

## Challenge

Every reclaimed steel member carries signs of its previous life (corrosion, attachments, penetrations, paint degradation, dents, welds, and plates). For reuse to scale, industry players need clear answers:

- Is this steel member worth recovering?
- What reprocessing work is needed?
- Where can it be used?

## HARNES: AI-Assisted Reuse for Reclaimed Steel

Led by Efestos Hub. Partners: ASBP and Caunton Engineering. Funded by Innovate UK  
Project duration: November 2025-March 2026 (5 months)

HARNES project delivered, using Caunton Engineering's yard in Nottingham as a live industrial testbed with approximately 350 tonnes of reclaimed steel. The following activities were conducted:

### Digitised reclaimed stock

Lengths, attachments, visible defects, and condition data on steel members recorded

### Conducted re-fabrication trials

Paint removal, cutting, grinding, sawing and surface preparation quantified

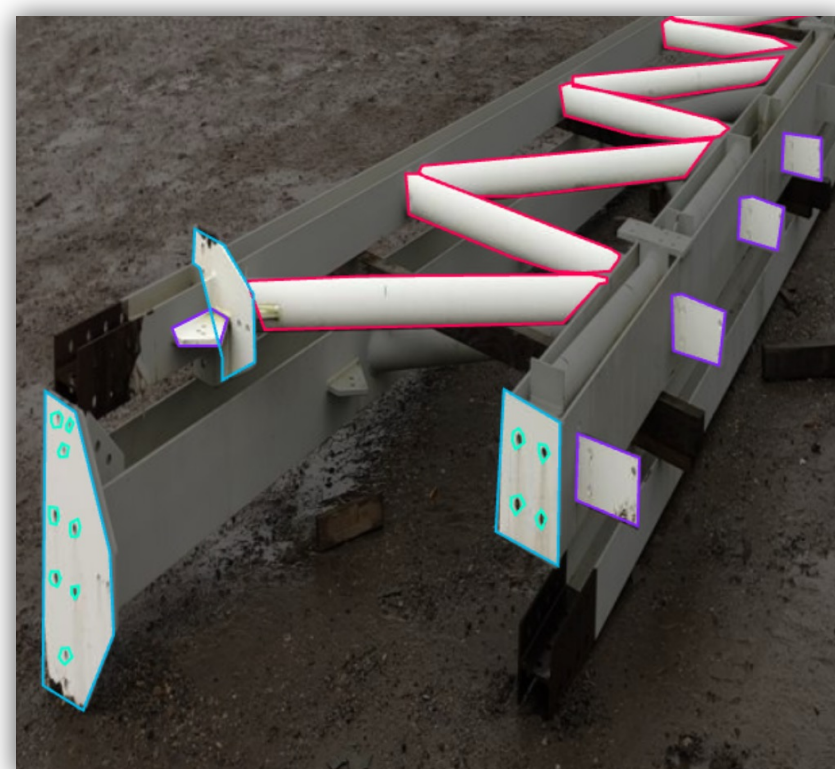
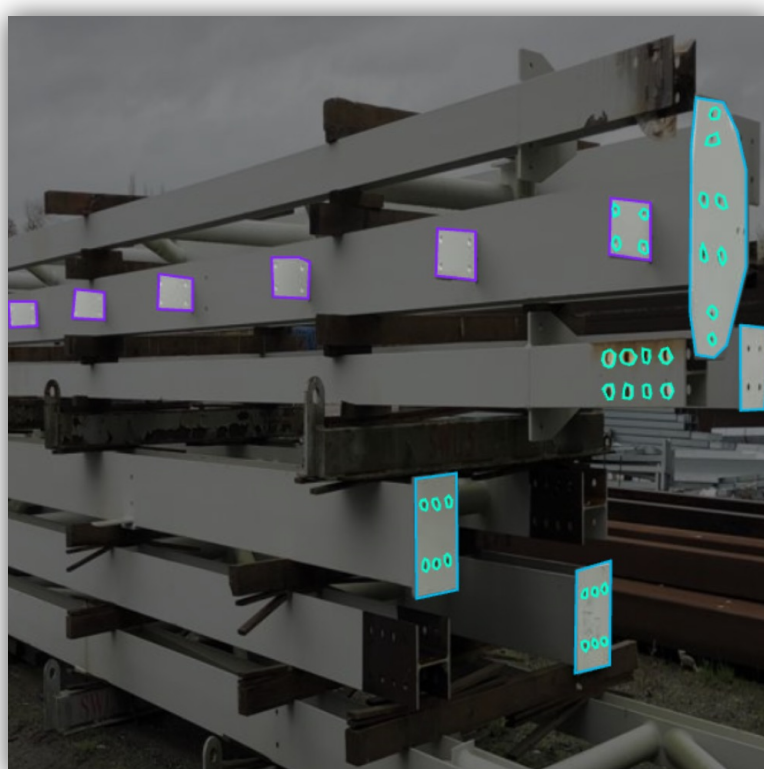
### Built the AI model

