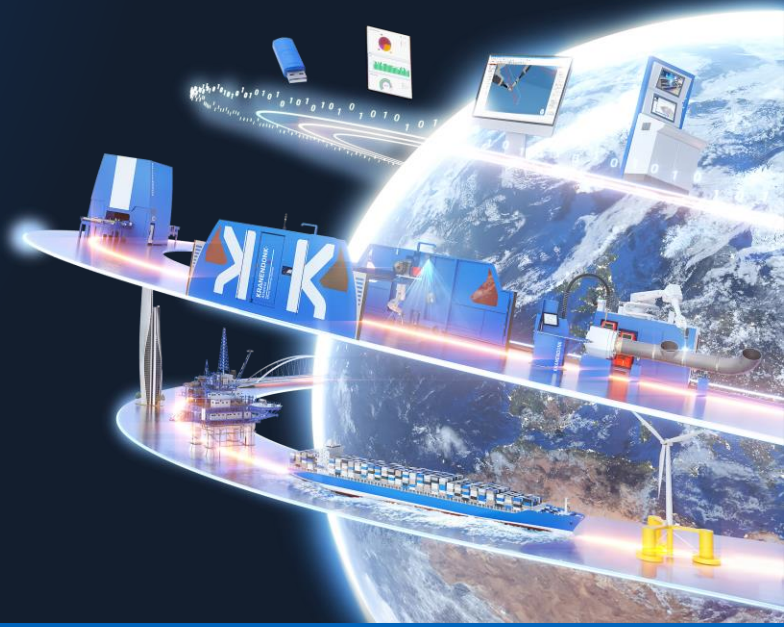
Enhancing Production Through Smart Robotic Automation

February 26th, 2025

NSRP

NATIONAL SHIPBUILDING RESEARCH PROGRAM™

Taking Shipbuilding and Repair to the Next Level



Agenda

- Short introduction, about Kranendonk
- RinasWeld 3D CAD automatic generating welding programs
- Welding and cutting solutions
- New development: Cobot automated welding with RinasWeld
- NSRP cooperation, test and training in NSRP centre(s)

About KRANENDONK

✓ **Over 40 Years of Expertise**
Proven experience in industrial automation

✓ **75 Highly Skilled Engineers**
A team of experts driving engineering excellence

✓ **Complete Solutions**
From consulting to support, we cover every stage

✓ **Global Presence**
Delivering solutions to industries worldwide

Goliath - World's Largest Welding Gantry

Artemis Micro Welding Gantry

Facilities at HQ Tiel

Established in 2016 and expanded in 2018, our HQ includes in-house engineering, assembly, testing, an R&D department, and a dedicated Academy and Training Center.

‘Think Global, Act Local’

Sales & Support Office:
KRANENDONK Japan
KRANENDONK Singapore

Sales Office:
KRANENDONK China

Headquarter:
KRANENDONK Netherlands

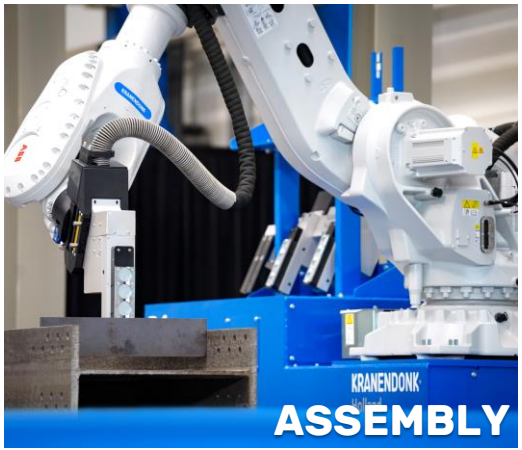
Software Development:
KRANENDONK Denmark

Support Office:
KRANENDONK USA

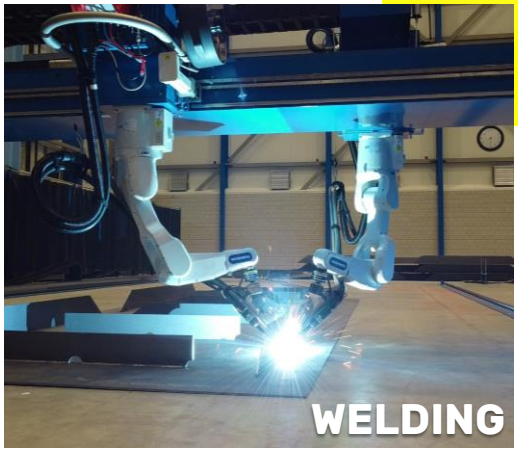
Supporting Every Stage of Production

KRANENDONK delivers advanced robotic automation, boosting precision and efficiency throughout production.

Profile Cutting Line



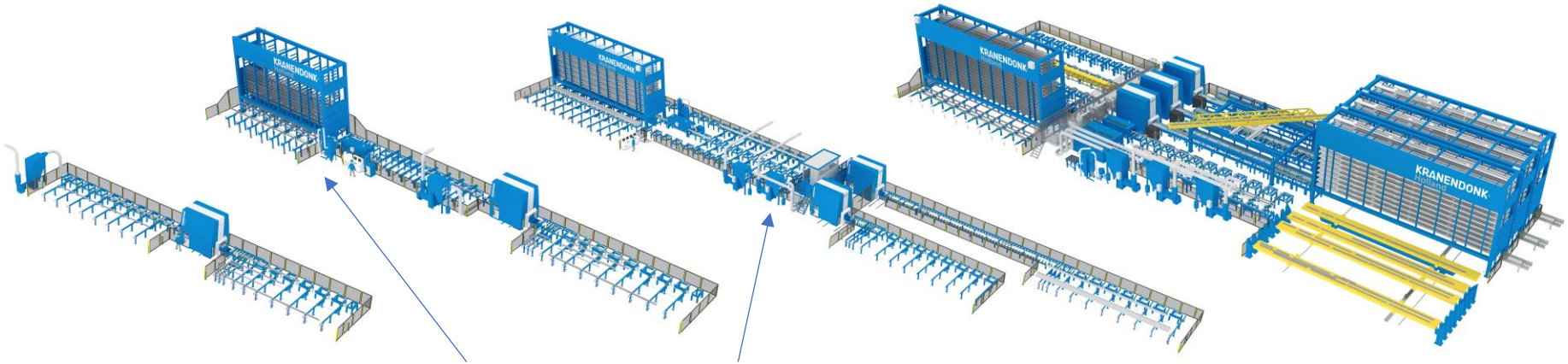
Robotic Beam Constructor



Artemis Micro Welding Gantry

From Standalone to Full Production Line

Whether you require a standalone machine or a full production line, KRANENDONK offers scalable solutions that grow with your business, meeting your production needs.



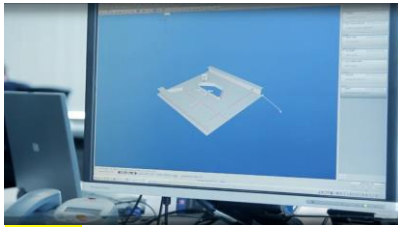
Integrate storage systems, profile processing

