



path

NATIONAL
SHIPBUILDING
RESEARCH
PROGRAM

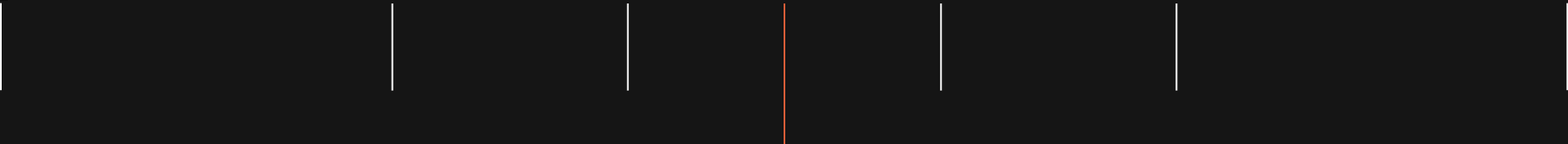
**PHYSICAL AI
FOR MARITIME
WELDING**

WELDING
TECHNOLOGY
PANEL



↘ “America can reshore these industries because we will have the **AI tools** to operate the robotic automation to build in America.”

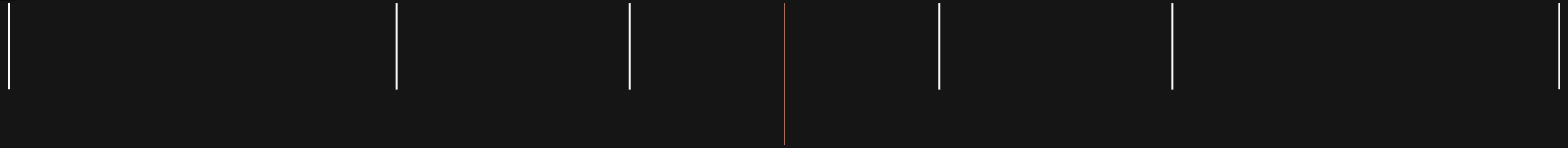
– Department of Commerce, Secretary Howard Lutnick
AI Honors Gala, June 2025



14%

of naval shipbuilders report extensive or moderate use of robotic welding

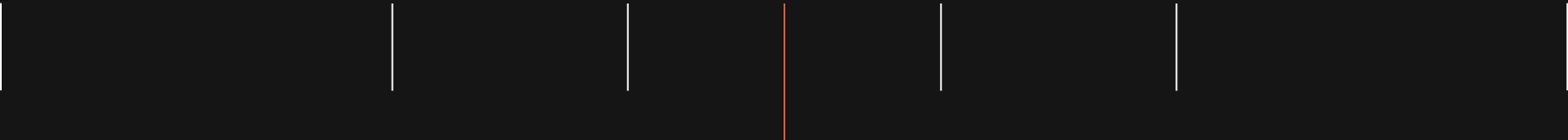
* Enhancing Naval Shipbuilding Efficiency and Quality through Robotic Welding Adoption, NDIA, December 2025



