

ERGONOMIC CERTIFIED MODERN CRANE OPERATION –

SERVICING LESS

OPERATION DOWNTIME

TOC
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Stephan Stiehler – Brieda Cabins



Ergonomic Certified Crane Operation

- Servicing Less Downtime

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Brieda Cabins

Established 1978

Italian Design and Manufacturing

Worldwide in Operation



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Brieda Cabins Production in Italy



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The rise of containerisation drives the need to improve the general design and technology of the cabins to overall impact on safety. New challenges for ports and terminals will concern the health and safety of their operators.

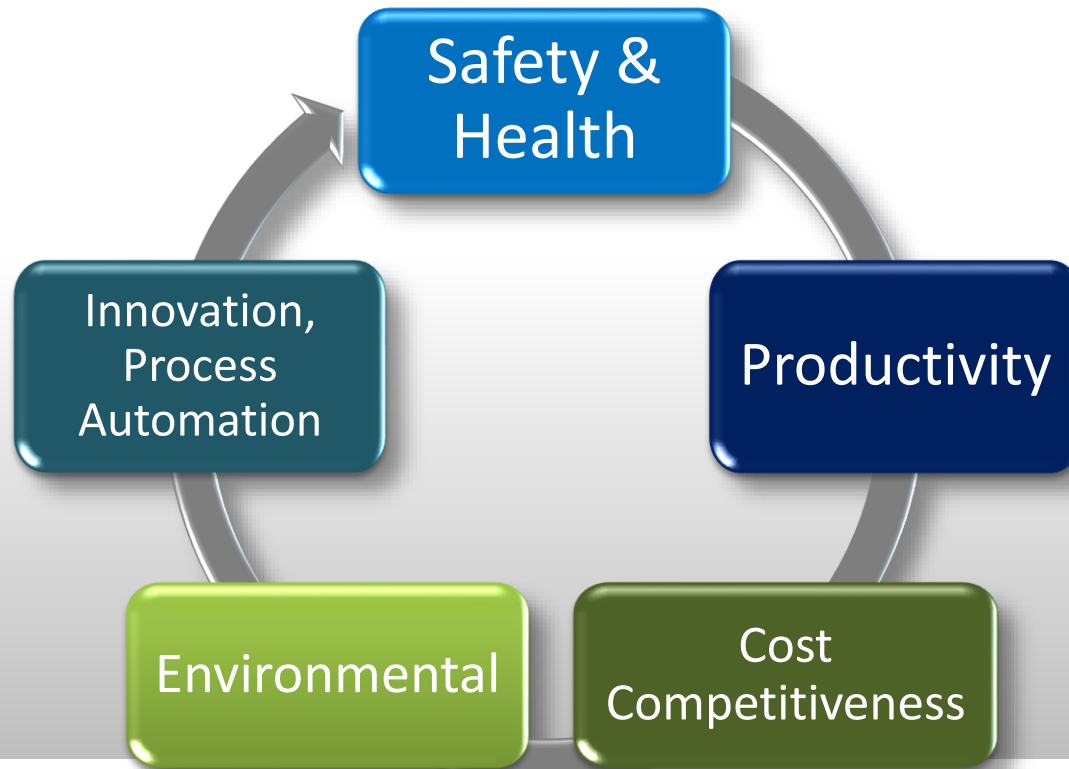
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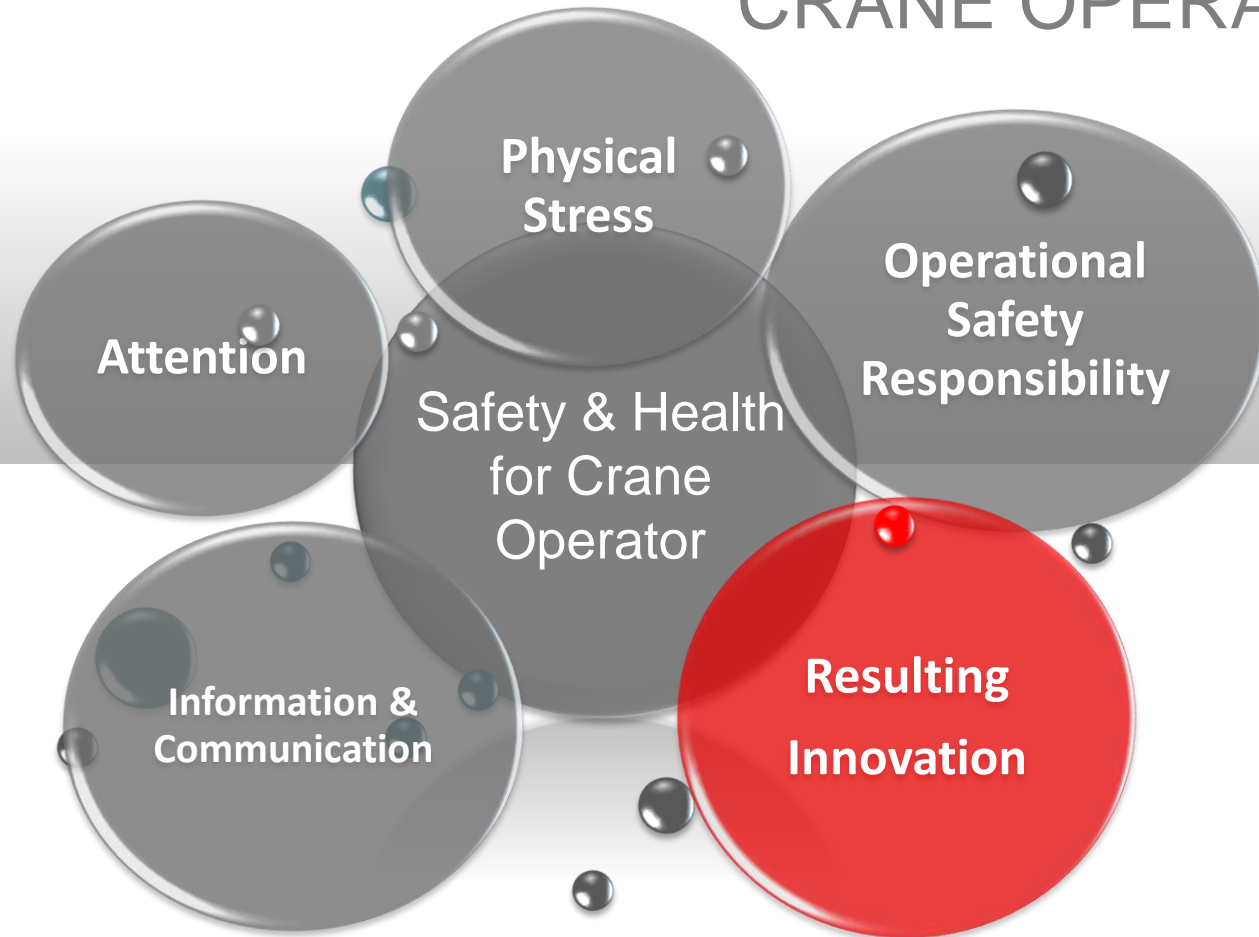
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OPERATIONAL PROCESS



CHALLENGES OF TODAY'S CRANE OPERATOR



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ERGONOMIC CERTIFIED MODERN CRANE OPERATION

Biomechanical Analysis, Opportunities in Driver Cabins & Remote Control



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A large, dark-colored industrial cab, likely from a crane or excavator, is shown suspended in the air. The cab is rectangular with a glass window and a metal railing. It is positioned in the center-right of the frame. To the left, a yellow mechanical component, possibly a hook or part of a crane, is visible. The background is a bright, cloudy sky. The overall scene suggests a construction or industrial setting.

