

# Automation of the welding process in the assembly of retrievable drill casing pipes

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Electromechanical Engineering Technology

## Objective

- Jans Automation: a Belgian-based company specialized in creating custom-made automated machines and retrofitting outdated machinery with automation technology.
- Customer demand for producing drill pipes in small series.
- Bachelor's thesis developed to investigate feasibility of project.
- Objective: assess feasibility of producing drill pipes in small series.



Fig. 1: drill pipes

## Problem

- This thesis aims to automate the welding process for prefabricated threaded fittings used in the production of retrievable drill pipes for water drilling.
- Current methods involve manual welding or turning the entire pipe and fittings on large lathes, which is time-consuming and labor-intensive.
- The objective is to propose an automated solution to improve efficiency and reduce the reliance on manual labor.
- To perform good drilling, the fittings must be welded to the pipes with very low concentric deviation.



Fig. 2: petroleum drilling pipes [1]

## Solution



Fig. 8: result

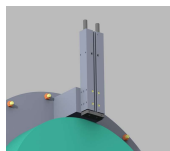


Fig. 3: pneumatic pusher



Fig. 4: extendable pneumatic finger

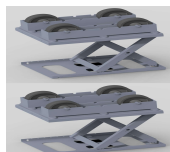


Fig. 5: scissor lift with pipe rotators

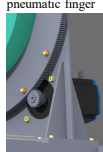


Fig. 6: drive rotating chuck

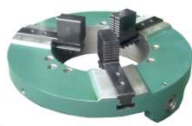


Fig. 7: rotating chuck

- Extendable pneumatic fingers used to position the pipes from the buffer on the scissor lift.
- A scissor lift equipped with pipe rotators that ensure the alignment and freedom of rotation of the pipes.
- Rotating chucks in which the fittings are clamped.
- Pneumatic pushers on both sides that precisely align the pipes with the fittings.
- Followed by welding as the entire tube rotates.
- Realised by using the van den Kroonenberg project method

## Method

- Buffer with a capacity of 10-20 tubes with a 114 mm diameter.
- Feed and input positions must be on the same side.
- The system should accommodate pipe lengths up to 3 meters.

- The system should handle pipe diameters ranging from 114 mm to 406 mm.
- The system should support the weight of pipes from approximately 63 kg to 460 kg (excluding fittings).
- The system must comply with the Machinery Directive 2006/42/EC.
- The system works 8 hours per working day.
- The width of the system may be up to 4 meters, the length is not binding.
- The use of a forklift to load and unload the drill pipes.
- The system should process about 1,000 pipes per year.

## Requirements

Supervisors / Co-supervisors / Advisors:

Prof. dr. ing. Karel Kellens  
Prof. dr. ing. Michael Daenen  
Ing. John Bijns

Prof. dr. Jeroen Lievens  
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Ing. Johan Jans

[1] J. Smith, "Petroleum Drilling Pipe Set Await Inspection," Shutterstock. [Online]. Available: <https://shorturl.at/IDKQR>. [Accessed on December 10, 2022].