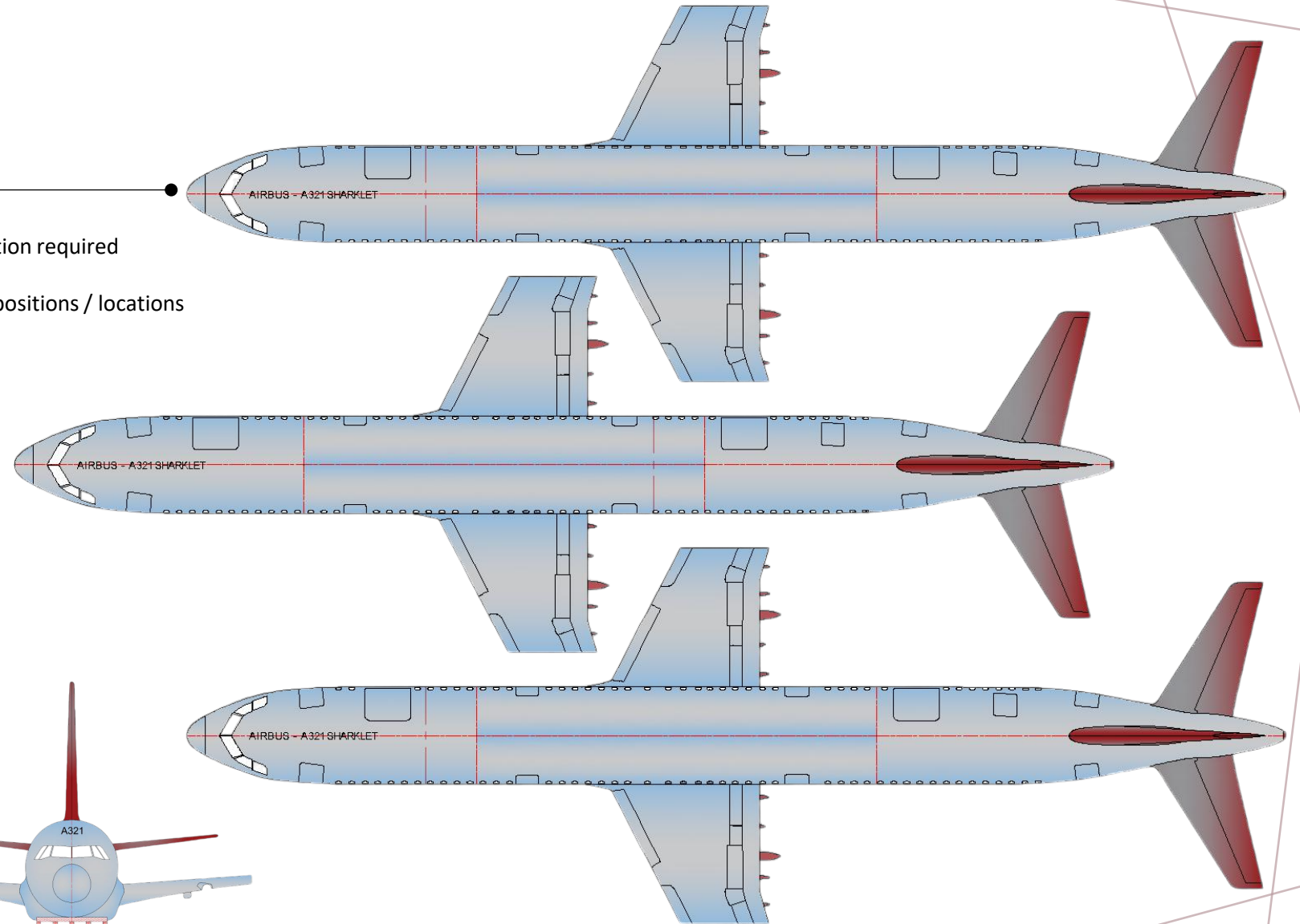
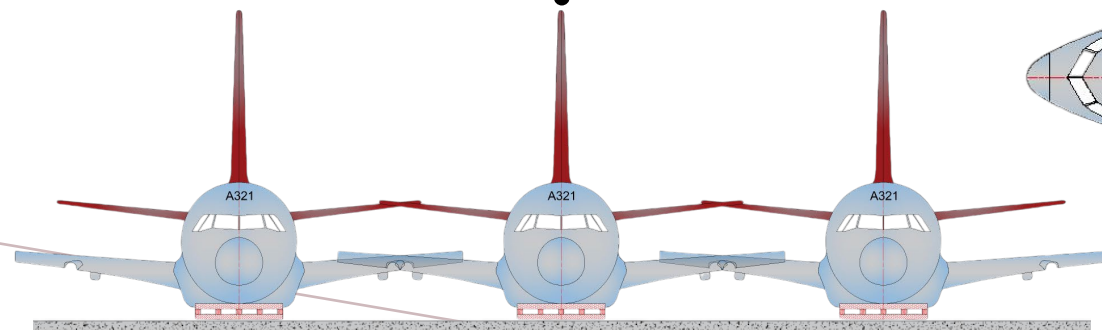
Narrow Body (NB) Application of the JetJack: (Laydown patterns & utilisation of space)

JJ-4040NB:

Sample application of the JJ-4040NB with an A321 aircraft

13) AIRCRAFT LAYDOWN PATTERN / NESTING:

- Aircraft set down into close proximity offset patterns
- Maximum safe control and movement of payload into any position required
- Ultimate maximisation of space for final processing
- Aircraft can be re-engaged multiple times and moved to other positions / locations without the need for any other support equipment