Full production line for profile cutting

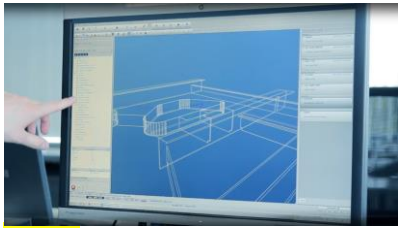
Smart Automation Software

Empowering Non-Repetitive Production Needs

RinasWeld software – From 3D CAD to welding program

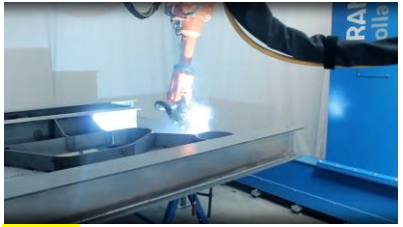


1 Import 3D CAD Model



2 Generate Robot Program Automatically

3 Review Generated Results

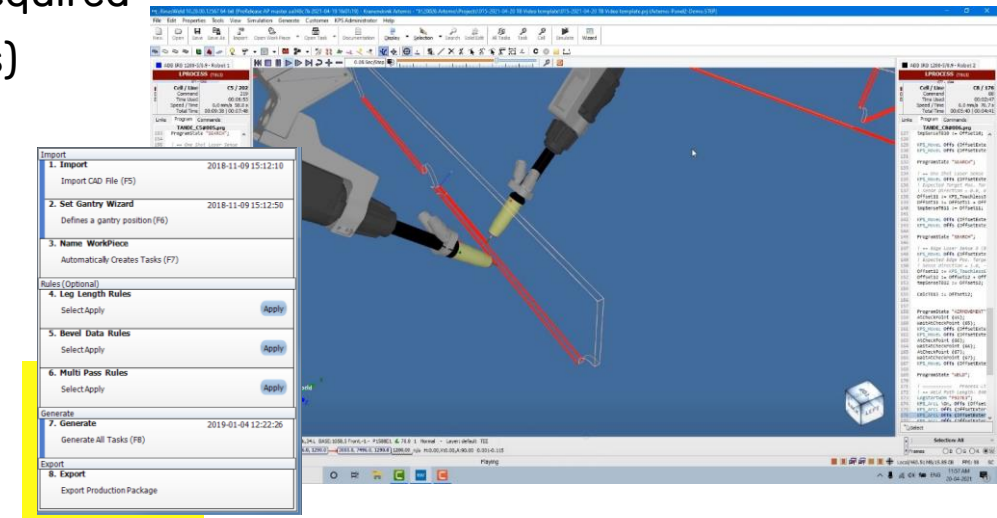


4 Start Automated Production

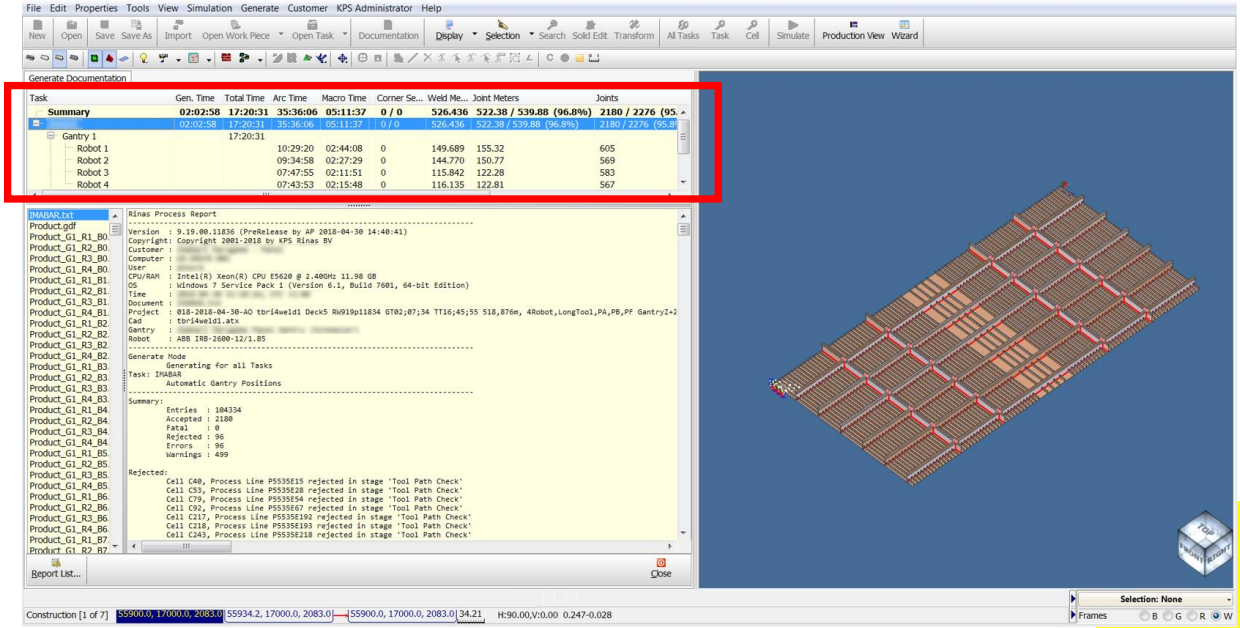
RinasWeld software – From 3D CAD to welding program

- ✓ Auto-detects weld locations and parameters
- ✓ No programming or robot teaching required
- ✓ Minimal work preparation (8-10 steps)
- ✓ Recognizes key 3D CAD elements (e.g., collar plates, curved panels)
- ✓ Generates weld paths and positions automatically

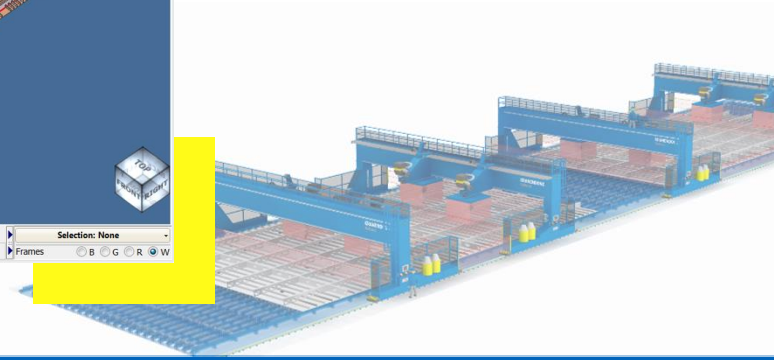
“No robot programming needed!”



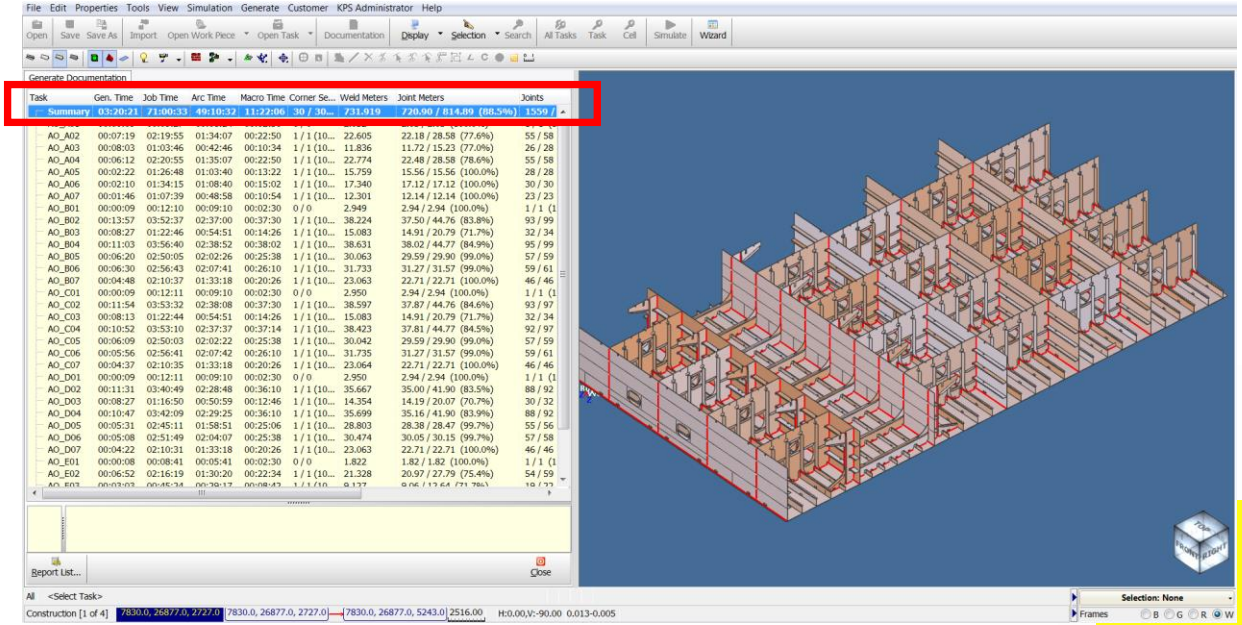
RinasWeld for Welding Applications



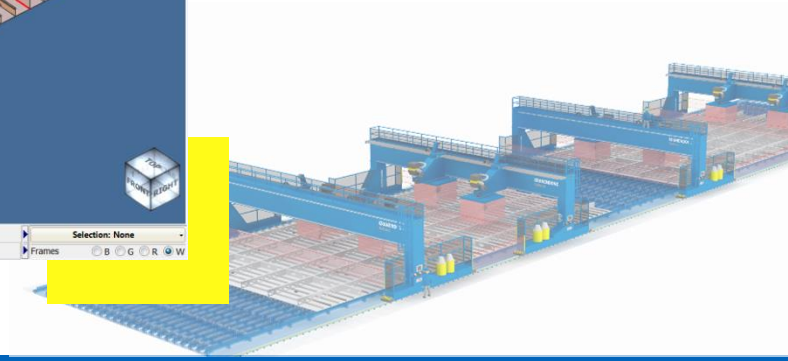
Accurate cycle times, optimized workload, and industry-leading arc-on time