320,500

projected welder labor gap by 2029

* Welder Workforce Data, American Welding Society, August 2026



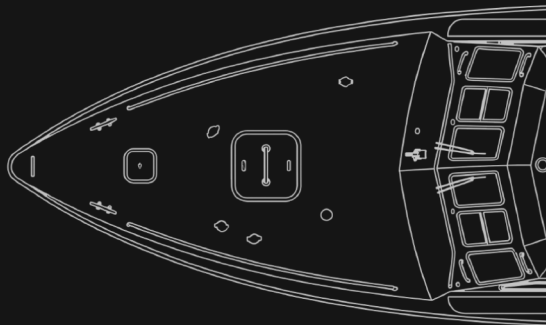
20,000

additional welders needed by 2033

* Anchoring Maritime Talent, McKinsey & Co., March 2026



+64



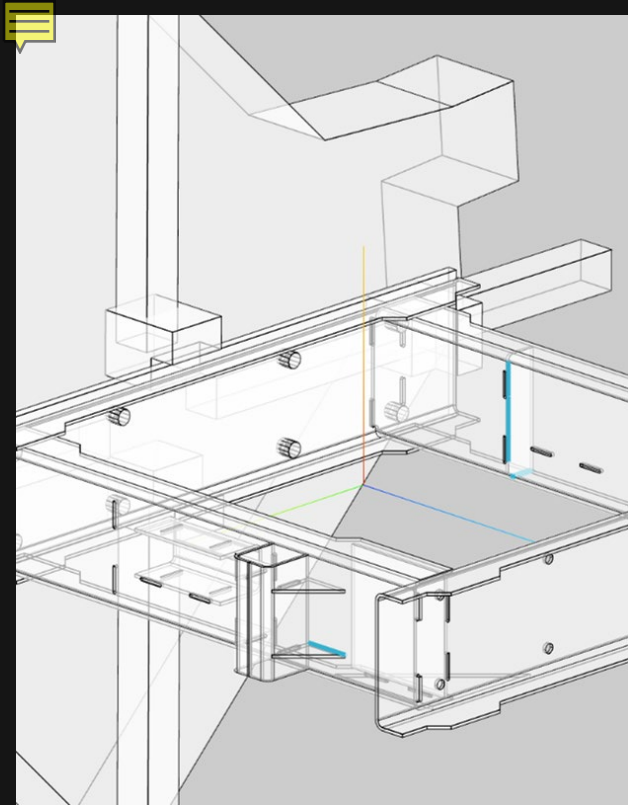
additional ships in the battle force by 2040

* U.S. Navy Shipbuilding Plan, DON, May 2026



An Answer

Enable autonomous welding for high-mix, low-volume and variable fit-up weldments through the application of **physical AI**



↘ **Flexible** for high-mix

JobBuilder™
Path Fixturing



↘ **Adaptable** to fit-up

Proprietary Vision System
Obsidian™ Weld Intelligence



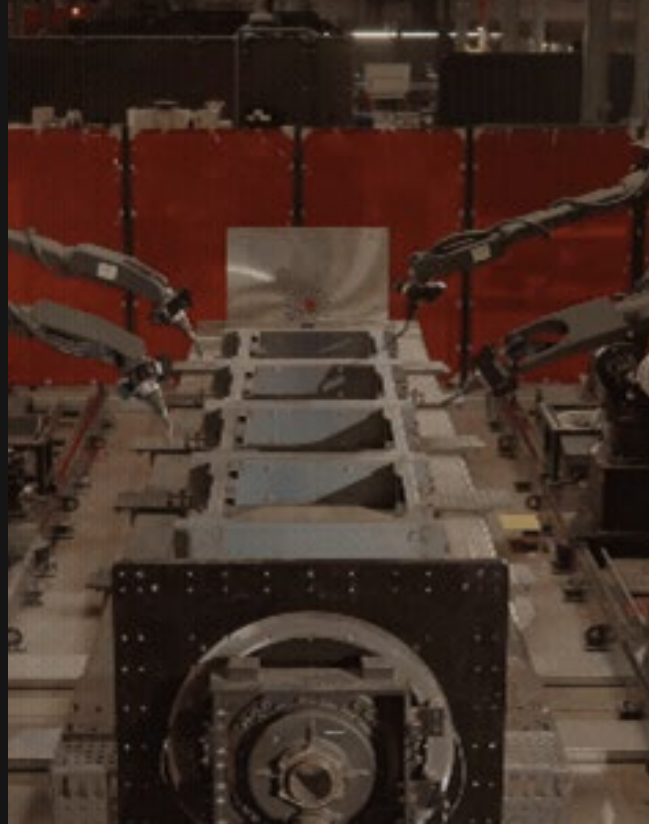
↘ **Responsible** for uptime

Contractual Performance Metrics
Mission Control Support

Utility Poles



Data Center Frames



Truck Chassis



↙ **Commercial Adoption | 100+ Arms Deployed by EOY**



Scaling physical AI for welding requires an
extensive amount of data...



Training AI Models

Every modern AI is built from the same three ingredients

INGREDIENT 1

Training Data

The information that is used to teach a machine learning model how to make predictions, recognize patterns or generate content

INGREDIENT 2

Model Architecture

The neural network that turns raw data into intelligence

INGREDIENT 3

Massive Compute

The horsepower to train at scale

↙ Training AI Models

For LLMs like ChatGPT and Clause

INGREDIENT 1

Training Data

90%

Public data

YouTube, Wikipedia, Reddit, etc.

5%

Private datasets

Licensed and purchased collections

5%

User chats

Conversations with the product

INGREDIENT 2

Model Architecture

The neural network that turns raw data into intelligence

INGREDIENT 3

Massive Compute

The horsepower to train at scale

↙ Training AI Models

For a physical AI model for welding

INGREDIENT 1

Training Data



Public data

Does not exist



Private datasets

Does not exist



User chats

Does not exist

INGREDIENT 2

Model Architecture

The neural network that turns raw data into intelligence

INGREDIENT 3

Massive Compute

The horsepower to train at scale

Training AI Models

Welding Data Farm

OPERATION 1

Runs 24 / 7

The farm operates non-stop executing welds with varying weld quality based on varying weld performance execution.