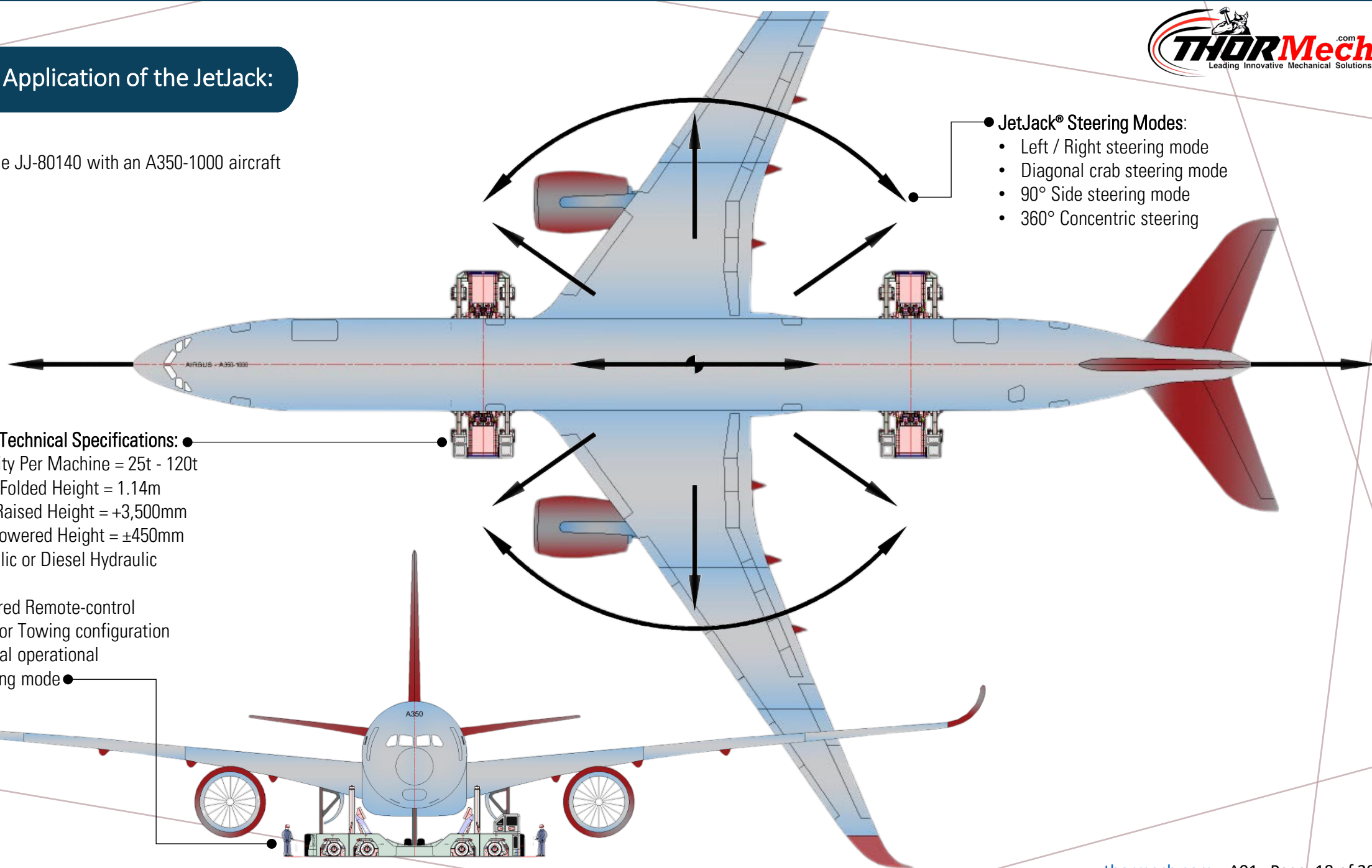
WIDE BODY AIRCRAFT APPLICATION:



Wide Body (WB) Application of the JetJack:

JJ-80140WB:

Sample application of the JJ-80140 with an A350-1000 aircraft



- JetJack® Steering Modes:
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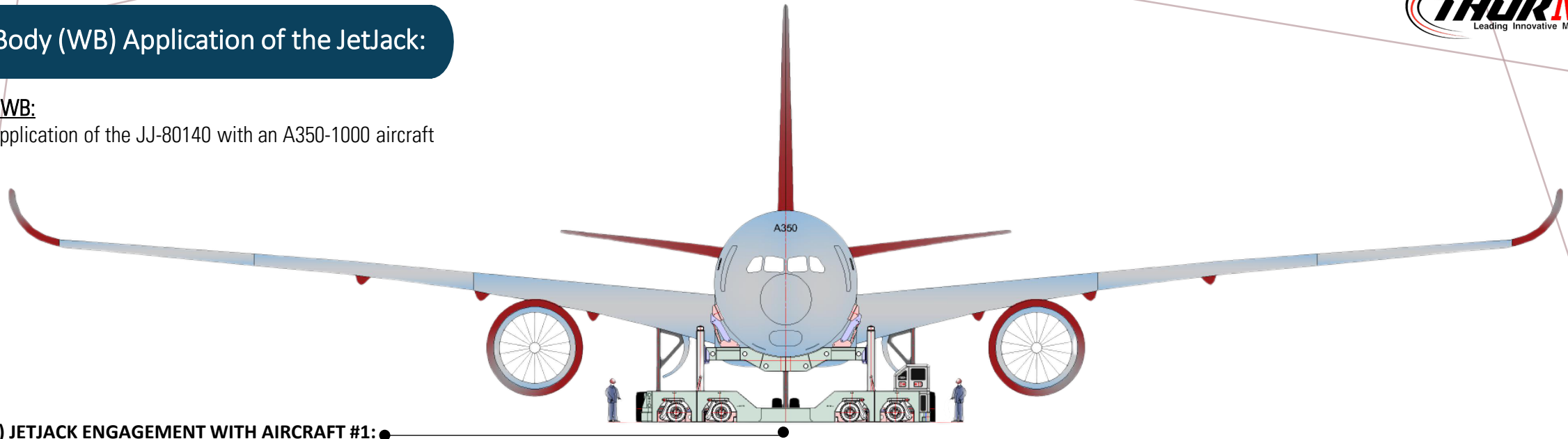
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- PLC Control
- Wireless or wired Remote-control
- Self-propelled or Towing configuration
- Multi-directional operational
- Multiple steering mode

Wide Body (WB) Application of the JetJack:

JJ-80140WB:

Sample application of the JJ-80140 with an A350-1000 aircraft

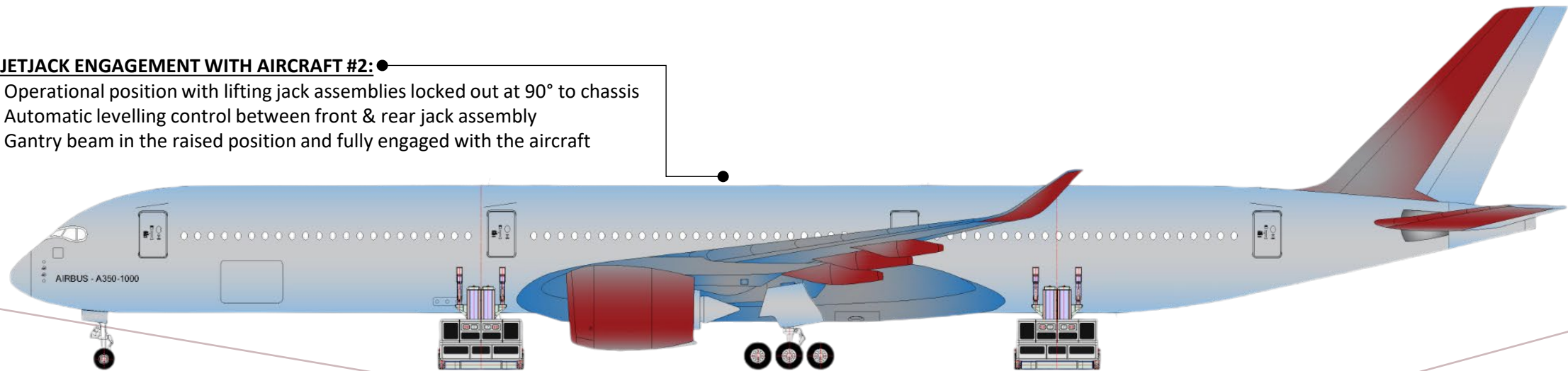


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2) JETJACK ENGAGEMENT WITH AIRCRAFT #2:

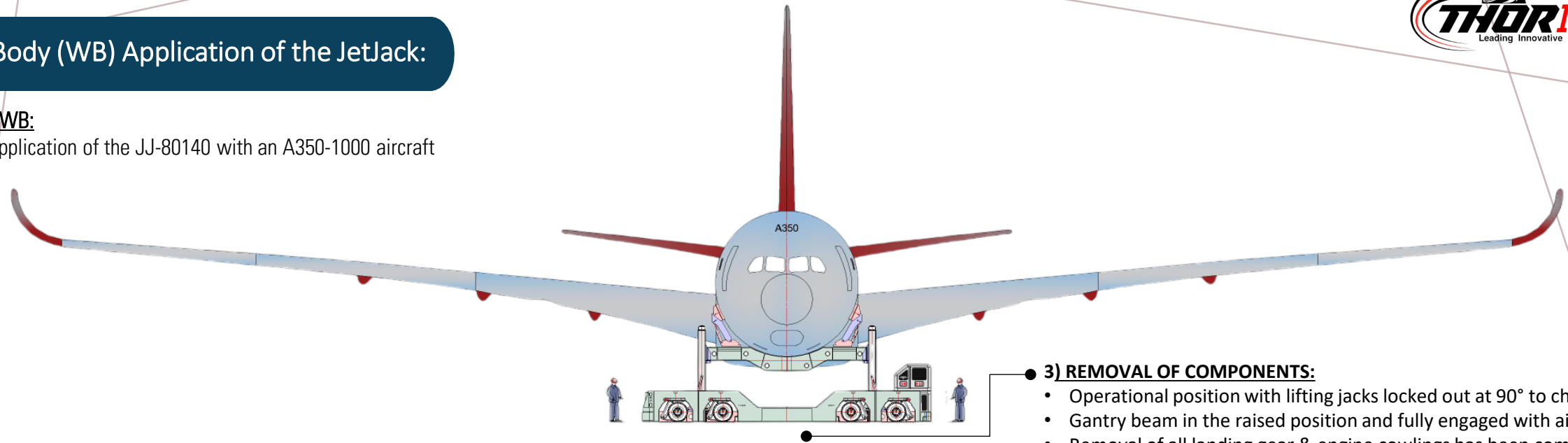
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Sample application of the JJ-80140 with an A350-1000 aircraft

