

## 4 to 6-month internship subject: ***3D CAD Reconstruction: Performance analysis, Optimisation and Semi-Automatic Labelling***

**Keywords:** CAD, Python, image processing, data labelling, data analysis

With the progress of additive manufacturing (AM) techniques, major manufacturing industries are now transitioning parts of their production to AM processes. These technologies rely on a numerical chain, at the root of which lies CAD representations of parts to manufacture. While CAD models are now considered standard practice, manufacturers often possess large catalogues of legacy parts defined only as engineering drawings, with critical parts sometimes relying on such documents for production.

To support the shift of manufacturers from traditional to advanced manufacturing techniques, Spare Parts 3D built a 3D reconstruction system to create CAD models from multi-source engineering drawings, processing both raster (png, jpg, tif, pdf...) and vector files (namely DXF/DWG or vector PDF). 3D models are built from extracted drawing features through a combination of traditional computer vision, deep learning and computational geometry.

Evaluating our solution to push its industrialisation forward is critical. To this end, we use a custom technical drawing dataset and design a detailed evaluation pipeline. We aim to efficiently discover bad cases where the reconstruction algorithm might fail and record its performance along consistent metrics, some still to be defined.

The envisioned internship work is as follows:

- Help define reconstruction success metrics.
- Run our reconstruction algorithm over drawings that still need to be tested and record the results in a detailed performance table.
- Identify, within the algorithm, steps and code snippets that bring the most significant error factors.
- Participate in the incremental improvement of the algorithm.
- Build auto-annotation systems for drawing labelisation.
- Participate in annotating drawings, both manually and automatically.

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