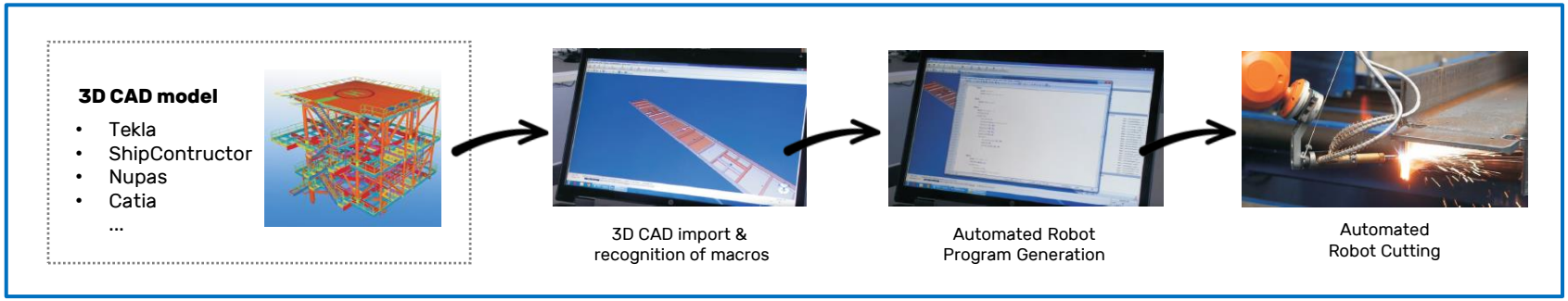
RinasWeld for Welding Applications



Independent of dimensions and height—if a robot can reach it, we can weld it.



RinasWPP for Cutting Applications



The system automatically recognizes geometry, joints, and cuts, converting them into robot programs for OFC and plasma cutting applications.

Additional macros are custom made. Each macro is independent on the size and orientation in the structure

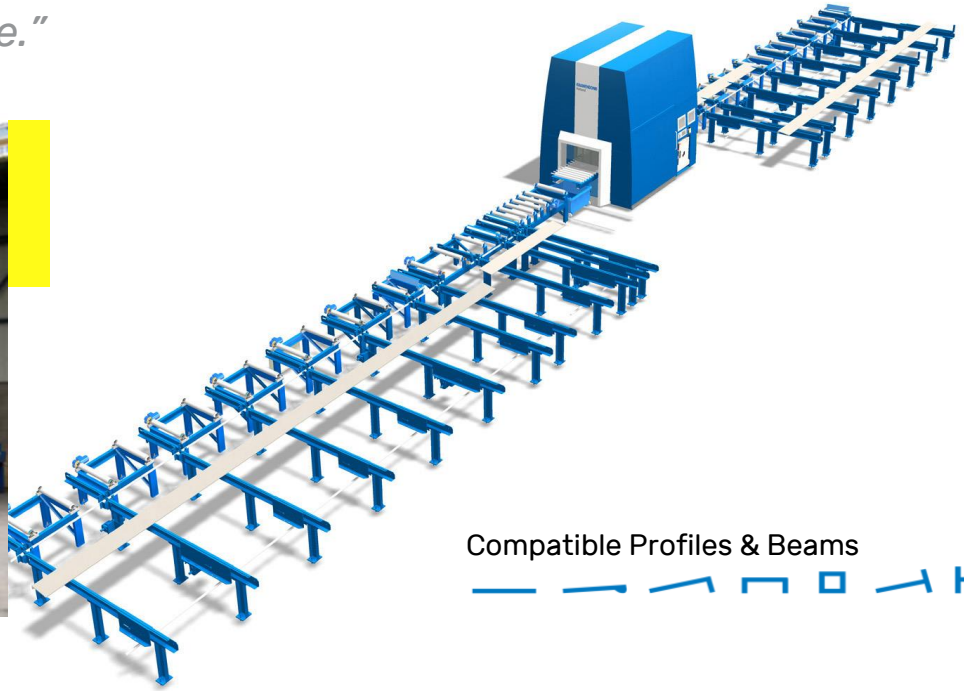
Our Solutions

Enhancing Production Through Smart Robotic Automation

Compact Cutting Station

Video

“Shaping Steel, Defining Excellence.”

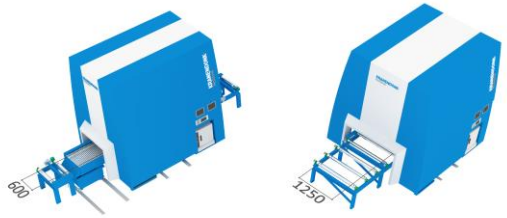


Compatible Profiles & Beams

Compact Cutting Station

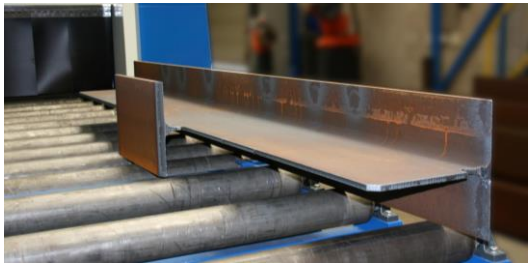
Video

- ✓ High-speed robotic plasma or oxy-fuel cutting
- ✓ Durable cutting system for harsh environments
- ✓ Automated cutting, marking, and grinding
- ✓ Integrated infeed and outfeed conveyors and buffers
- ✓ All-in-one cutting cell for years of reliable production