FULL LANDSCAPE 2

Before, During, After

The farm captures the full quality landscape, not just the finished weld. Data is acquired to tell the full story of each weld executed.

RECONSTRUCTION 3

Multimodal

Dozens of data signals are collected on every single joint with time and spatial domain anchors

↙ Training AI Models

Welding Data Farm

100,000s of inches of weld performed

Training AI Models

Welding Data Farm

↙ Training AI Models

For a physical AI model for welding

INGREDIENT 1

Training Data



Data farm

Purpose-built data generation



> \$1B in customer parts

Real production welds from the field



Data goldmine

Largest welding dataset in the world

INGREDIENT 2

Model Architecture

Proprietary and purpose-built for manufacturing

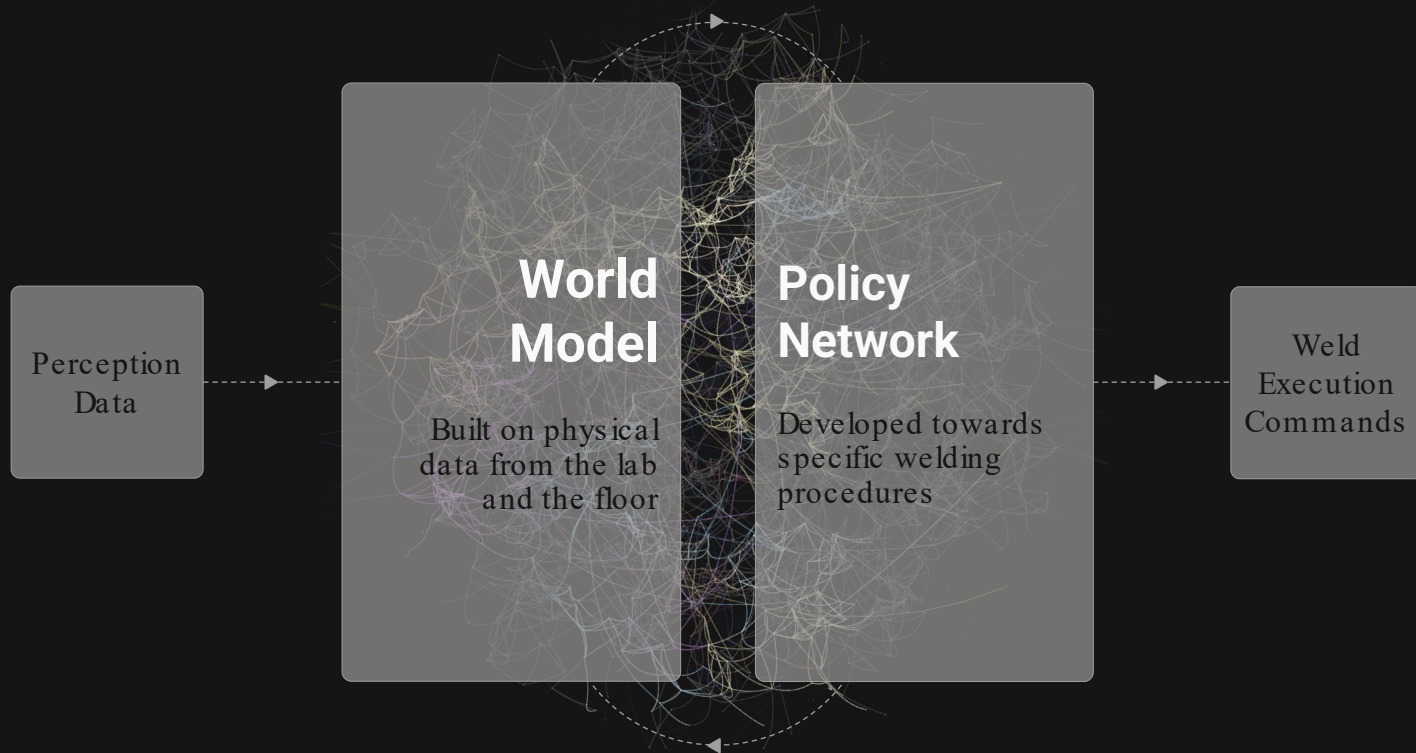
INGREDIENT 3

Massive Compute

Our monthly bill from Amazon is painful...