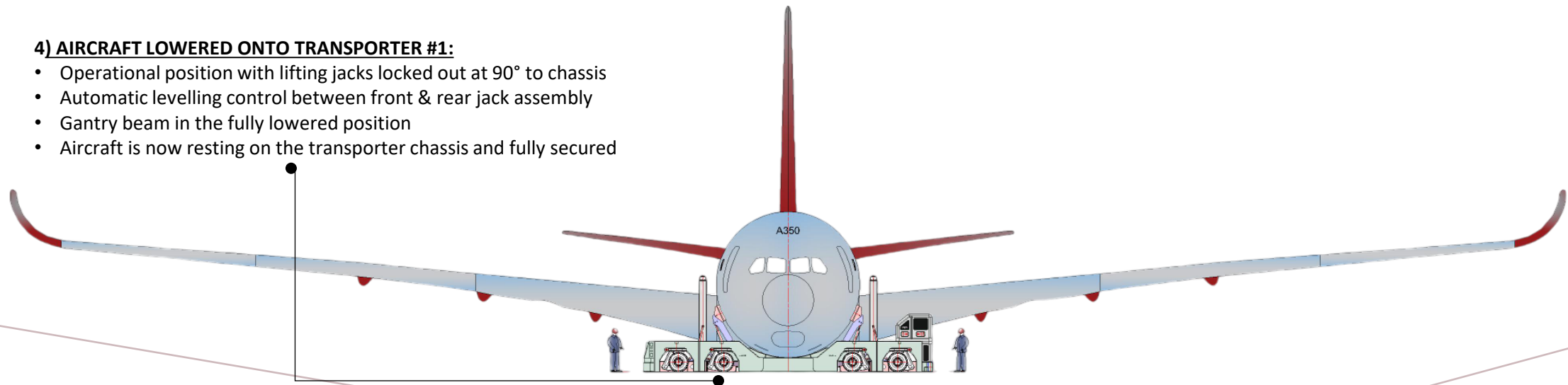


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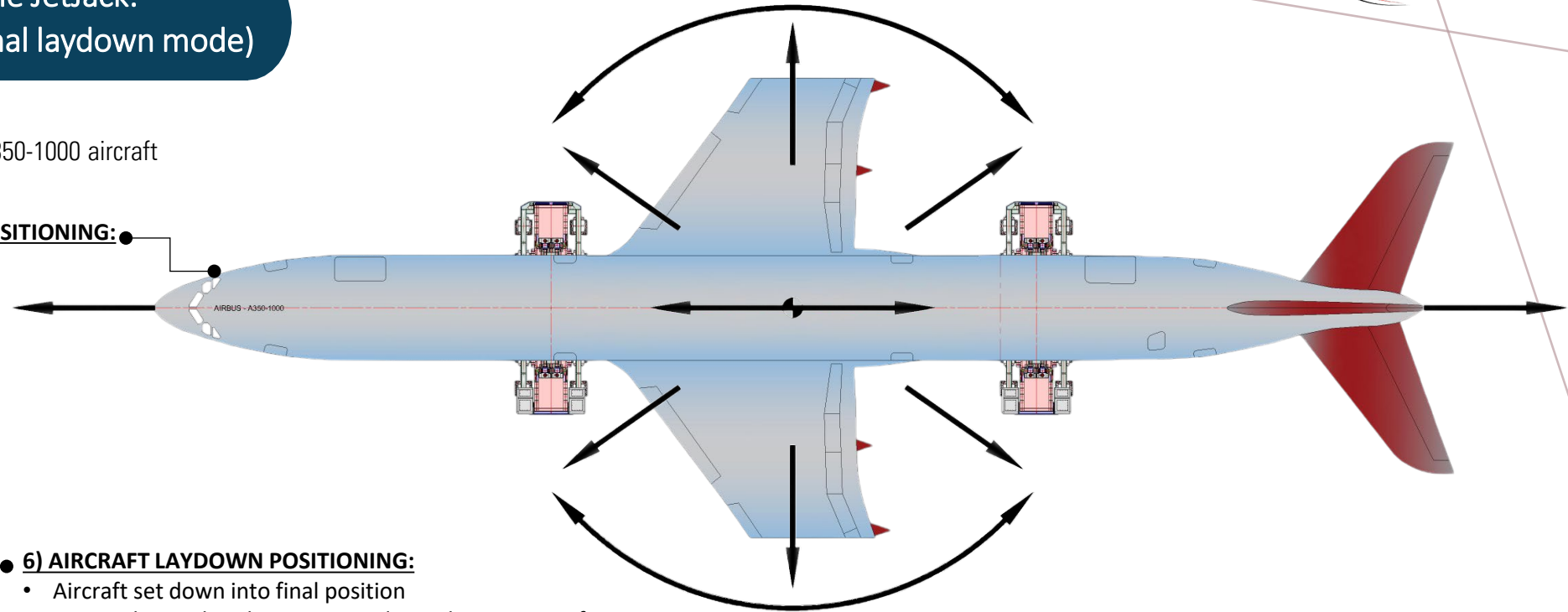
Wide Body (WB) Application of the JetJack: (Transportation mode & directional laydown mode)

JJ-80140WB:

Sample application of the JJ-80140 with an A350-1000 aircraft

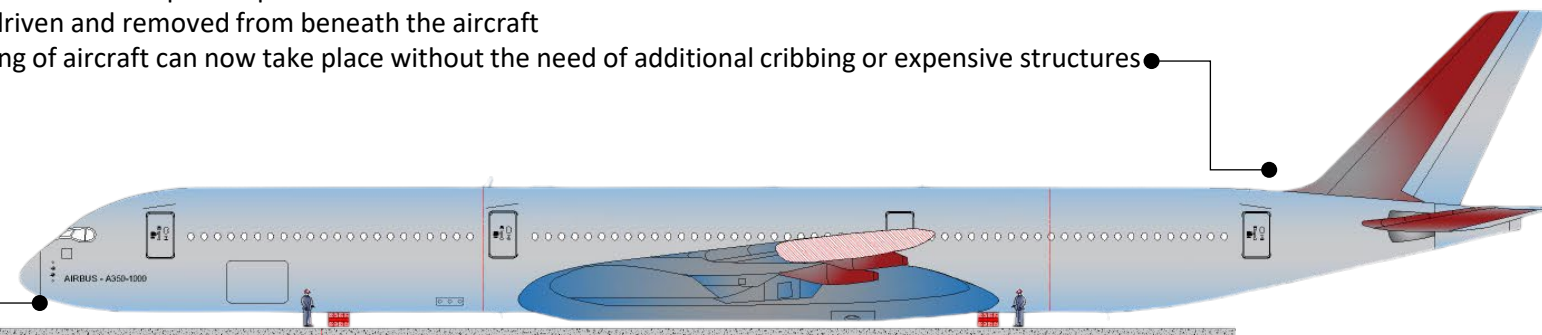
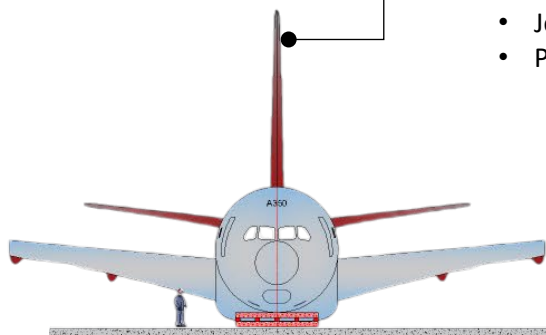
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7) RE-ENGAGEMENT OF AIRCRAFT:

- The JetJack's unique design allows for any payload to be re-engaged multiple times and moved to other locations without the need for any other support equipment (Self driven design)