BRIEF HISTORY - SIMPLE PAST

INITIAL CAB DESIGN FOCUSED ALMOST ENTIRELY ON THE MECHANICAL STRUCTURE AND SIMPLE CONTROL LAYOUT, WITH LITTLE REFERENCE TO THE DRIVER.

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WRONG
WRONG POSTURES ADOPTED BY CRANE OPERATORS
DRIVES FROM IMPROPER CABIN & CONTROL STATION
DESIGN. SIGNIFICANTLY AFFECT WELLBEING & SAFETY.



SYNOPSIS

OF SCIENTIFIC RESEARCH ON KEY ISSUES

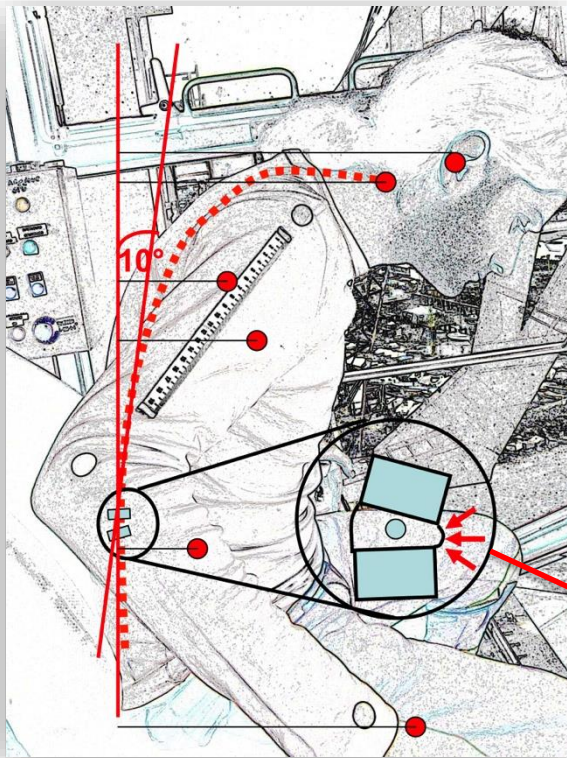
HOW TO DO

OF TO IMPROVE THE WORKING CONDITIONS OF THE OPERATORS AND CABIN LAYOUT.

Research according to EUROPEAN STANDARDS EN 1005-3/4/5

- ✓ MAKE AN OBJECTIVE BIOMECHANICAL RESEARCH ON DIFFERENT APPLICATIONS AND ENVIRONMENTS.
- ✓ TRANSFER INFORMATION IN A LAB CABIN.
- ✓ FROM THE RECORDED DATA, DEVELOP A NEW PRODUCT.

BIOMECHANICAL ANALYSIS



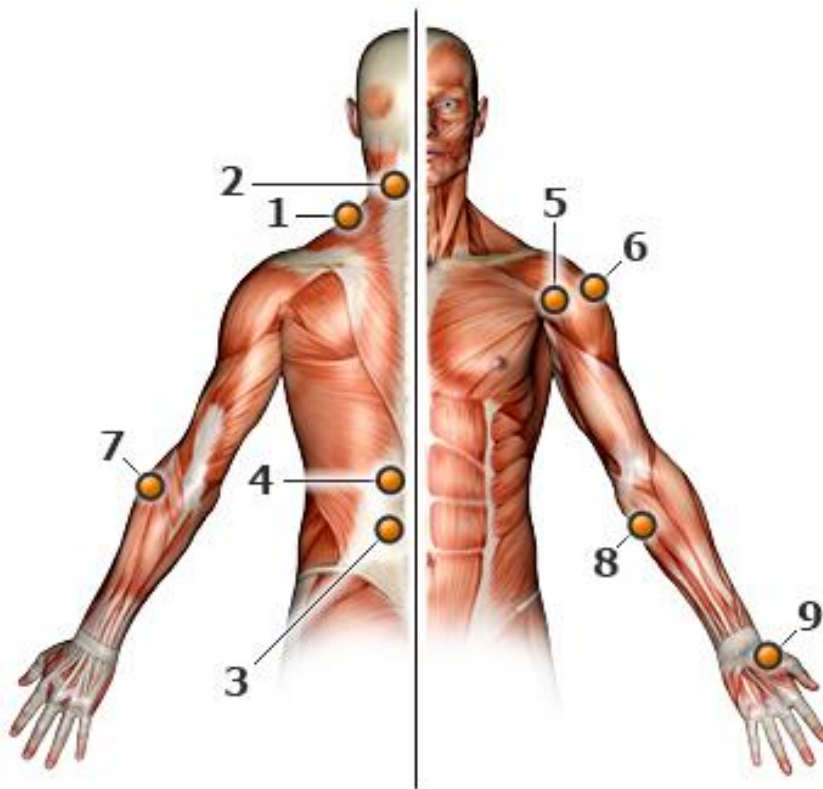
LUMBAR REGION

L3 DISC LOAD ESTIMATION
BACK-LUMBAR FLEXION: 10°

Lumbar disk load value:

250 Kg

BIOMECHANICAL ANALYSIS USE OF ELECTROMYOGRAPH



Positioning of the sensors:

- 1) UPPER TRAPEZIUS
- 2) CERVICAL SPINAL ERECTORS
- 3) LOW LUMBAR SPINAL ERECTORS
- 4) HIGH LUMBAR SPINAL ERECTOR
- 5) FRONT DELTOID
- 6) MIDDLE DELTOID
- 7) FINGERS EXTENSORS
- 8) FINGERS FLEXORS
- 9) THUMB ADDUCTOR

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BIOMECHANICAL ANALYSIS
APPLYING ON OPERATOR SENSOR FOR THE STUDY
OF MUSCULAR STRESS