Assess re-fabrication effort from images; match stock to design requirements

### Test against current practice

AI-assisted workflow benchmarked against the existing manual process

The AI model was trained to be able to recognise attachments, openings, and steel members:



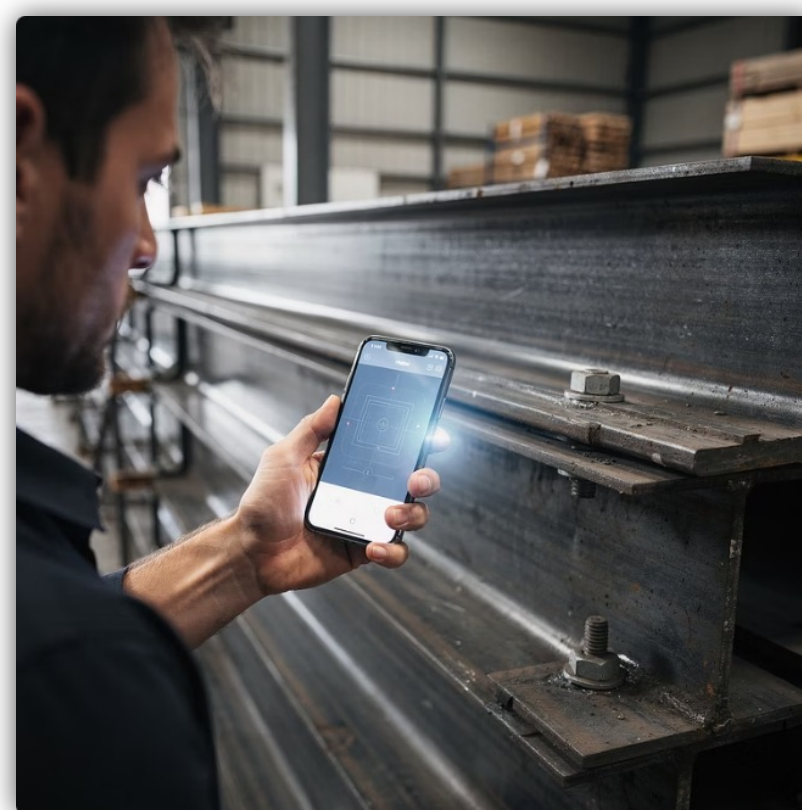
## Why Not Just Use a Laser Scanner?

Laser scanning captures geometry but geometry alone is insufficient for reuse decisions. LiDAR cannot reliably identify corrosion zones, welds, bolt holes, plates, or paint degradation. It is also:

- **Time-intensive:** typically requires a full day on site, two experienced engineers, suitable weather conditions, and 3-4 hours data processing
- **Limited defect recognition:** LiDAR is not designed to reliably identify steel surface conditions.

Instead, within HARNES, we developed an app that can work with ordinary **smartphone images**. It shortens the inspection from days to hours. It is fast, does not require specialised equipment, and it is scalable.