Compact Cutting Station

Video

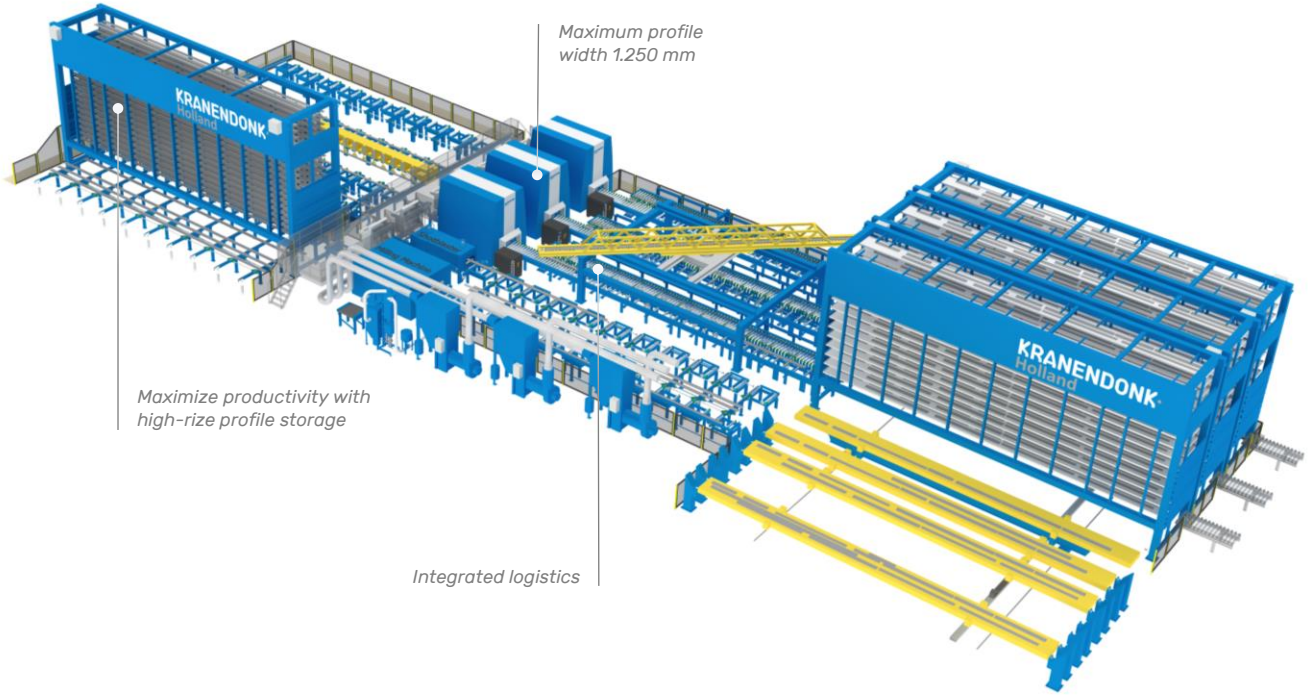


Compact Cutting Station

Video

Fume extraction

Profile tracking system



Maximum profile width 1.250 mm

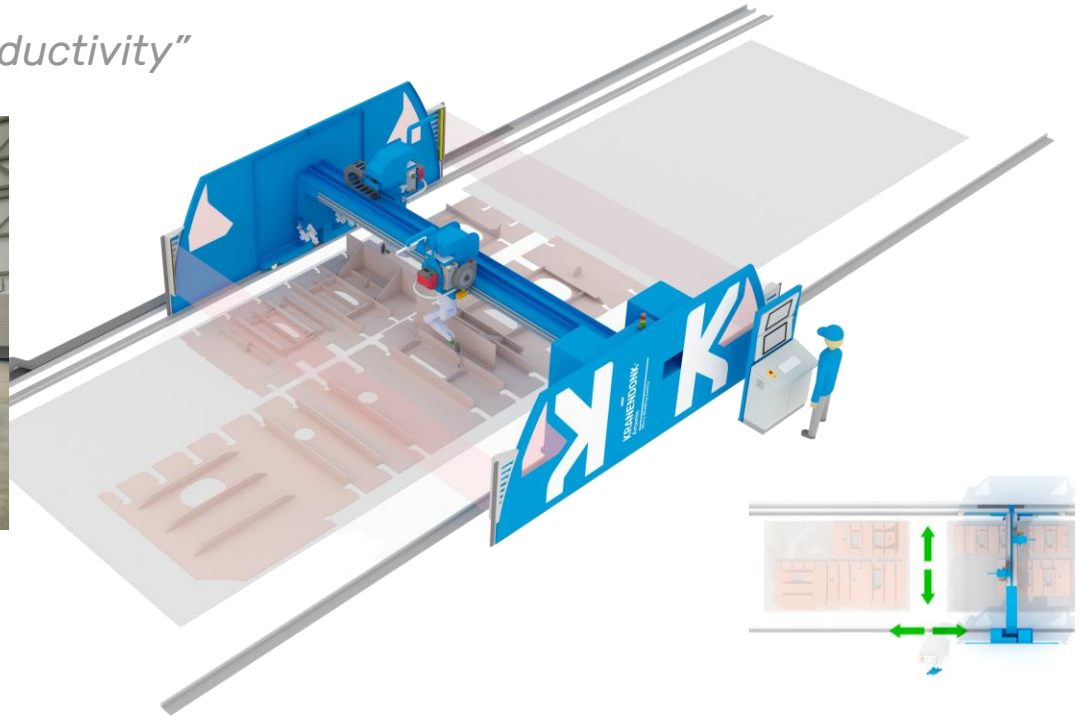
Maximize productivity with high-rize profile storage

Integrated logistics

Artemis Micro Welding Gantry

Video

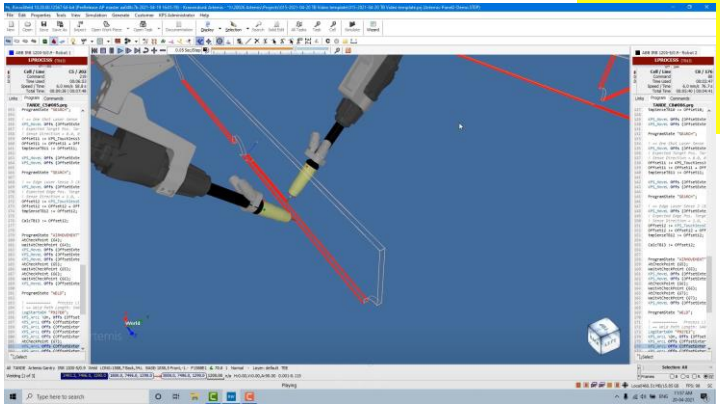
“Small footprint, maximum productivity”



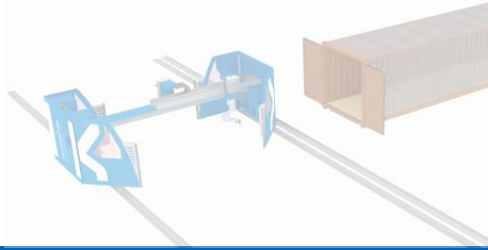
Artemis Micro Welding Gantry

Video

- ✓ Supports double-fillet welding
- ✓ Fits into a single container

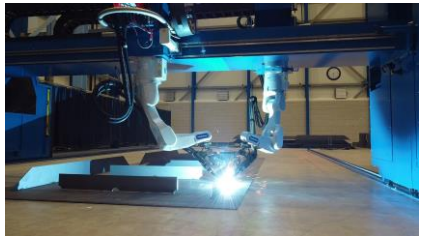


- ✓ Plug-and-play
- ✓ Easy shopfloor control
- ✓ Dual-robot capability



Artemis Micro Welding Gantry

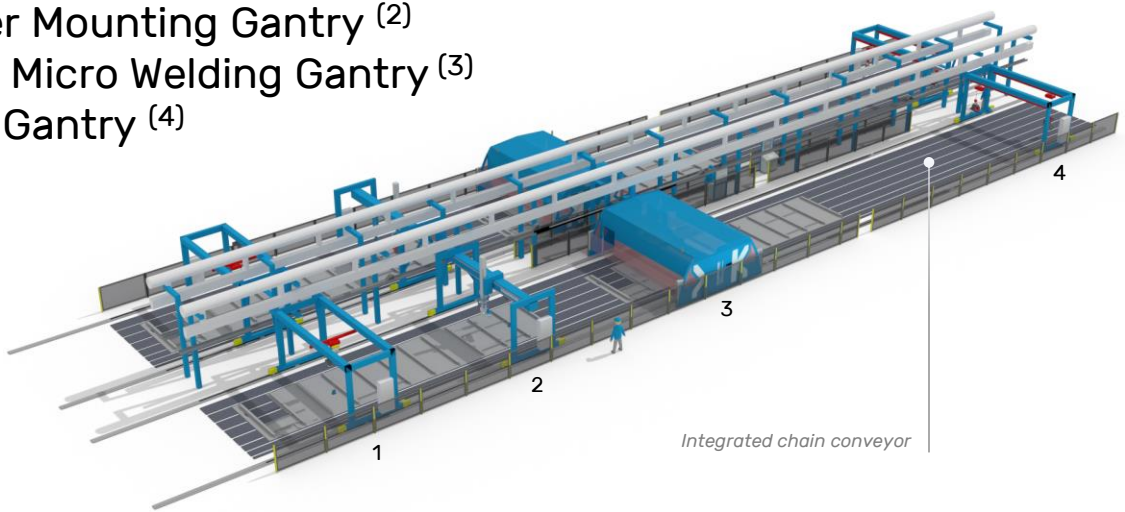
Video



Customer Case - France

Branche	Shipbuilding
Scope of work	Production of panels for new to build ships
Solutions offered	Manual Handling Gantry (1) Stiffener Mounting Gantry (2) Artemis Micro Welding Gantry (3) Service Gantry (4)

Management Dashboard by KRANENDONK

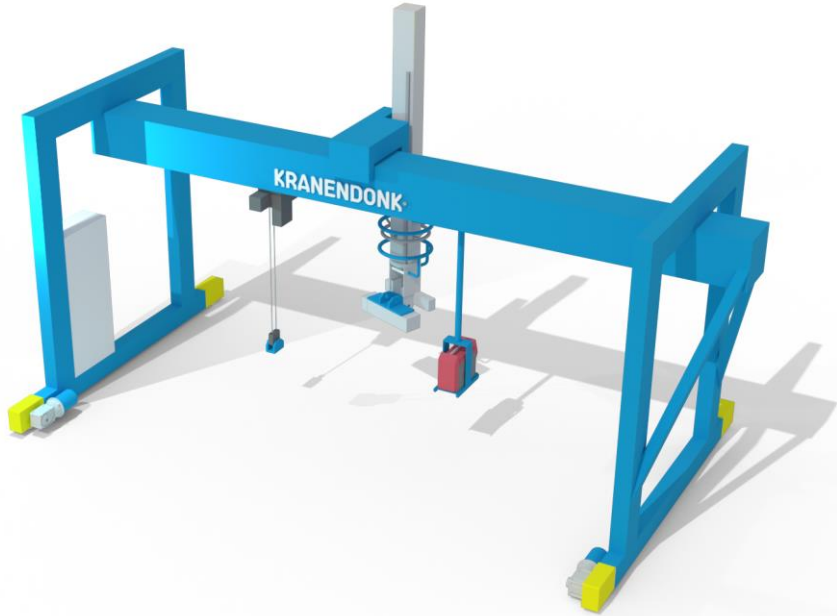


Integrated chain conveyor

Stiffener Mounting Gantry

Video

“Positioning Stiffeners with Robotic Precision.”