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BIOMECHANICAL ANALYSIS

TEST LABIN-CAB WITH DIFFERENT CONTROL STATIONS

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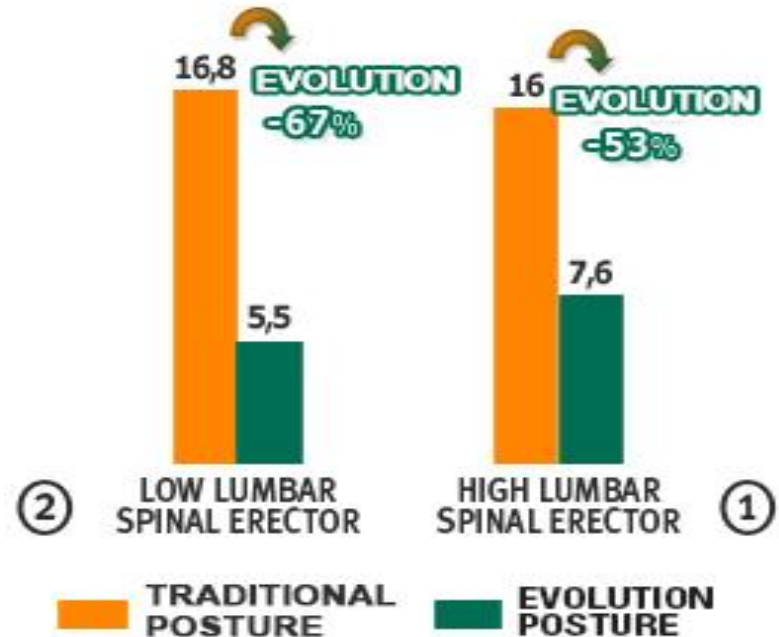
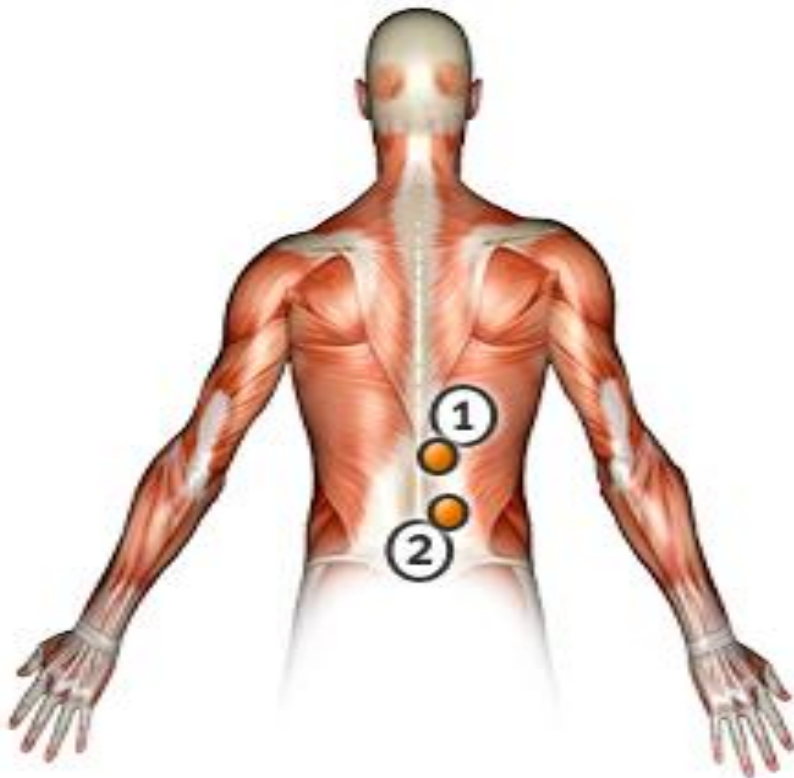
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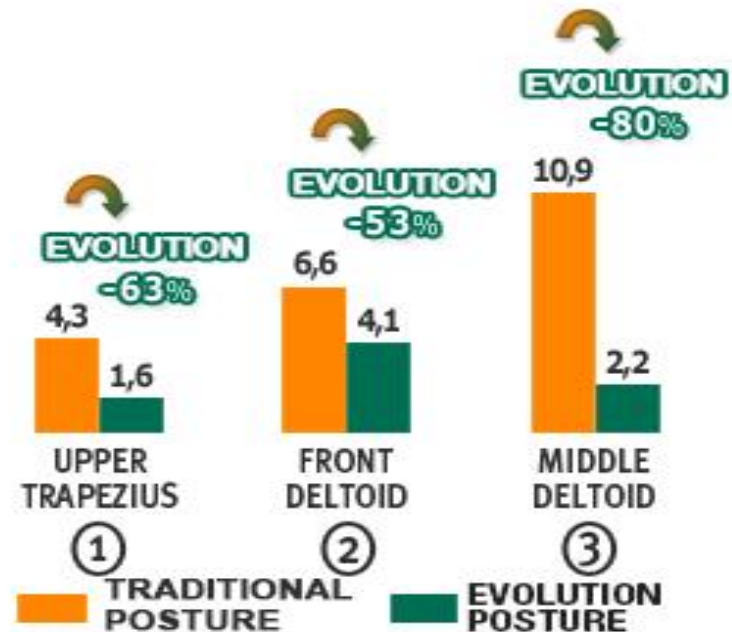
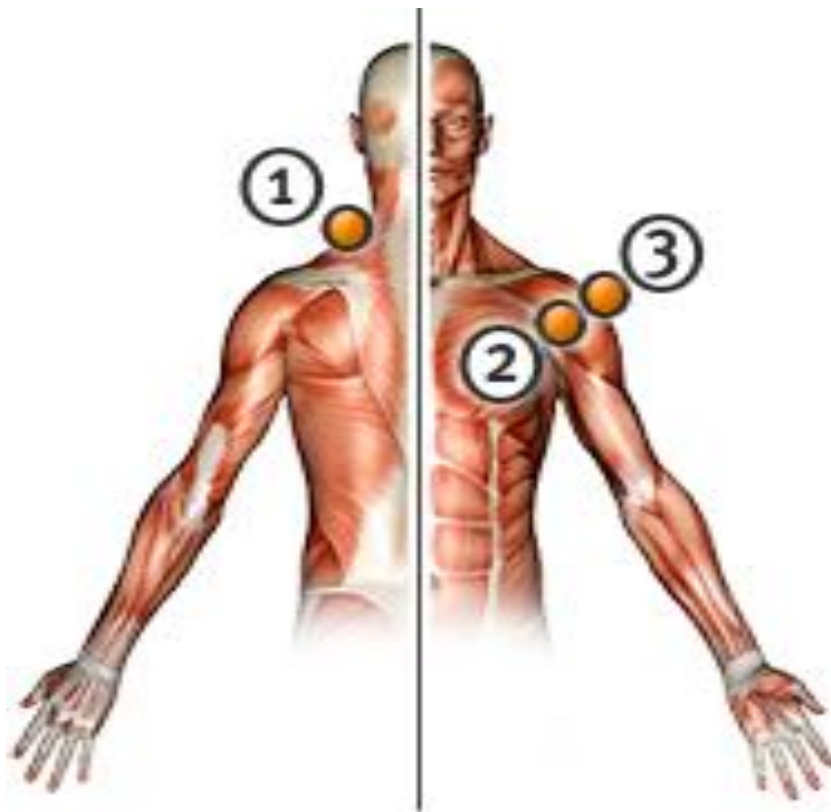
BIOMECHANICAL ANALYSIS

TREND OF THE LUMBAR MUSCULAR LOAD
IN THE TWO COMPARED MODELS OF WORKING POSTURE.