## HARNES Workflow. This is how it works:



1. You take photos of reclaimed steel sections on the app



2. A digital stock library is built, capturing geometry and condition



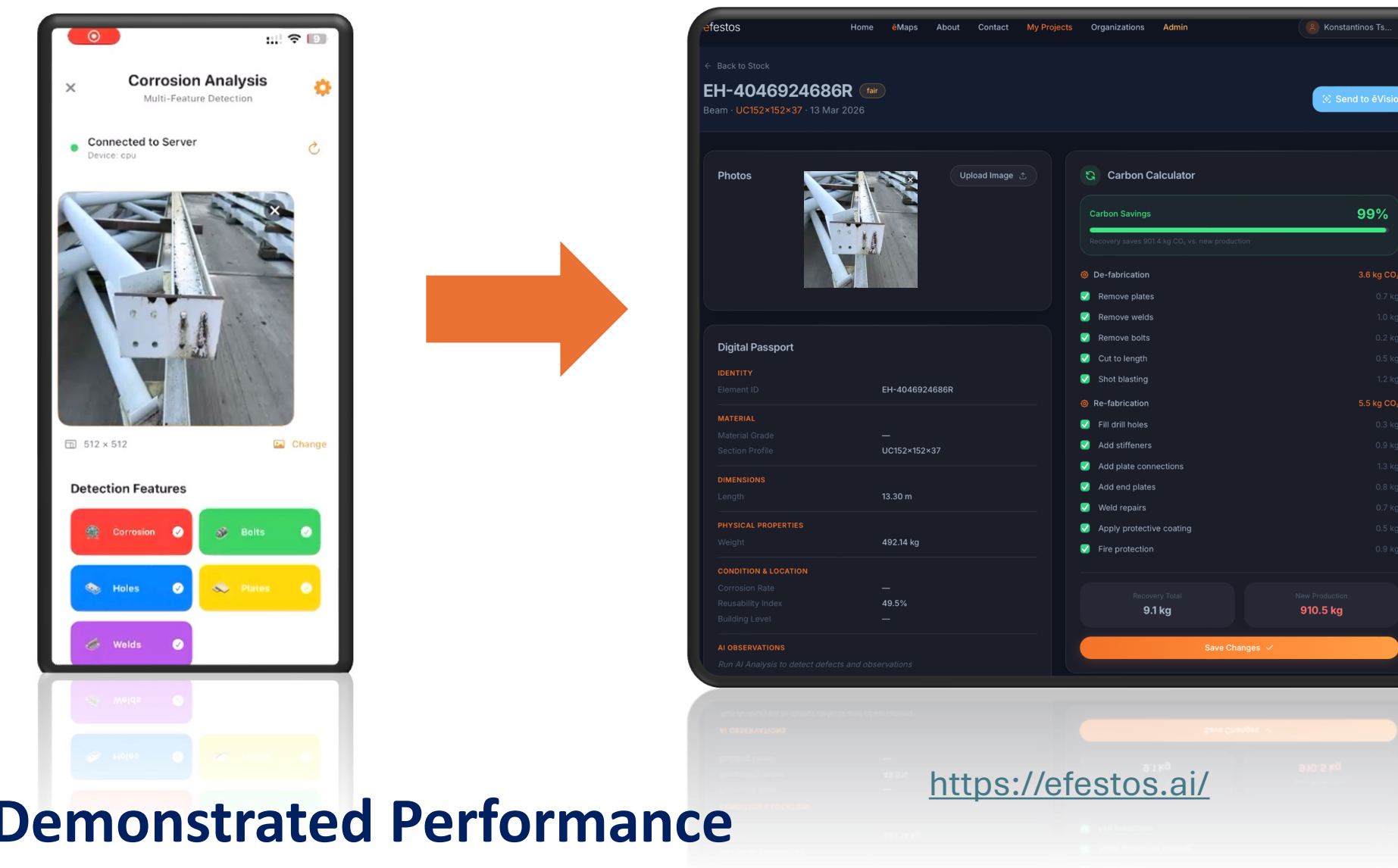
3. The AI model estimates re-fabrication effort required for each steel member.

- You can decide which steel sections to select for reuse
- You can customise re-processing (e.g. not filling holes)



4. The AI model matches the available stock to design requirements for new projects

## The App Interface. This is what you will see:



## Demonstrated Performance

Caunton Engineering tested the HARNES workflow against their baseline manual process and recorded the following outcomes:

300%

Steel Reuse rate increase

Reused steel rose from 8 t/year to 32 t/year

33%

Off-cut Loss Reduction

Material loss reduced from 15% to 10%

2x

Rework Reduction

Failed matches dropped from 1 in 15 to 1 in 30

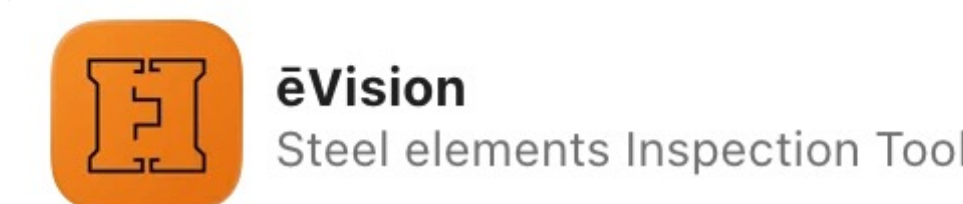
25%

Hours Saved/Year

Stocktake time reduced from 40 to 30 hrs/month

## The App - Try It Yourself

Register to the platform and download the app



For more information, contact:

Prof Konstantinos Tsavdaridis, Founder of Efestos Hub: [Info@efestoshub.com](mailto:Info@efestoshub.com)

Dr Asselia Katenbayeva, Sustainability Research Lead at ASBP: [Asselia@asbp.org.uk](mailto:Asselia@asbp.org.uk)

Connect on LinkedIn:

