


Welding Production Automation (MVP)

Overview

This is a **personal engineering project** inspired by common workflows in Oil & Gas EPC projects, where welding joint data from piping isometric drawings is often updated manually into Excel or production reporting systems.

The goal of this project is to **automate the extraction and structuring of joint-level welding data** from piping isometric PDFs and generate **PCA-ready Excel reports**, reducing repetitive manual effort and human error.

 **Disclaimer:** This project does **not** use any proprietary drawings, contractor data, or confidential information. All examples and inputs are synthetic or publicly created for demonstration purposes.

Problem Statement

In many construction and piping projects: - Piping isometrics are issued for production - Welding joints must be tracked individually - Engineers or document controllers manually read each joint from drawings - Data is entered repeatedly into Excel or internal PCA/production systems

This process is: - Time-consuming - Error-prone - Difficult to audit - Repeated across projects

Solution (MVP Scope)

This application provides a **lightweight automation layer** between piping isometric documents and production reporting.

MVP focuses on:

- Uploading a piping isometric PDF
- Extracting joint-related information
- Applying simple business rules
- Generating a structured Excel report

The MVP intentionally avoids advanced features to stay focused and production-oriented.

MVP Features

1. ISO Upload

- Upload a single piping isometric PDF
- Validate file type and size

2. PDF Parsing

- Extract raw text from the PDF
- Identify:
 - Line number
 - Joint numbers
 - Joint size
 - Spool number

3. Data Processing

- Convert extracted data into structured domain objects
- Apply default rules:
 - Revision number
 - Subcontractor (config-based)

4. Persistence

- Store extracted joint data in a relational database

5. Excel Export

- Generate PCA-style Excel output
- Downloadable report ready for further processing

Out of Scope (For MVP)

The following are intentionally excluded: - Authentication & authorization - OCR for scanned drawings - CAD/DWG parsing - Multi-project configuration - Role-based access - Dashboards & analytics - Cloud deployment - Microservices architecture

System Architecture (High Level)

```
PDF Upload
  ↓
Spring Boot API
  ↓
```

PDF Text Extraction (PDFBox)



Business Rules



PostgreSQL



Excel Generator (Apache POI)



Download Report

Tech Stack

Backend

- Java 17+
- Spring Boot
- Spring Data JPA
- Apache PDFBox
- Apache POI

Database

- PostgreSQL

Frontend (Minimal)

- React (file upload & download UI)

Project Structure

```
com.weldingmap
├─ controller
├─ service
├─ repository
├─ domain
├─ dto
├─ exception
└─ config
```



Future Enhancements

- OCR support for scanned isometrics
 - Rule-based configuration per project
 - Revision comparison & change tracking
 - Validation & error reporting UI
 - Dockerized deployment
 - Cloud deployment (AWS)
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Author

Built as a **personal upskilling project** by a software engineer with domain exposure to Oil & Gas piping and production workflows.



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