

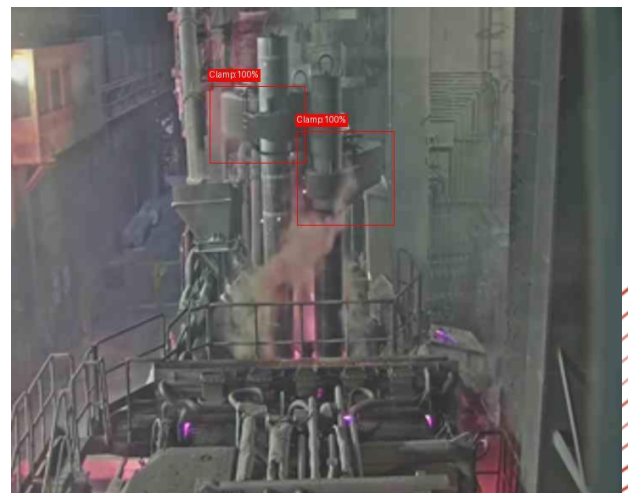
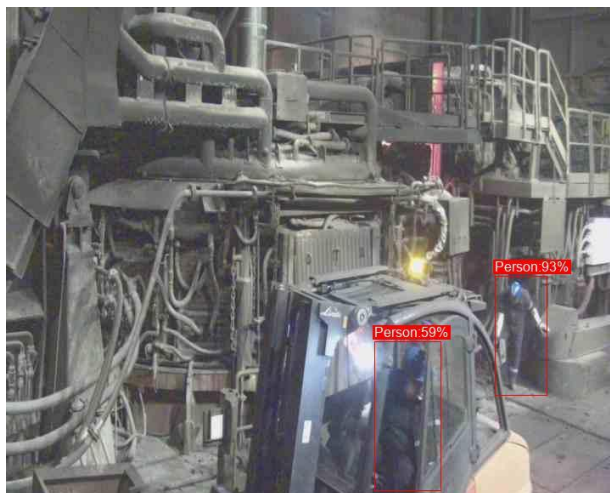
## iSteel-Expert Newsletter No 6

The iSteel-Expert project is approaching its conclusion, and the realization of the first pilot **remote expert virtual system** for EAF continuous monitoring is being finalised. The previous newsletter presented Artificial Intelligence-based anomaly detection, this one is dedicated to a different use of AI in the iSteel-Expert project:

### Artificial-Intelligence based image processing

A central pillar of iSteel-Expert is the use of computer vision to give the remote expert system a continuous visual awareness of the furnace area. Cameras installed around the Electric Arc Furnace feed images to machine learning models that automatically interpret what is happening, 24/7, complementing and informing the operators on the floor, improving process efficiency as well as safety in the plant.

The solutions rely on two families of models: **object detection**, which identifies what objects appear in an image and where they are located, and **image classification**, which assigns a single label to an entire image. Both are built on **convolutional neural networks (CNNs)** and transfer learning, re-using established architectures such as ResNet and RetinaNet (pre-trained on large public datasets) as a backbone, and fine-tuning them on images gathered directly inside the plant.



Gathering images in a steel plant is simple and training the networks is quick using modern technology; the hardest part is manually tagging the images, especially the rare edge cases, so that the models learn to detect and classify images in the desired way. This often requires judgment of skilled operators with deep domain knowledge. These operators usually struggle to find the time to carry out this often long and somewhat tedious task, but if done well this is the activity that leads to the best results.

The models now power several monitoring functions: **smoke detection** flags fumes and flames near the electrodes and roof; **people detection** locates personnel in high-risk zones; **electrode clamp speed estimation** tracks arm position and velocity via optical flow; **slag door status detection** spots when the door fails to close; and **electrode tip evaluation** detects tip wear.



## Dissemination

TENOVA has presented the implemented solution for AI-based image processing at the **Annual Iron and Steel Technology Conference and Exposition AISTech 2026**, held in USA in **Pittsburgh** on May 4-7, 2026. The iSteel-expert monitoring solution was also presented at the **European Electric Steelmaking Conference EEC2026**, held in Milan on May 11-13, 2026.