Training AI Models

Obsidian™



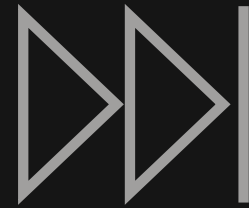
Articulated Arms



Quadrupeds



Next Platform...

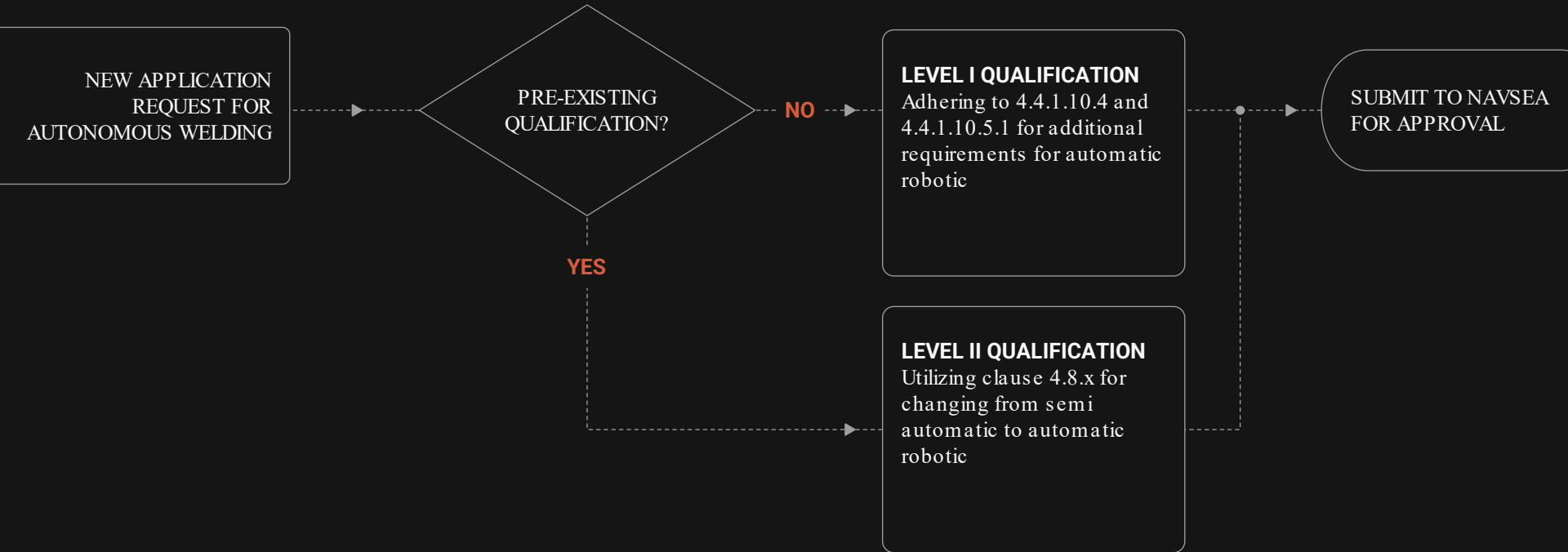


↘ AI models can **scale across robotic platforms**

Qualifying an AI-based model for autonomous welding on U.S. Navy has its challenges...

Qualification via TP-248

Current Pathways





Requalification via TP-248

Current Interpretation

Clause 4.8.r

1. An **addition, deletion, or change of adaptive fill welding control algorithm** that determines the bead planning or placement.
2. An addition, deletion, or change in weld joint tracking method (e.g., through-arc, laser, camera), including changes in make or model.
3. Except for manual methods, a change in joint locating method (e.g., wire touch, laser, camera), including changes in make or model. A change from manual

Interpretation

..the intent of **4.8.r** is to trigger requalification based on **macro changes** to the fundamental algorithm or method, not **micro changes** to parameters within the algorithm or method.

Opportunity

But **digital requalification** is a possible for model-based welding technologies by archiving qualification data.

Requalification can be executed upon a model update in the cloud.



Requalification via TP-248

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Qualification Status + Plans

3+

level II qualifications
for CY26

2

robotic platforms
with qualifications
for CY27



engagement with
NSWC-Carderock



THANK YOU.

PHYSICAL AI FOR MARITIME WELDING

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