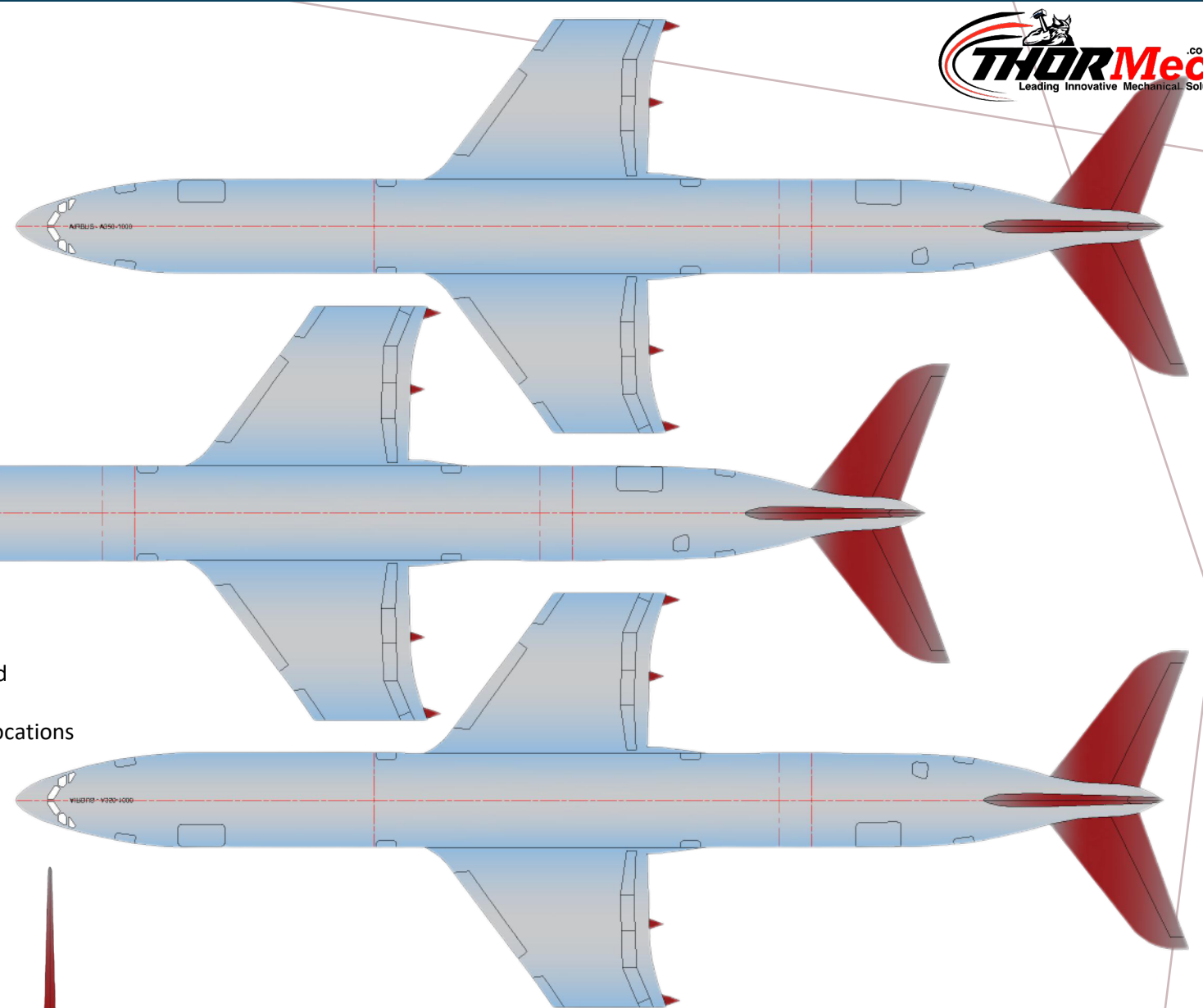
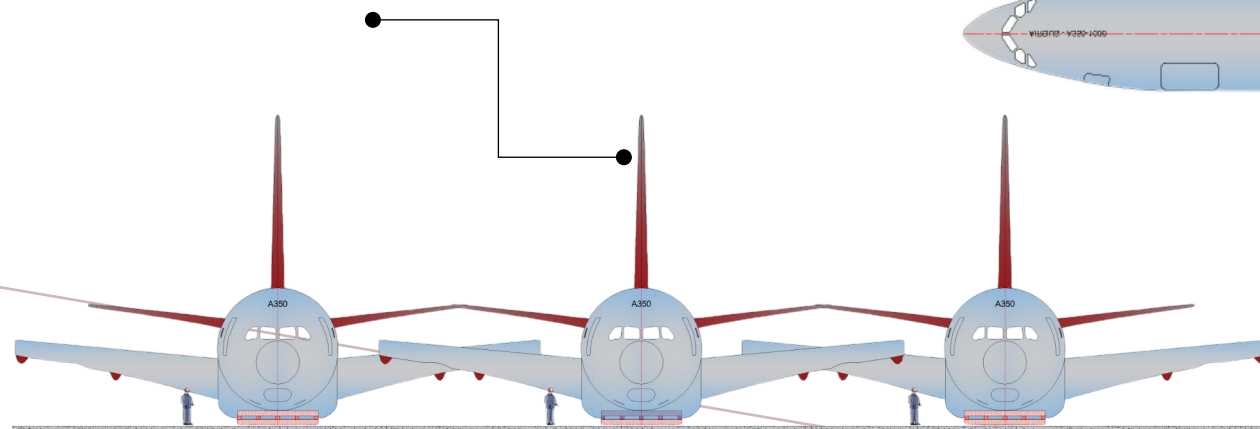
Wide Body (WB) Application of the JetJack: (Laydown patterns & utilisation of space)

JJ-80140WB:

Sample application of the JJ-80140 with an A350-1000 aircraft

8) AIRCRAFT LAYDOWN PATTERN / NESTING:

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MODEL RANGE AVAILABLE:

JetJack Model Range:

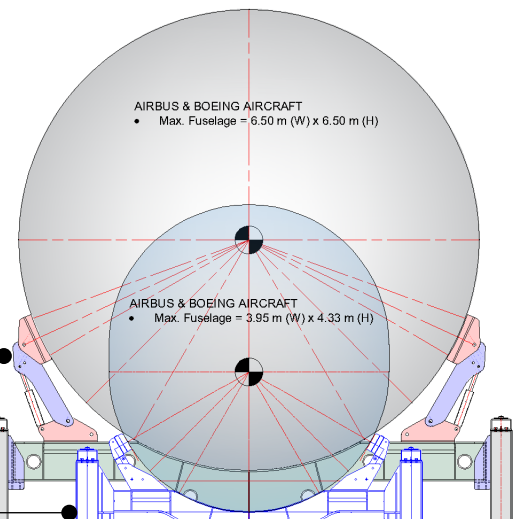
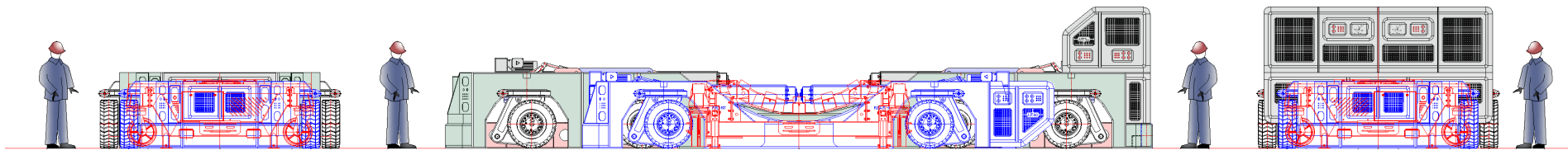
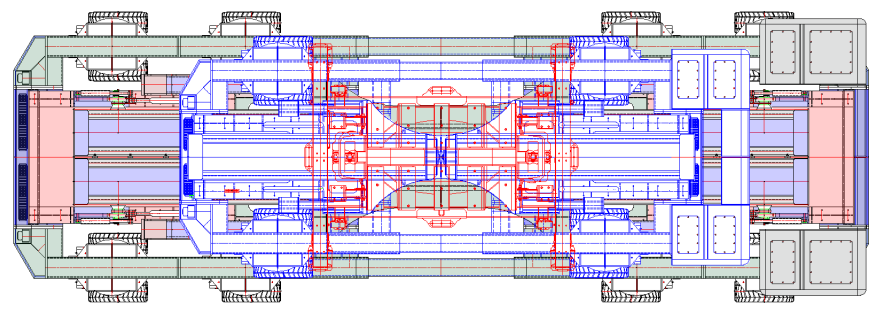
JETJACK® MODEL RANGE:

Table showing capacities per individual machine:

JetJack® Model Sequence:	Model:	Lifting Capacity:	Transport Capacity:	Aircraft Body Type:	Capacity Range:
☞ #1.0	JJ-12.5NB	12.5t	12.5t	Narrow Body	Low Capacity
#1.1	JJ-25NB	25t	25t	Narrow Body	Low Capacity
☞ #2.0	JJ-4040NB	40t	40t	Narrow Body	Medium Capacity
#2.1	JJ-5050NB	50t	50t	Narrow Body	Medium Capacity
☞ #3.0	JJ-80140WB	80t	140t	Wide Body	High Capacity
#3.1	JJ-100140WB	100t	140t	Wide Body	High Capacity
#3.2	JJ-120140WB	120t	140t	Wide Body	High Capacity

- Additional model ranges currently in development

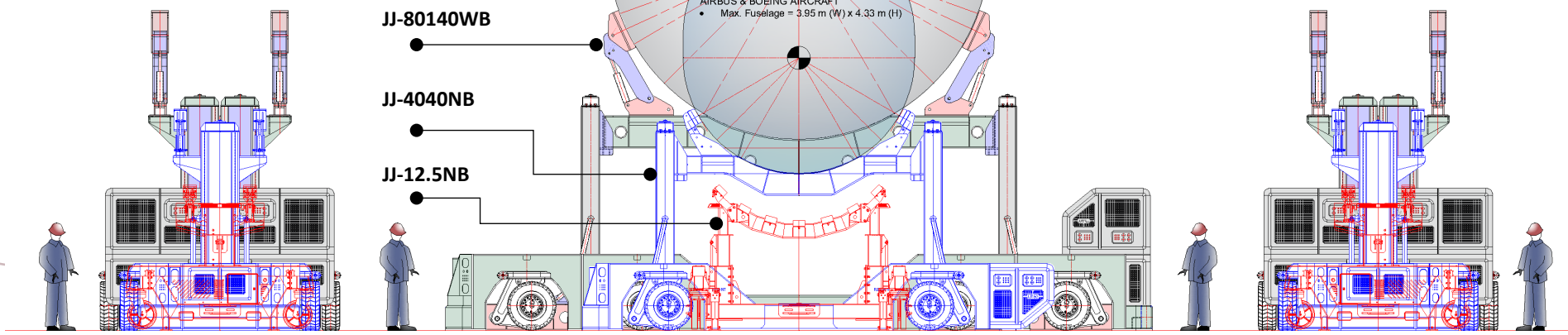
Model size comparison:
JJ-12NB, JJ-4040NB & JJ-80140WB



JJ-80140WB

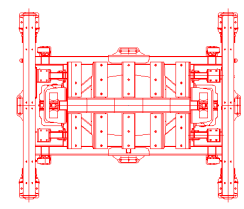
JJ-4040NB

JJ-12.5NB

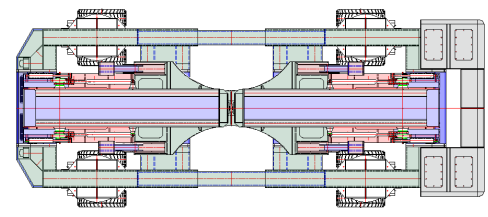


Model size comparison:
JJ-12NB, JJ-4040NB & JJ-80140WB

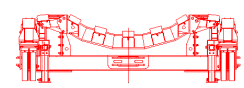
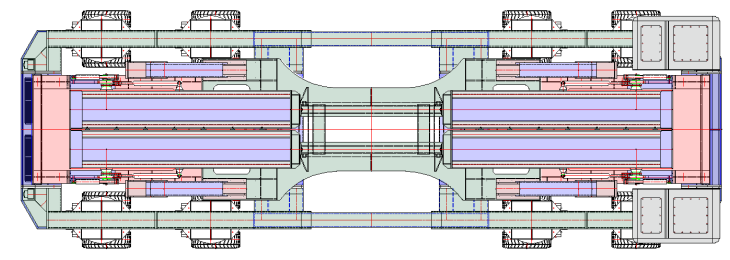
JJ-12.5NB