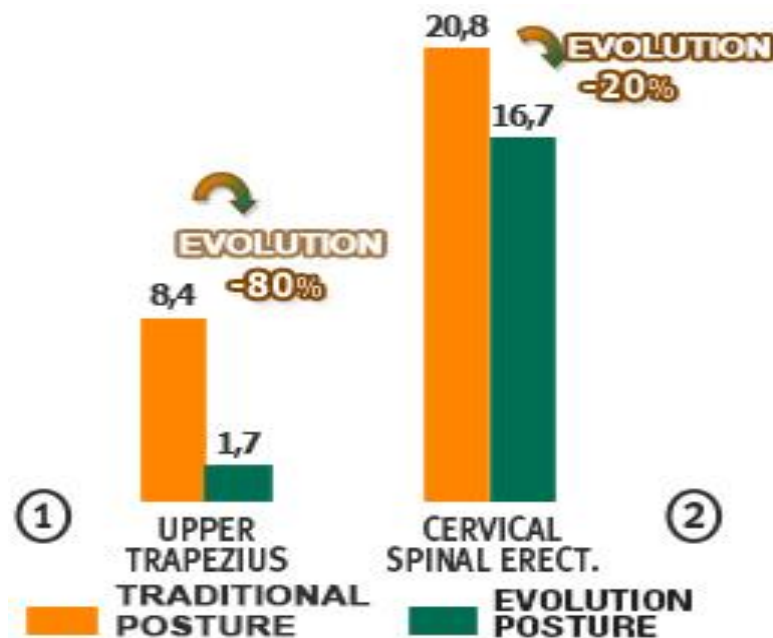
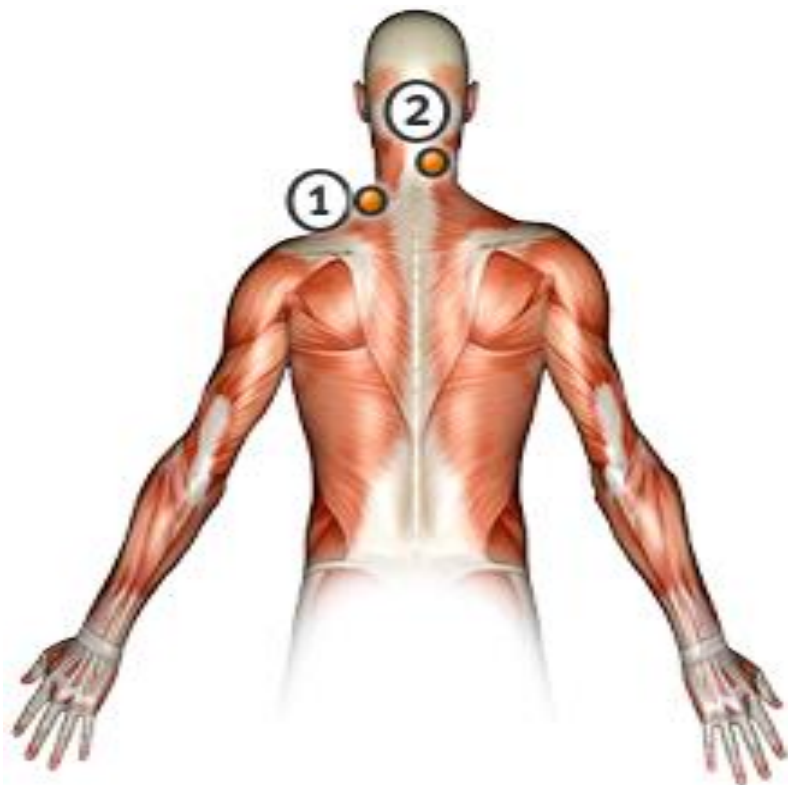
BIOMECHANICAL ANALYSIS

TREND OF THE ARM MUSCULAR LOAD
IN THE TWO COMPARED MODELS OF WORKING POSTURE.










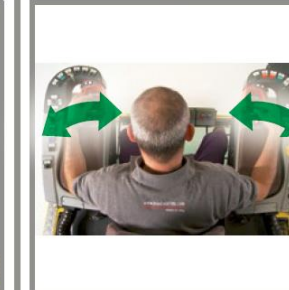
BIOMECHANICAL ANALYSIS

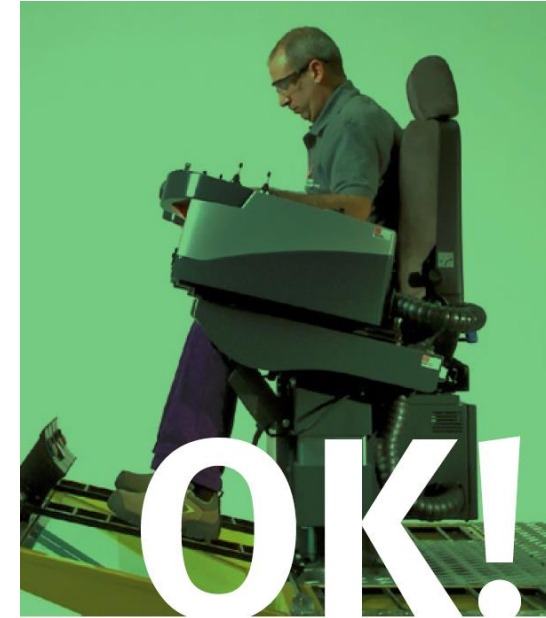
TREND OF THE NECK MUSCULAR LOAD
IN THE TWO COMPARED MODELS OF WORKING POSTURE.



Dynamic Crane Operator Control Station – DYCS

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<p>1</p> <p>Rotation lock</p> 	<p>2</p> <p>Seat adjustment</p> 	<p>3</p> <p>Seat backrest adjustment</p> 	<p>4</p> <p>Height adjustment</p> 
<p>5</p> <p>Side box tilting</p> 	<p>6</p> <p>Side box height</p> 	<p>7</p> <p>Side box forward/backward</p> 	<p>8</p> <p>Side box opening angle</p> 



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Dynamic Crane Operator Control Station – DYCS

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Joystick use



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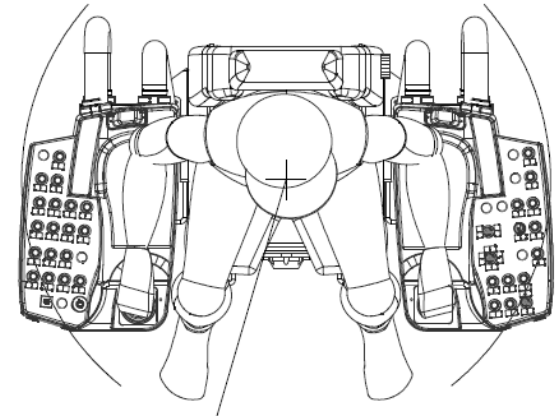
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Dynamic Crane Operator Control Station – DYCS