Stiffener Mounting Gantry

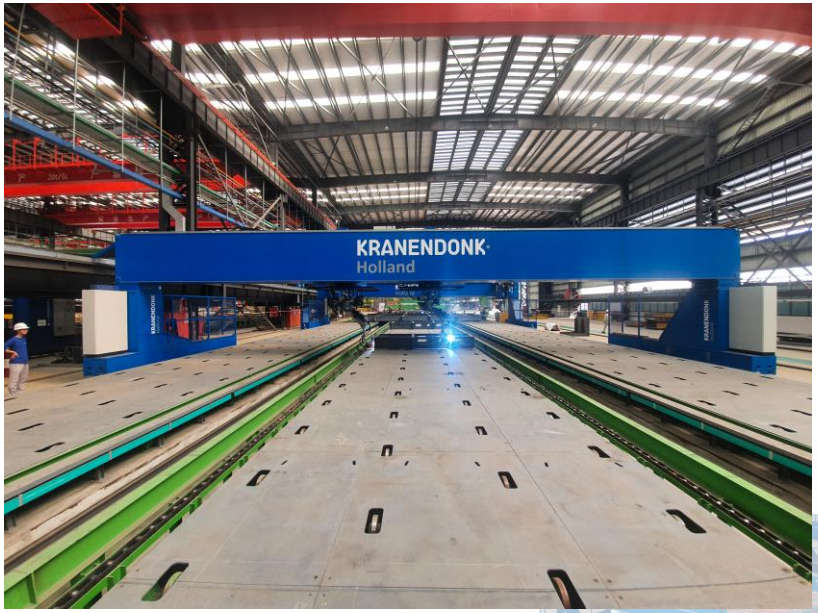
Video

- ✓ High lifting capacity (up to 1,600 kg)
- ✓ User-friendly operation
- ✓ Flexibility to handle various profile sizes

Panel Welding Gantry

Video

- ✓ Up to 4 welding robots per gantry
- ✓ Continuous welding of different panels and sizes



Panel Welding Gantry

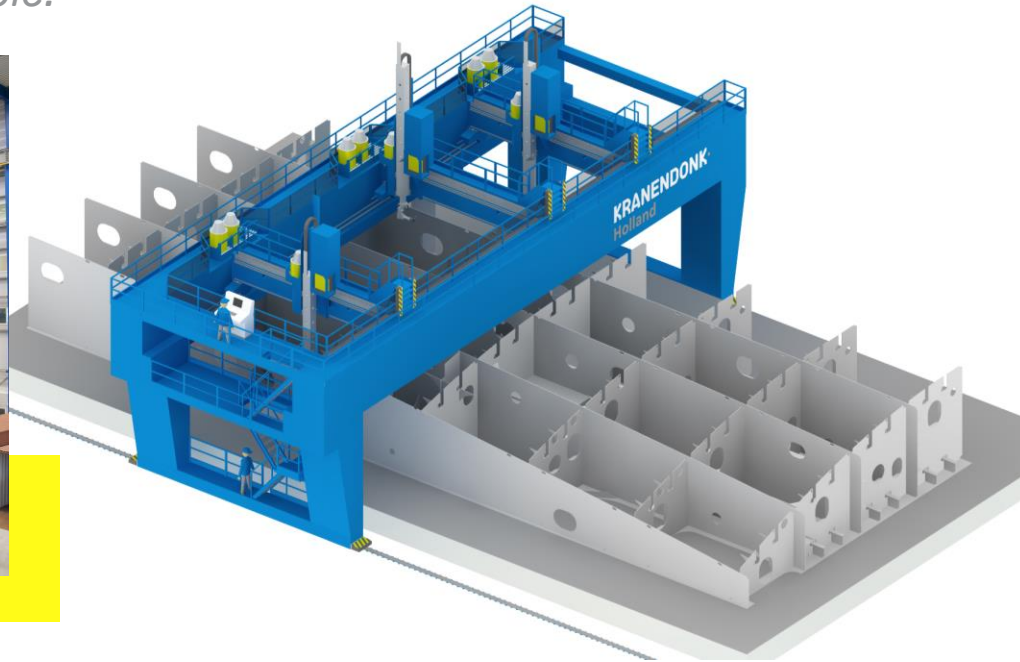
- ✓ Flexible solution for micro panels and webs
- ✓ High throughput with multiple robots
- ✓ Intuitive operation via touch and tablet control
- ✓ Fully customizable for unique needs


KRANENDONK
KRANENDONK

Block Welding Gantry

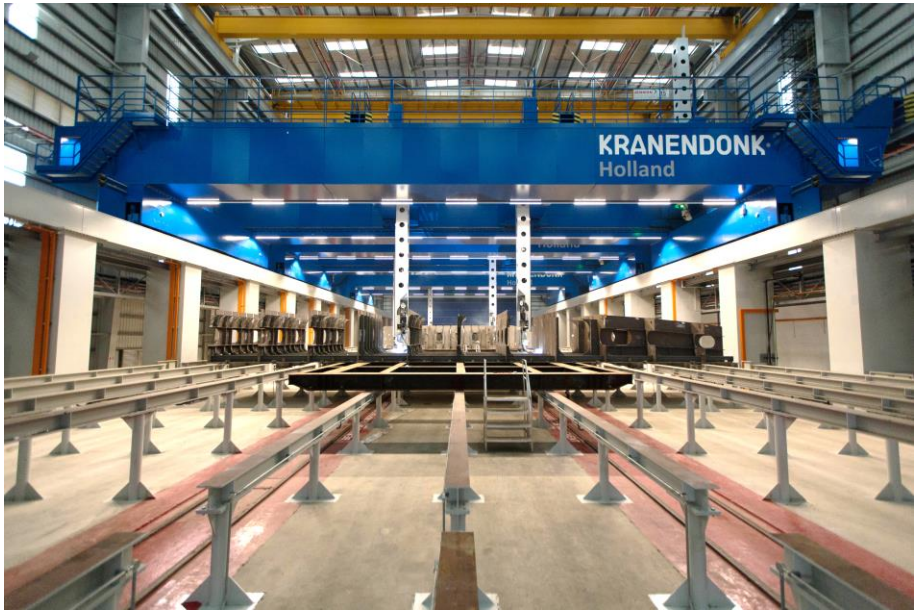
Video

“World’s Largest, Industry’s Most Reliable.”



Block Welding Gantry

Video

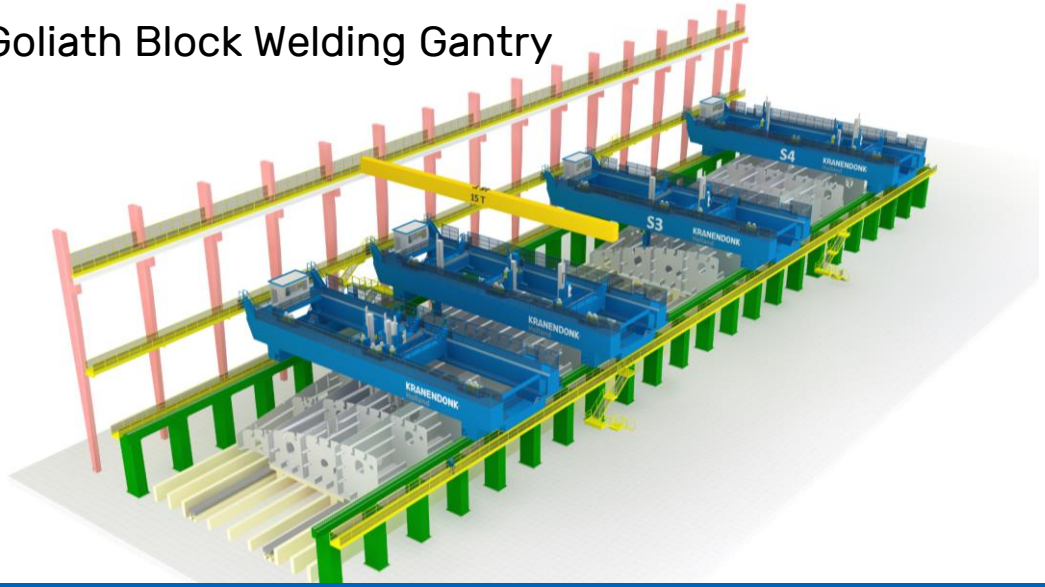


- ✓ Centralized control with operator integration
- ✓ Handles panels up to 7 meters

Customer Case - Singapore

Seatrium

Branche	Offshore rig & platform newbuilding, FPSO newbuild and conversion, repair vessels, etc.
Scope of work	Welding double-hull sections for ship construction
Solutions offered	Goliath Block Welding Gantry



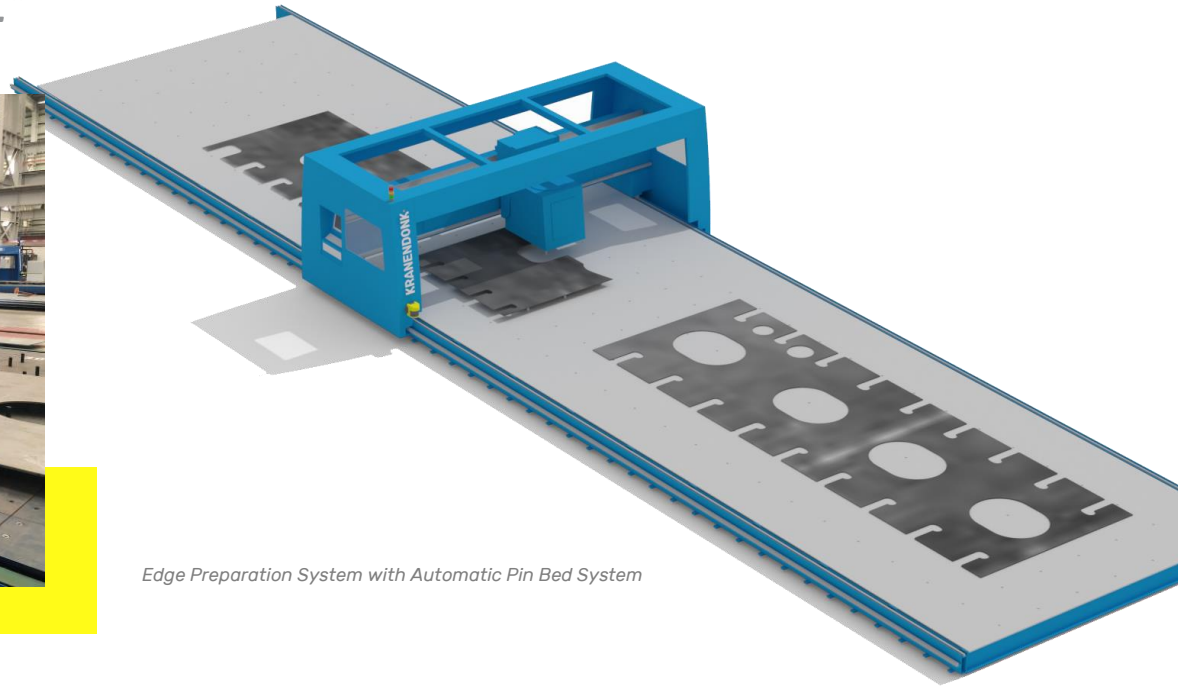

S3R1
KRANENDONK
KRANENDONK
BEWARE OF TRANSFER CAR MOVEMENT

Edge Preparation System

Maritime Innovation Award

Video

“Perfect R2 Radius, Every Time.”



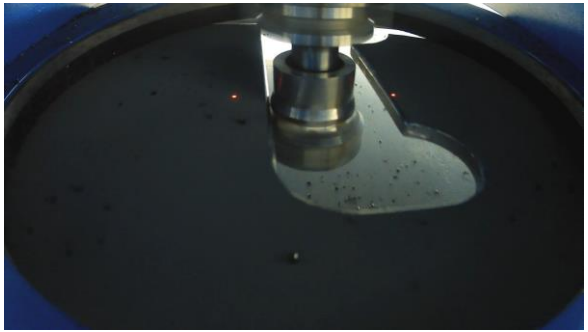
Edge Preparation System with Automatic Pin Bed System

Edge Preparation System

Maritime Innovation Award

Video

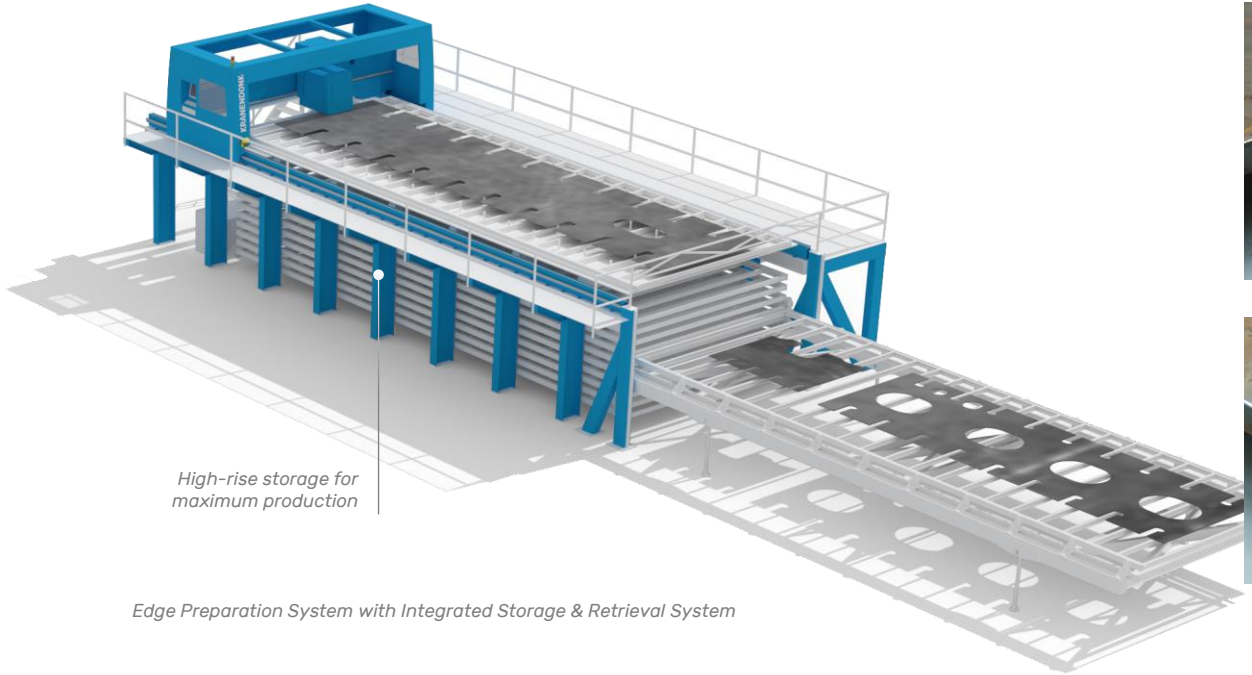
- ✓ Adaptive milling head with force-controlled guidance
- ✓ IMO PSPC compliant edge rounding
- ✓ Processing both sides without turning plates
- ✓ Any plate size, any contour, perfect R2 radius



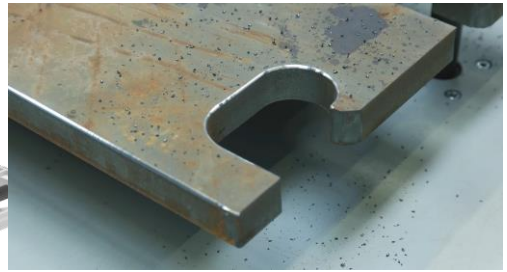
Edge Preparation System

Maritime Innovation Award

Video



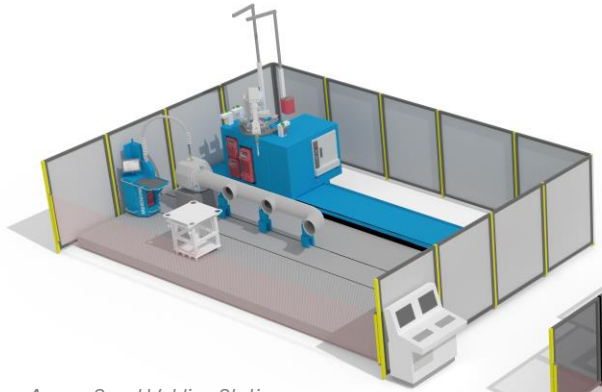
Edge Preparation System with Integrated Storage & Retrieval System



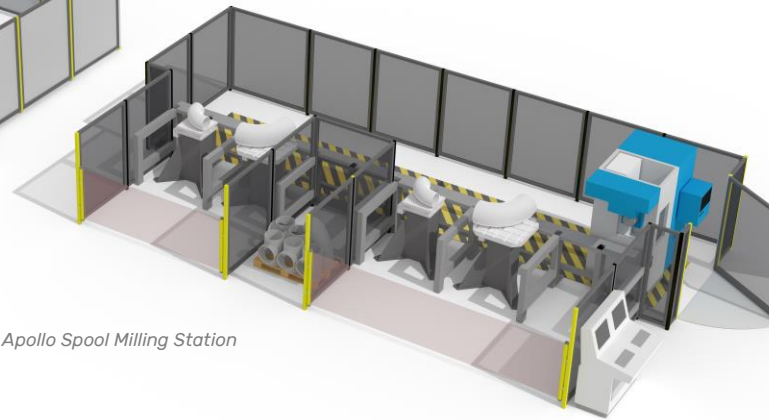
Robotic Pipe Shop

Video

“Redefining Spool Fabrication Standards.”