JJ-4040NB

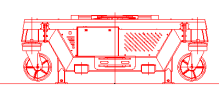
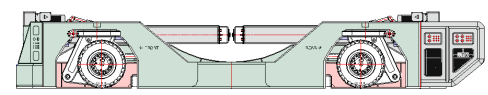


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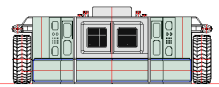


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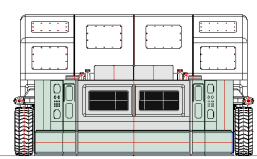
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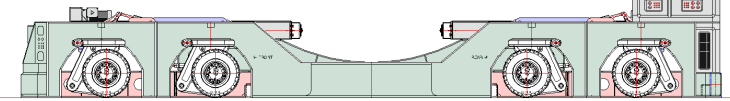
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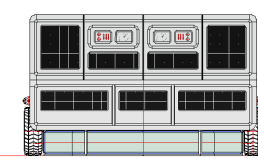
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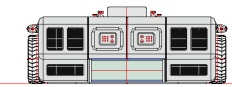
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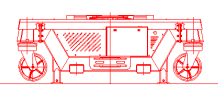
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JJ-80140WB

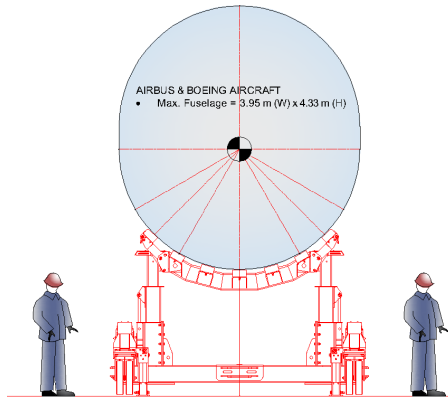


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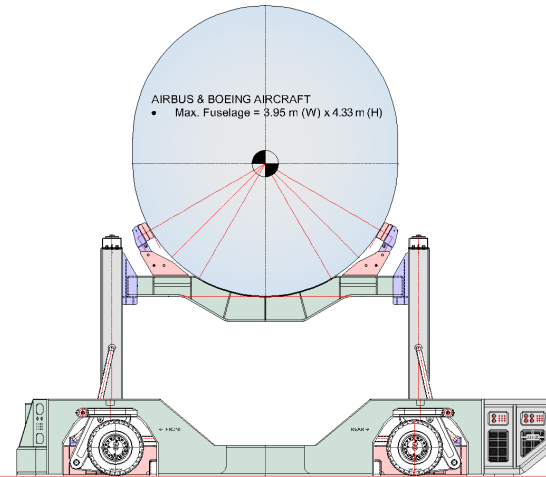


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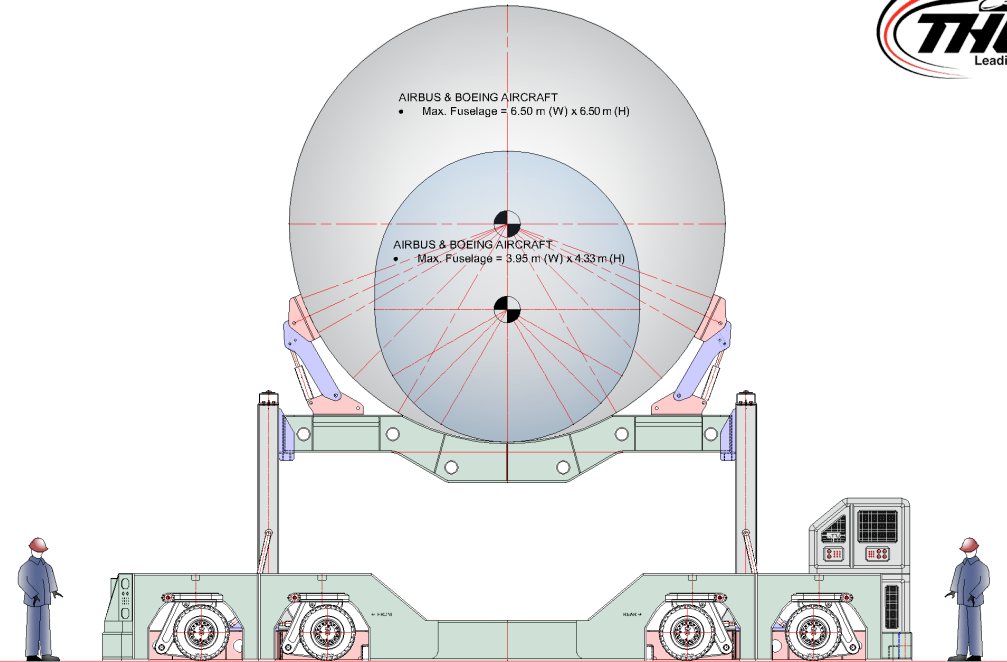
Model size comparison:
JJ-12NB, JJ-4040NB & JJ-80140WB