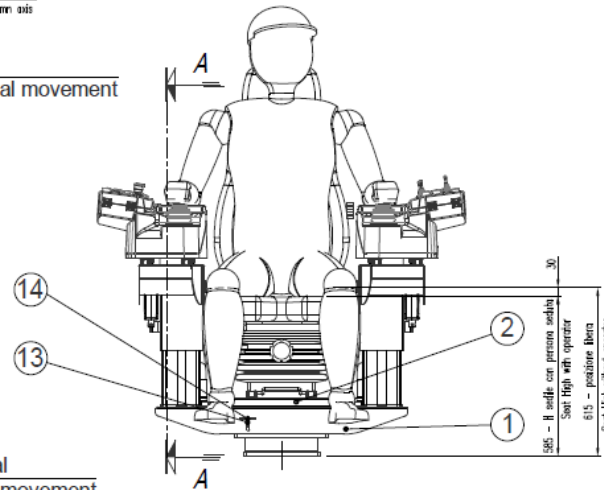
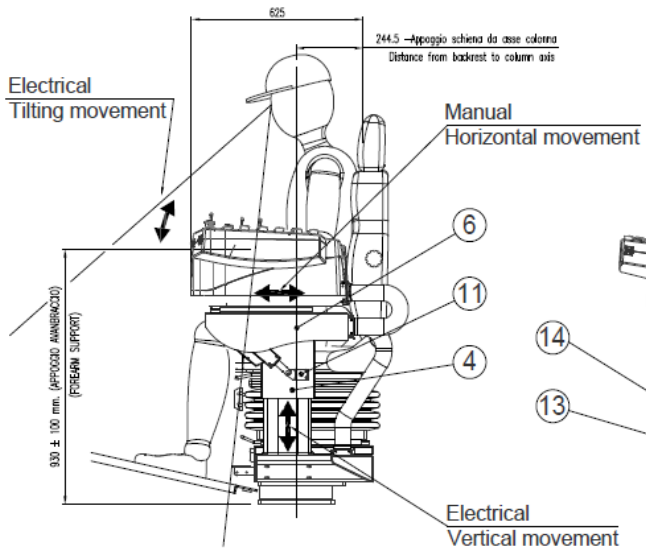
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TOP VIEW

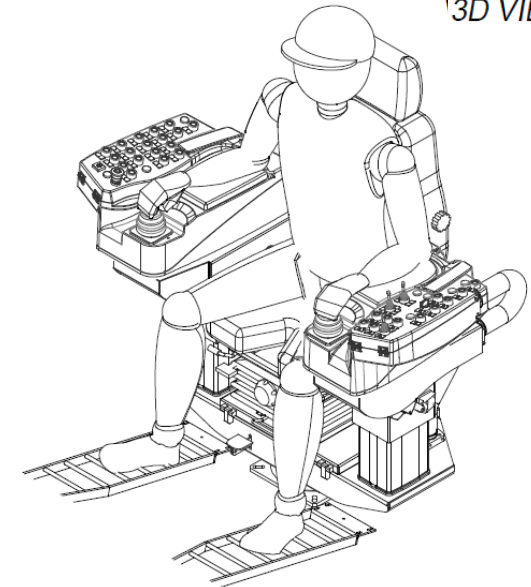


VISTA LATERALE / LATERAL VIEW
POSIZIONE CENTRALE / CENTRAL POSITION

VISTA FRONTALE / FRONTAL VIEW



3D VIEW



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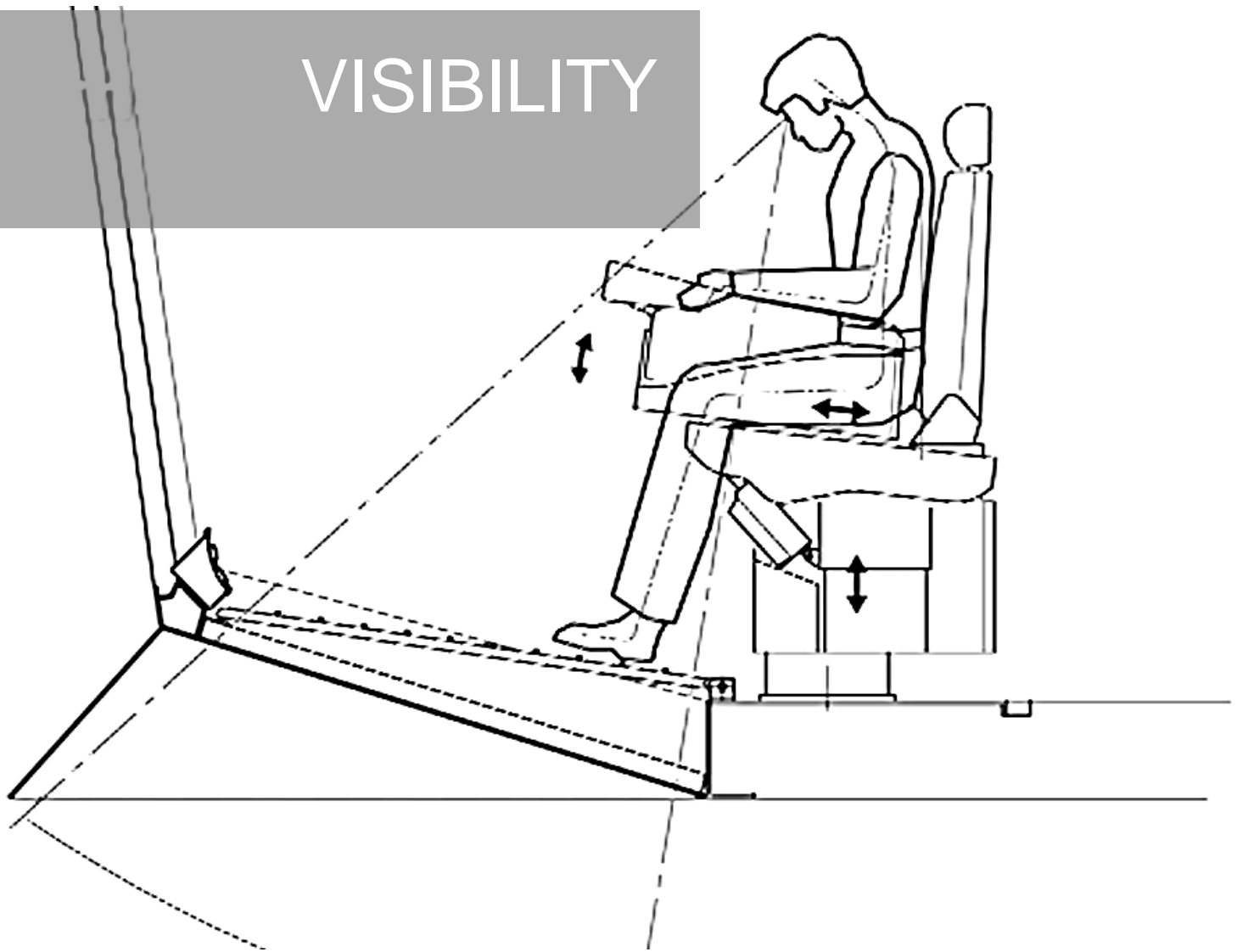


