

EXAMENSARBETE AI-Based Profile Matching for Extruded Components**STUDENTER** Oscar Torstensson, Filip Greiff**HANDLEDARE** Mathias Haage (LTH)**EXAMINATOR** Jacek Malec (LTH)

Vision-based AI That Finds Old Engineering Drawings in Seconds

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Engineers in manufacturing companies often spend significant time searching for old technical drawings. Although the drawing they need might already exist, large and poorly structured archives make them surprisingly hard to find. Over time, these systems become increasingly dependent on employee experience and memory.

Together with a global manufacturing company, we developed a vision-based AI search system capable of finding similar engineering drawings. Instead of searching using filenames or part numbers, engineers can simply upload a blueprint or a sketch. The AI then searches through thousands of technical drawings and retrieves the most visually similar designs.

The system is based on modern deep learning models originally developed for image recognition. We tested different AI architectures, including Vision Transformers and Convolutional Neural Networks, to determine how well they could understand and compare technical drawings. The drawings consist mainly of thin geometric lines, measurements, symbols, and annotations rather than colors and textures present in pretraining data.

To improve performance, we experimented with image preprocessing techniques that remove irrelevant information such as text, measurement lines, and metadata. We also explored methods that combine multiple AI models and techniques that help the system better interpret low-quality input images.

The results showed that modern AI models can perform remarkably well even without retraining or fine-tuning. In many cases, the system suc-

cessfully identified highly relevant drawings from a database containing over 18,000 blueprints. The system also demonstrated robustness when handling imperfect input such as sketches and blurry customer images.

However, the project also revealed an important limitation: humans and AI do not always interpret “similarity” in the same way. Engineers often focus on functional or manufacturing-related aspects of a drawing, while the visual models focus on visual geometry. Understanding this difference became an important part of the project.

To evaluate the system in practice, usability tests were conducted with engineers from the company. The tests indicated that the AI-based workflow could significantly reduce search time and improve efficiency compared to traditional manual search methods, in certain situations.

The project demonstrates how artificial intelligence can help companies reuse existing knowledge more effectively, reduce unnecessary redesign work, and support engineers in their daily tasks. More broadly, the thesis highlights both the opportunities and limitations of applying modern AI to industrial problems that have traditionally depended heavily on human expertise.