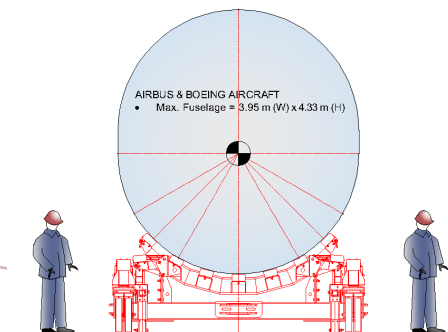
JJ-12.5NB Fully Raised



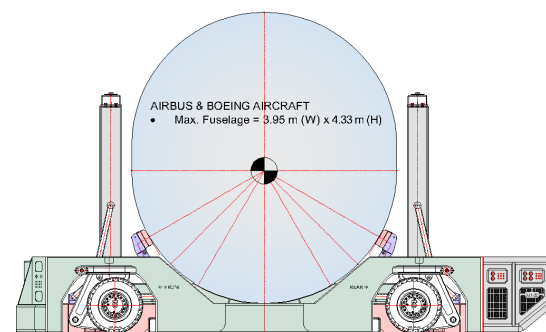
JJ-4040NB Fully Raised



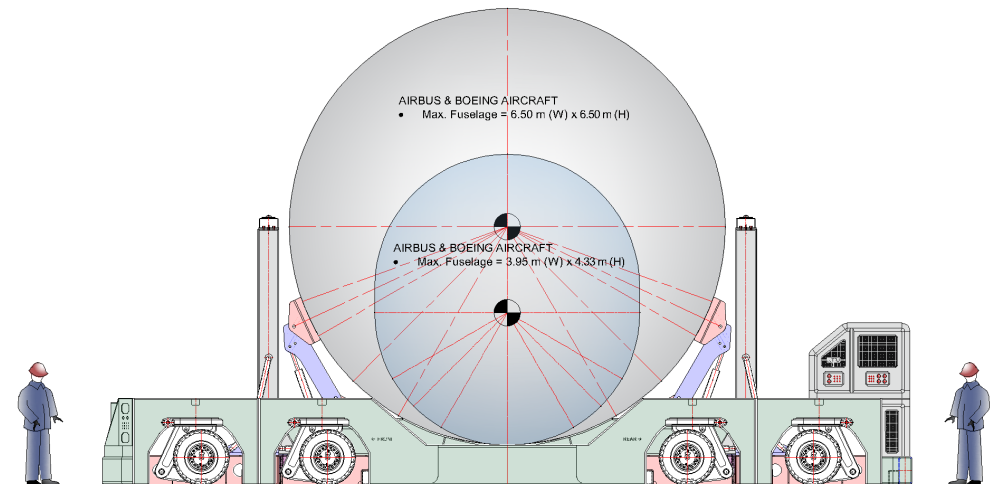
JJ-80140WB Fully Raised



JJ-12.5NB Fully Lowered

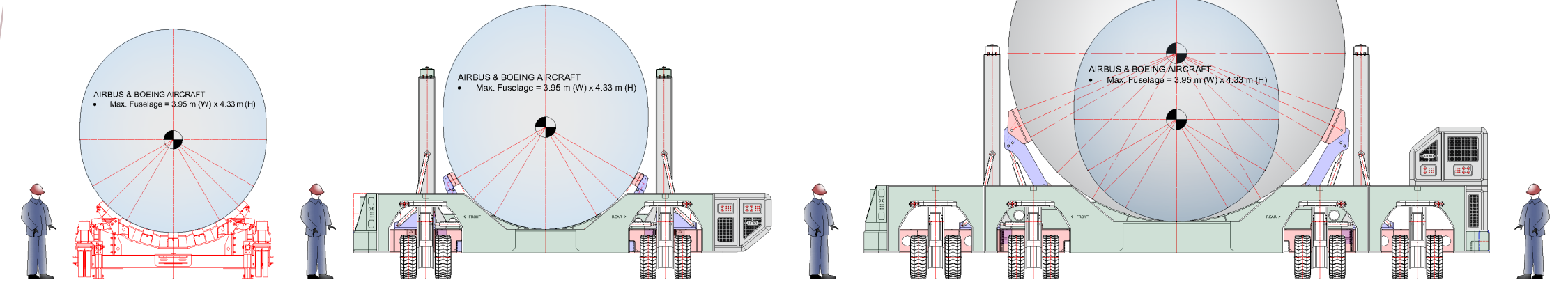


JJ-4040NB Fully Lowered



JJ-80140WB Fully Lowered

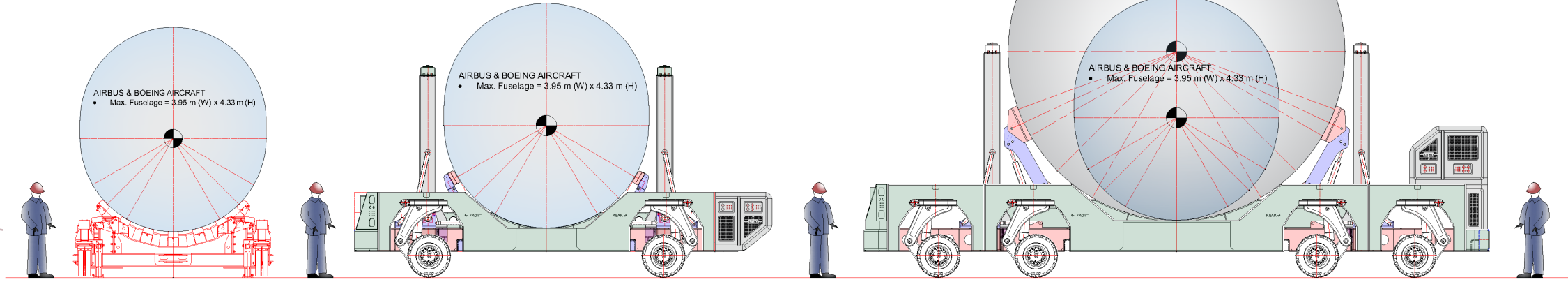
**Model size comparison:
JJ-12NB, JJ-4040NB & JJ-80140WB**



JJ-12.5NB Fully Raised

JJ-4040NB Fully Raised Crab-steering

JJ-80140WB Fully Raised Crab-steering



JJ-12.5NB Fully Lowered

JJ-4040NB Fully Lowered Crab-steering

JJ-80140WB Fully Lowered Crab-steering

THANK YOU

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