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VISIBILITY



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EXCELLENT FUNCTIONAL LAYOUT

INCREASED VISUAL CONTROL OF ALL MAIN
INFORMATION



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DYNAMIC REMOTE DESK

FOR CRANE CONTROL

TREND



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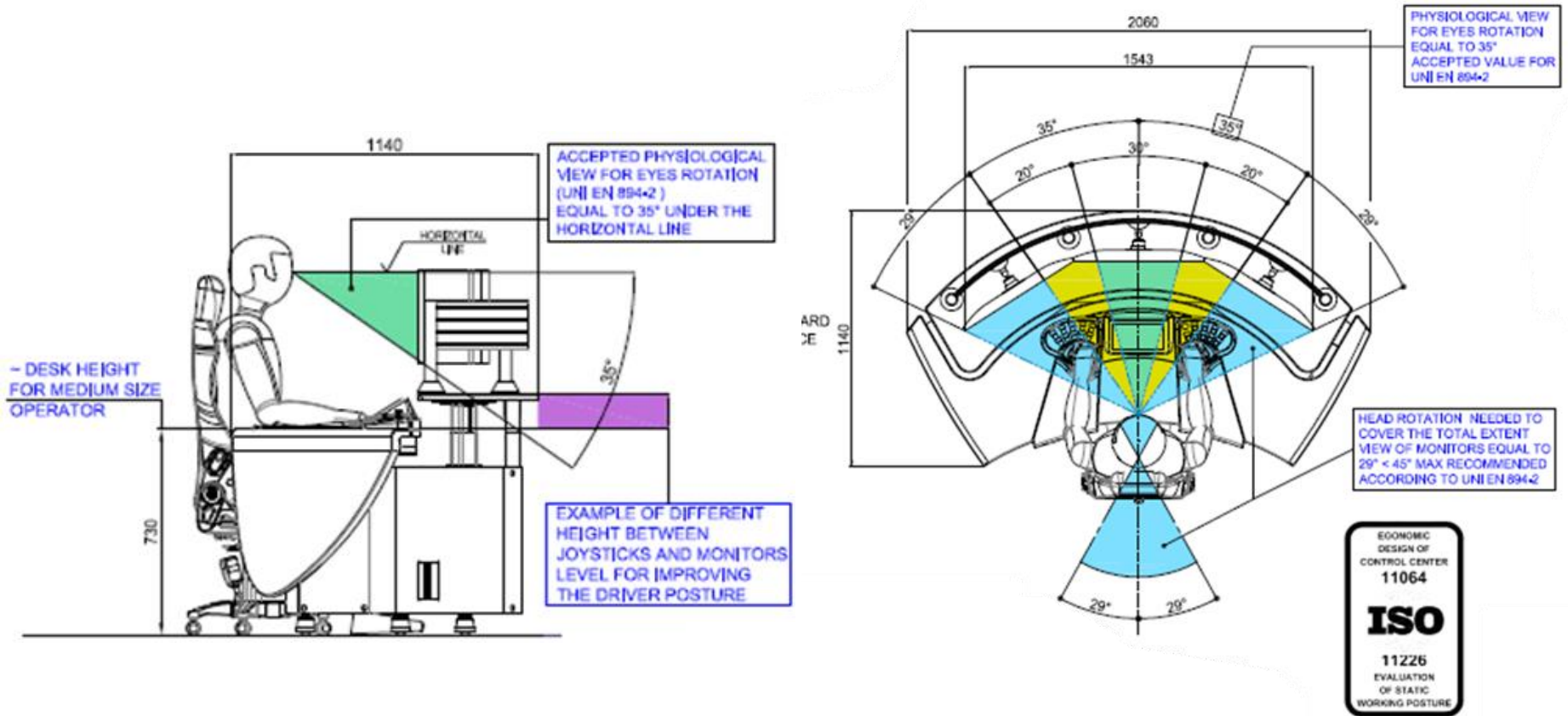
DEVELOPMENT OF DESK

BASED ON THE ERGONOMIC & BIOMECHANICAL STUDY

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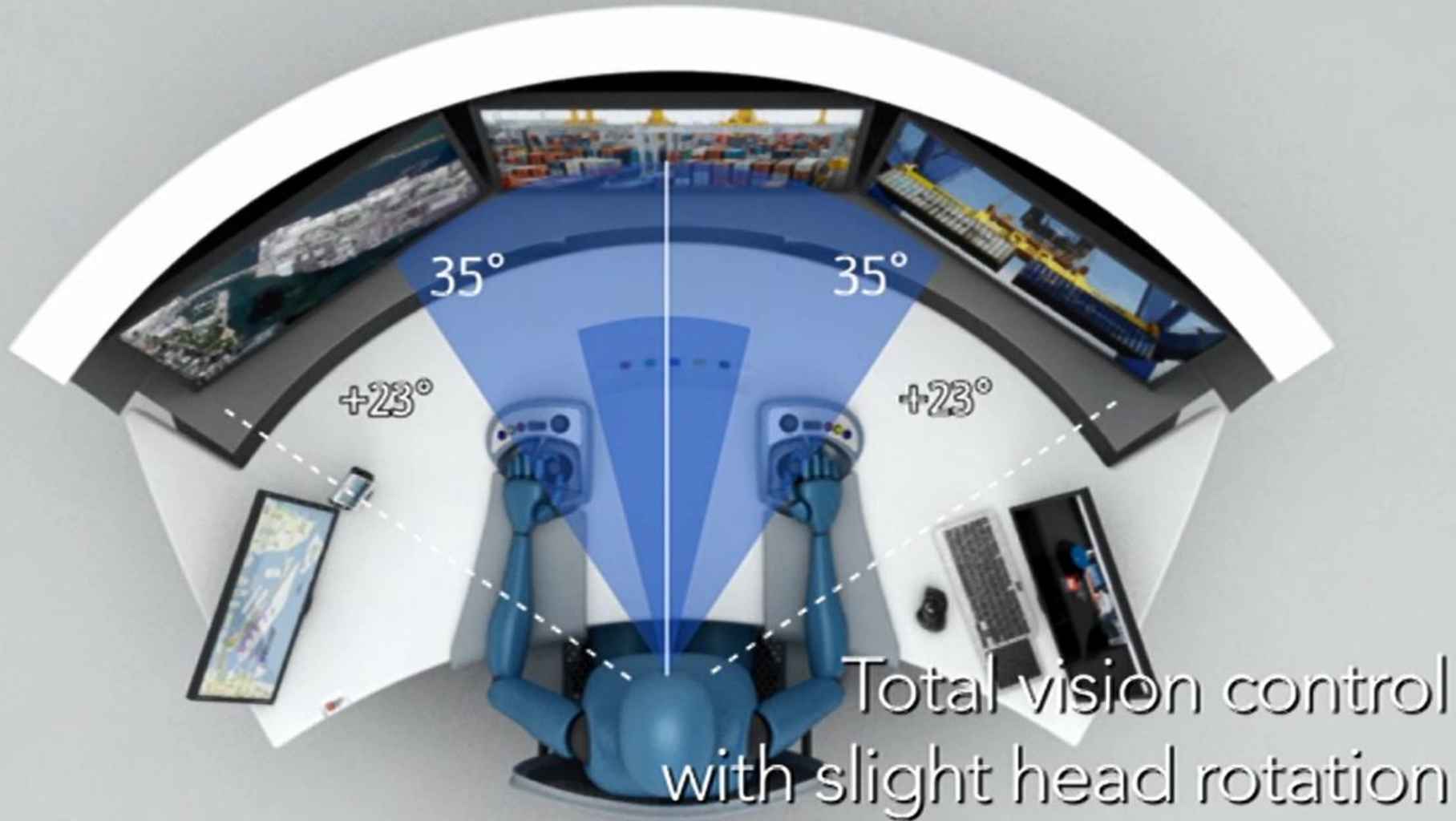
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Dynamic Control Desk

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Dynamic Remote Desk



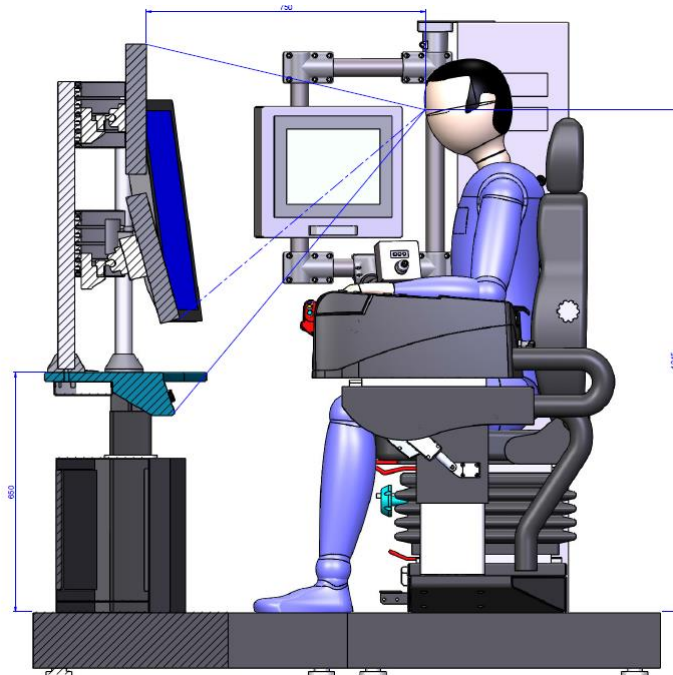
Free multiple desks' configuration



Innovation at Crane Operation

REMOTE GROUND CONTROL STATION FOR CRANE CONTROL

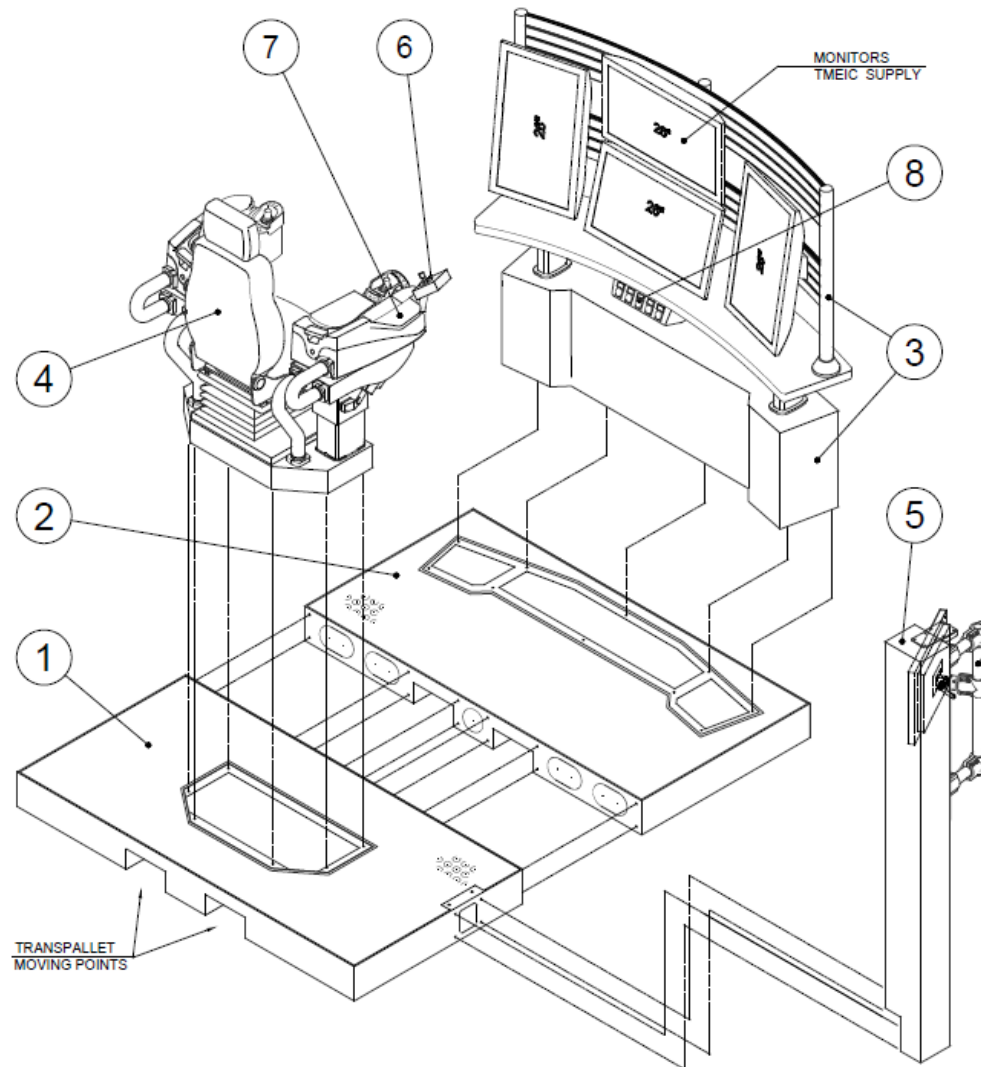
NEW INNOVATION



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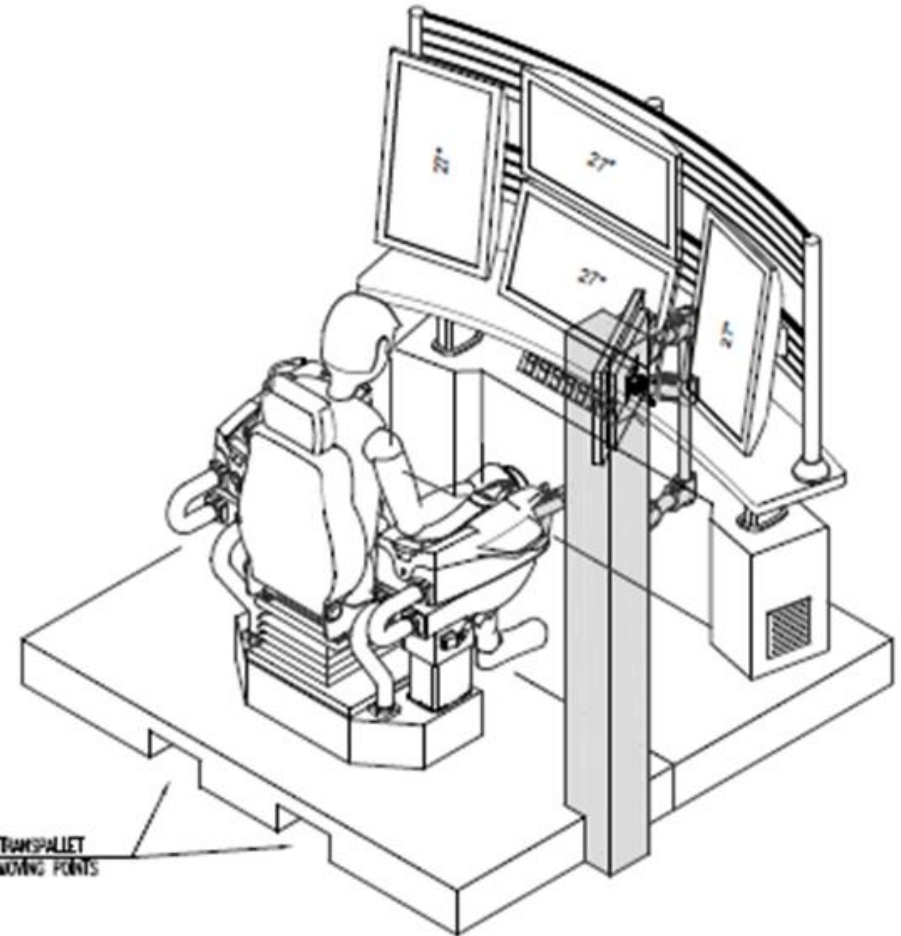
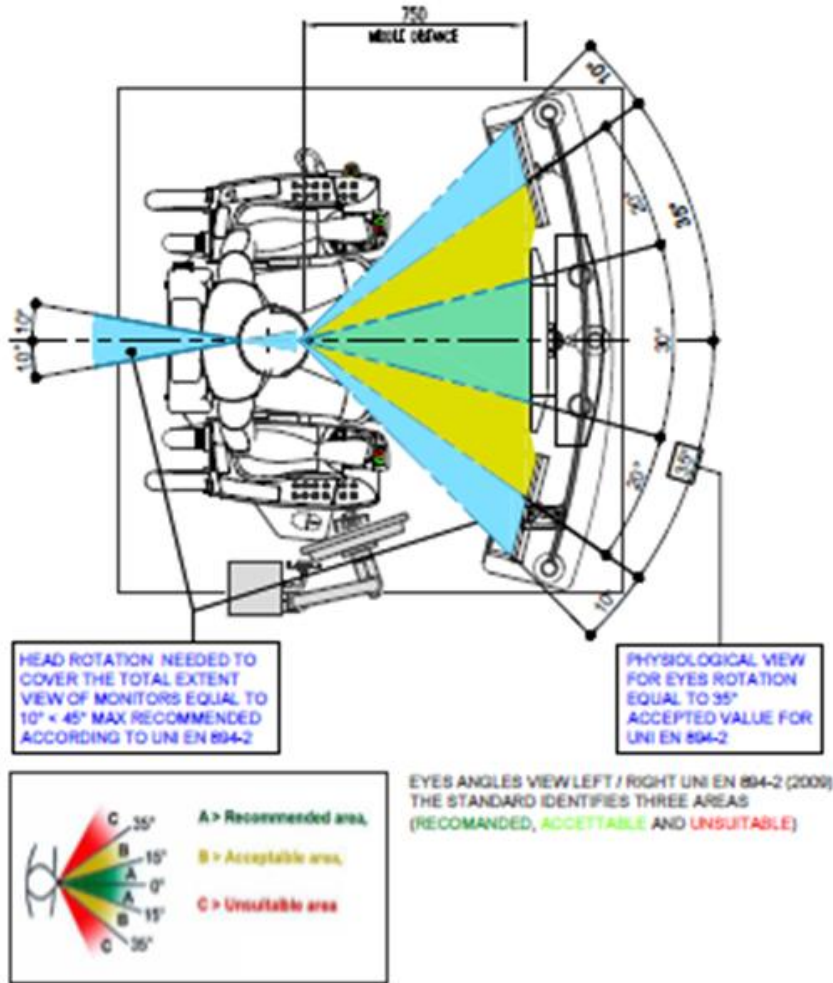
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ERGONOMIC
DESIGN OF
CONTROL CENTRES



EVALUATION
OF STATIC
WORKING POSTURE

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ISO CERTIFICATION

DYCS – DYNAMIC CONTROL STATION
& REMOTE CONTROL DESK



ISO proof report referred to computerised analysis of motion and made by ERGOCERT a spin-off of the University of Udine and an accredited ergonomic laboratory for Ergonomic Certification.



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ISO proof report referred to computerised analysis of motion and posture finalised with an Ergonomic Certification made by ERGOCERT on the

DYCS – Dynamic Crane Control Station based on following ISO Standards:

UNI EN 1005-3
ISO 11226/ UNI EN 1005-4
ISO 11228-3/ UNI EN 1005-5
UNI EN 1335-1

R-DYCD – Remote Control Desk based on following ISO Standards:

UNI EN ISO 14738
UNI EN 894-2
ISO 11226/ UNI EN 1005-4
ISO 11228-3/ UNI EN 1005-5
ISO 11064-4



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brieda cabins
dynamic project team

**For more information:
Please visit us at booth D12**

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THANK YOU

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Ship to Shore
Container Cranes
Ship Unloader

Intermodal
R.T.G.
R.M.G.

Mobile
Harbour Crane
Offshore Crane

Shipyards
Jib Crane

Stacker
Reclaimer

Overhead Cranes
Steel Mill Plants
General Industries

Control Station
Special Seat
DYCS

Crane
Remote
Desk