Aurora Spool Welding Station

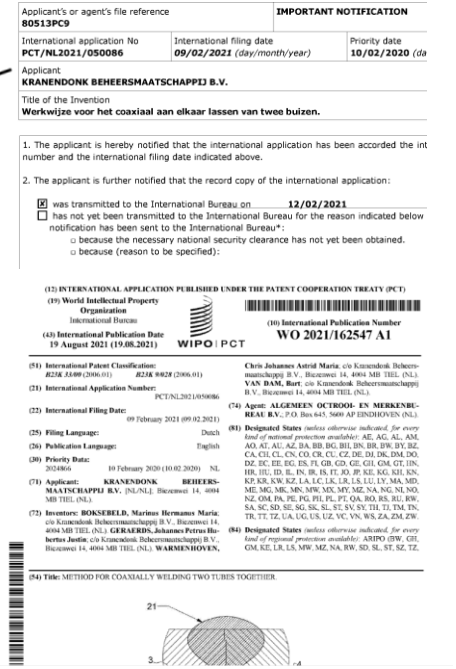


Apollo Spool Milling Station

Robotic Pipe Shop

Video

- ✓ Scalability for high-volume production
- ✓ Reduced material waste
- ✓ Customizable setup



Applicant's or agent's file reference
80513PC9

IMPORTANT NOTIFICATION

International application No	International filing date	Priority date
PCT/NL2021/050086	***09/02/2021*** *(day/month/year)*	**10/02/2020** *(da*

Applicant
KRANENDONK BEHEERSMAATSCHAPPIJ B.V.

Title of the Invention
Werkwijze voor het coaxiaal aan elkaar lassen van twee buizen.

1. The applicant is hereby notified that the international application has been accorded the int number and the international filing date indicated above.

2. The applicant is further notified that the record copy of the international application:

☒ was transmitted to the International Bureau on **12/02/2021**
☐ has not yet been transmitted to the International Bureau for the reason indicated below
notification has been sent to the International Bureau*:
- ☐ because the necessary national security clearance has not yet been obtained.
- ☐ because (reason to be specified):

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International Bureau

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WIPO | PCT

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

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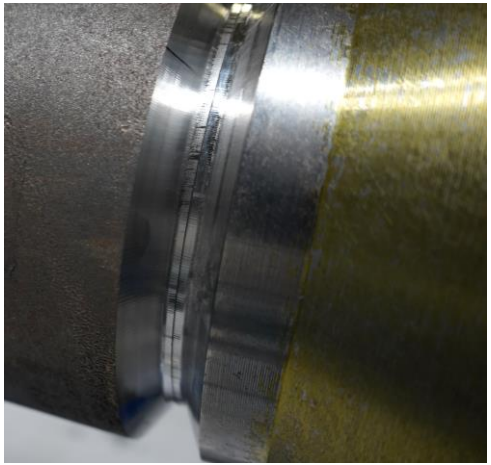
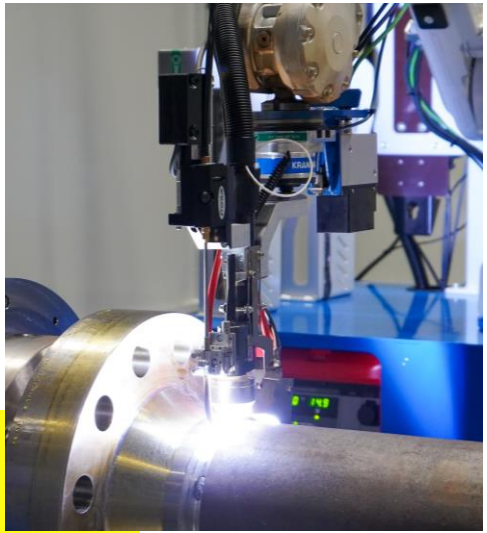
(54) Title: METHOD FOR COAXIALLY WELDING TWO TUBES TOGETHER.

Robotic Pipe Shop

Video

- ✓ Significant time reduction
- ✓ Automated work preparation with PSWP

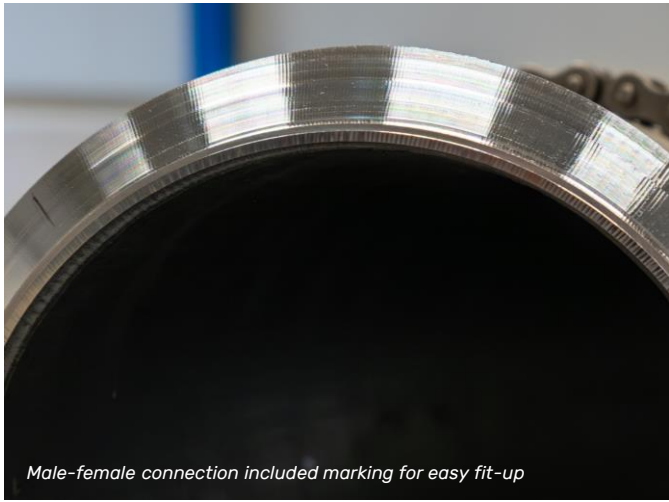




ZEROGAP Technology

The best GAP for a robot, is no GAP. So KRANENDONK's ZEROGAP technology is feasible making automation easier to do.

- ✓ Welding conditions are replicable
- ✓ Seam geometry is optimized for robotics
- ✓ The process is controlled, reducing reliance on manual skill



Male-female connection included marking for easy fit-up

NEW

PORTABOT – Automated COBOT Welding

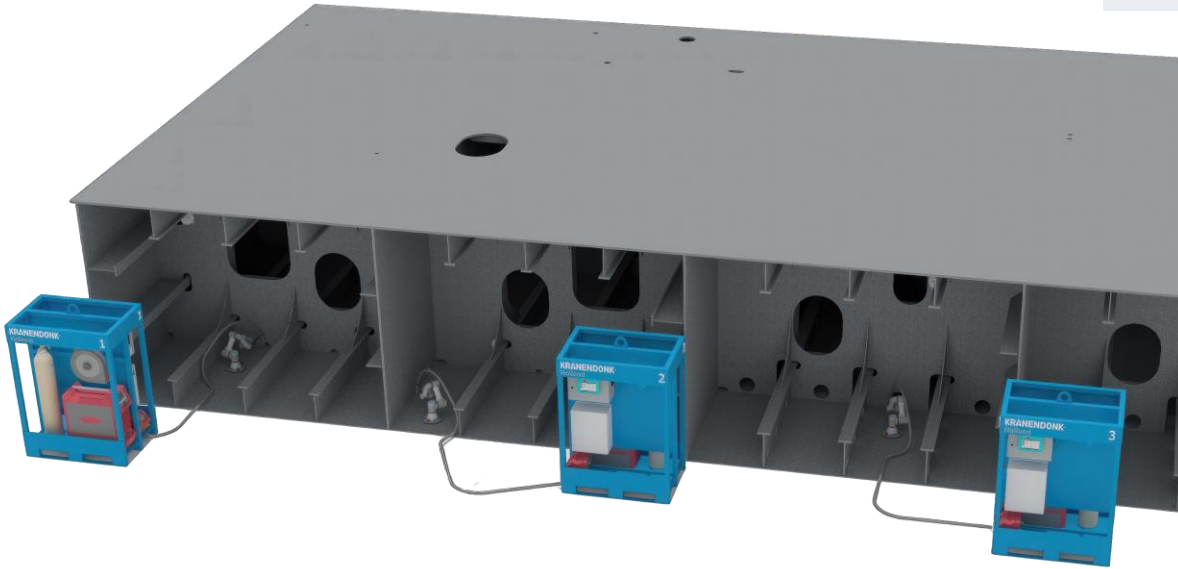
- ✓ Ideal for small, hard-to-reach spaces
- ✓ Lightweight and portable
- ✓ Non repetitive products
- ✓ Equipped with magnet, crawler, or track options
- ✓ Compatible with common welding processes
- ✓ Works with RinasWeld software
- ✓ No programming, no teaching

Introduced at SMM Hamburg, September 2024

NEW

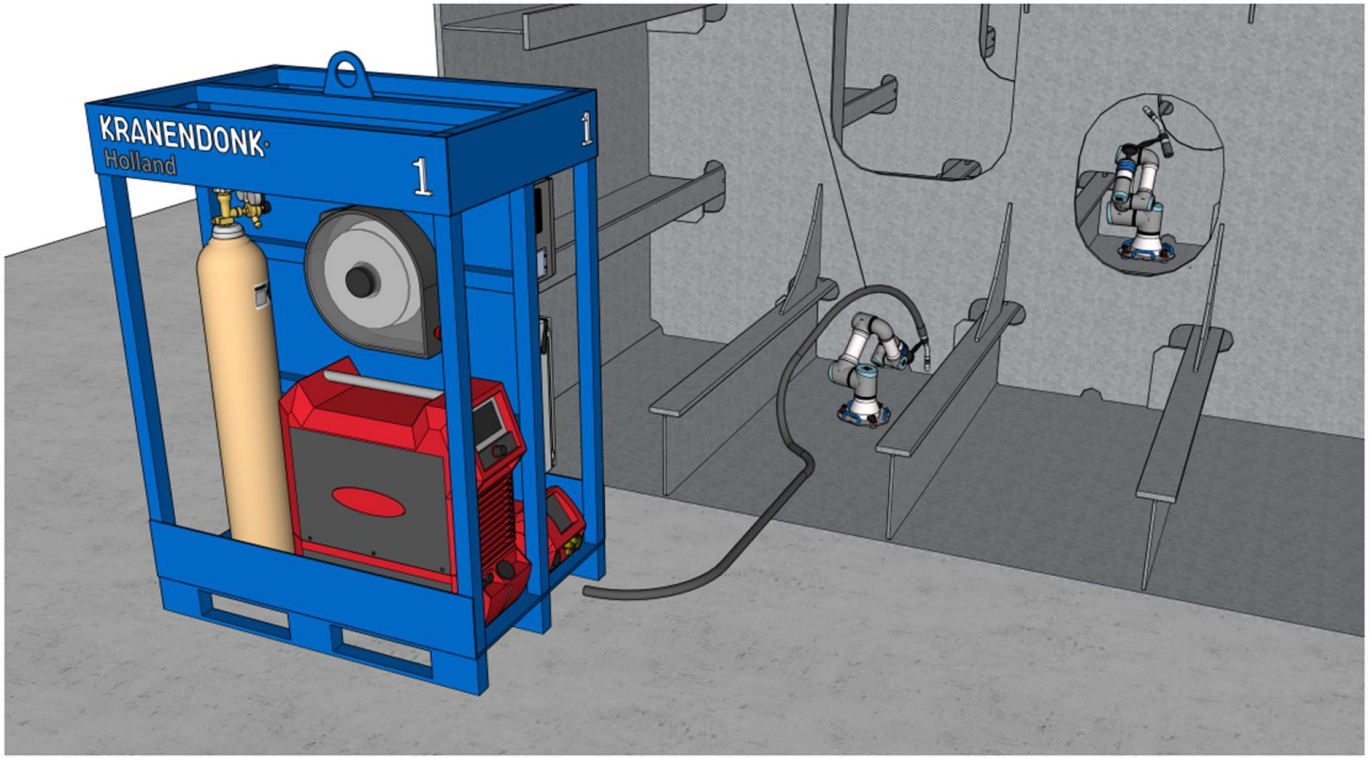
PORTABOT - Multi-Cobot Operations

- ✓ Control multiple cobots simultaneously
- ✓ Scalable system to add more cobots
- ✓ Enhanced flexibility for various tasks
- ✓ Cost-effective and efficient production setup



NEW

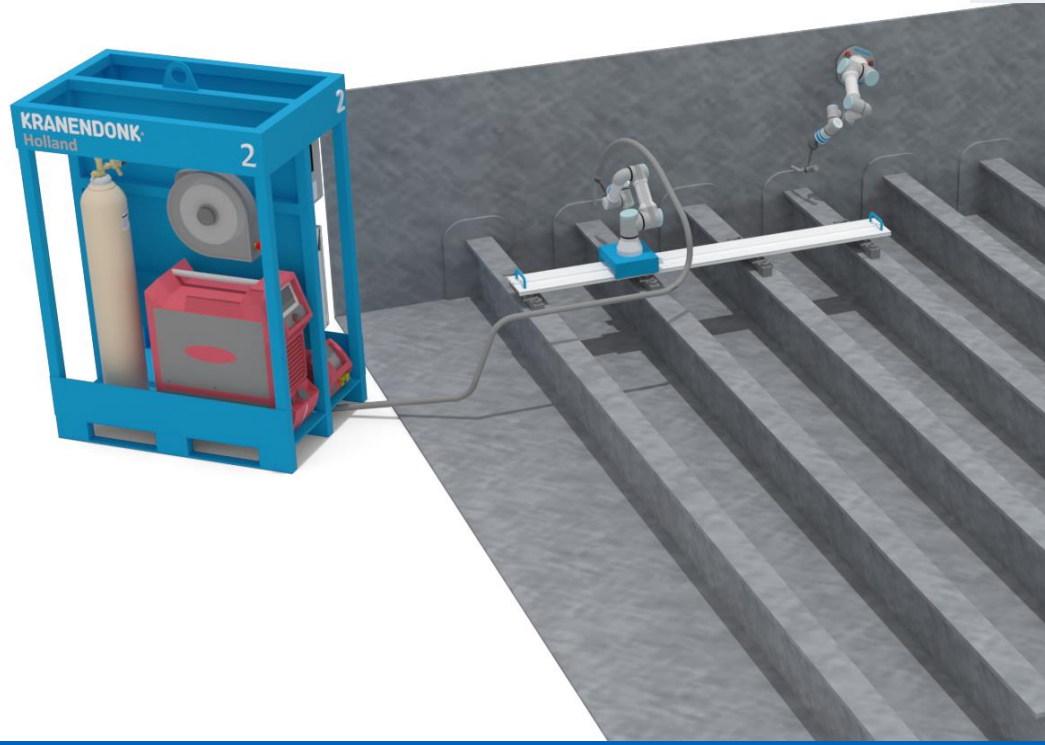
PORTABOT - Multi-Cobot Operations



NEW

PORTABOT - Welding Track

- ✓ Covers larger areas
- ✓ Quick setup minimizes downtime
- ✓ Adaptable to various layouts
- ✓ Minimizes manual oversight



Universal Robots UR3e - Robot 1

JMOVE

Cell / Line	C1 / 0
Command	1
Time Used	00:00:00
Speed / Time	250.0 mm/s 0.0 s
Total Time	00:00:51 | 00:00:30

Links Program Commands

-360	J1-Base:0.0	360
-360	J2-Shoulder:-90.0	360
-360	J3-Elbow:-90.0	360
-360	J4-Wrist 1:0.0	360
-360	J5-Wrist 2:90.0	360
-360	J6-Wrist 3:-90.0	360

TCP X:	818.7mm
Y:	-131.1mm
Z:	358.2mm
Rz',Ry',Rx':	-180.0°,60.0°,-180.0°
Gantry X:	0.0mm
Gantry Y:	0.0mm
Gantry Z:	0.0mm
Speed:	Peak AIR:0.0 Process:0.0 mm/s)
Distance:	n/a
confdata:	0,0,-1,2
Tool:	tWeldGun0Ext - (3)
Arm:	250.3mm
Wrist:	90.00°
Elbow:	108.8°
Weave:	829.1mm
Name:	
Script:	
Line:	

0.05 Sec/Step

Block World

All T Cobot UR3e Weld Name: Selection: None

Universal Robots UR3e [1 of 9] -374.6, -937.0, 163.0 (-366.8, -941.5, 161.4)→(-374.6, -937.0, 163.0) 9.16 H:149.67,V:9.92 Frames B G R W

Local/554.17 MB/63.15 GB FPS: 76

Cobots for NSRP Shipbuilders

Kranendonk Cobot to be implemented at Cobot Alliance Training Center in Norfolk (RA Project)

- Certifying system for Naval Shipbuilders
- Demonstrating capabilities
- Developing training program

- Kranendonk Exploring further Cobot Solutions
  - Field deployed
  - Tracks, crawlers, wall mounted etc

Thank you for yo

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