WERKHUIZEN HENGELHOEF

INDUSTRIAL CONTRACTING

GENK - LIMBURG

+20,000,000 EUR

+100 EMPLOYEES

+75 YEARS EXPERIENCE

COMBINED IN THREE SITES

PHARMACY – NUTRITION – AUTOMOTIVE – CONCRETE – CHEMICAL – STEEL – AVIATION – WASTE PROCESSING – CONSTRUCTION – ART&DESIGN

On-Site production of quasi-continuous UHV pipes

April to November 2022; EU contribution: 49.350,00 €

Lead partner
(SME, Aachen)
Specialist in welding

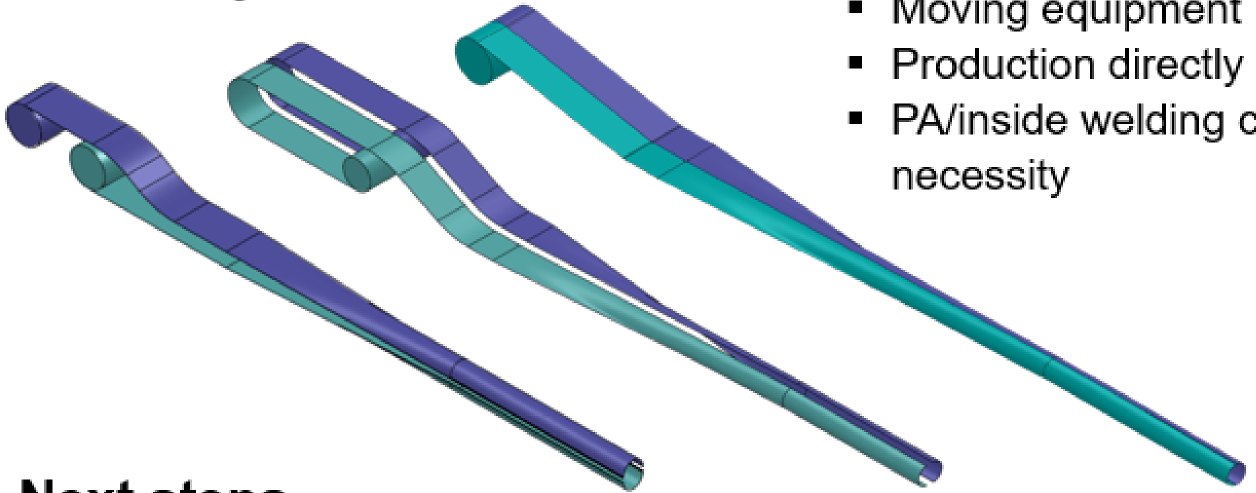
Lead Partner
(SME, Flandern)
Specialist in metal processing

Partner without funding
(large enterprise, Flandern)
Steel producer

Associate Partner

Summary & next steps

Summary



Source: Author: Jef Hoste, Werkhuizen Hengelhoef, 23.03.2023

- Moving equipment
- Production directly in the tunnels
- PA/inside welding considered as necessity

- Pre-welded coils due to limited coil width
- Custom bending process needed

- 500 m pieces are realistic
- Concept is considered feasible
- Open questions must be discussed

Next steps

- Welding parameter study
  - most stable parameters
  - ramp-up and ramp-down
- Adaption & testing of the mobile vacuum

- Tolerances & edge preparation at bending
  - pre- and post-treatment of the sheets

- Adjustment / modification of material
  - optimizing bending & welding properties
  - robustness to the prevailing underground conditions.


ET2SMEs
Interreg
Innovation Voucher
Innovation project
"On-Site production of quasi-continuous pipes"
EUR
€ 49,350 - -
AGIT
NMWP.
LIÈGE
SOWALFIN
Skywin
www.et2smes.eu

VACUUM INNOVATION PROJECT

ET2SMEs – On-Site production of quasi-continuous UHV pipes

“Beampipes for Gravitational Wave Telescopes 2023”

Dr. M. Purrio
CERN, 27.03.2023

Why are we investigating in a continuous underground production?

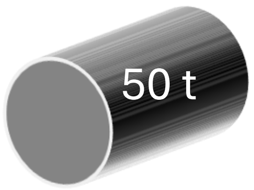
one 20 m piece per day transported, put in place, joined

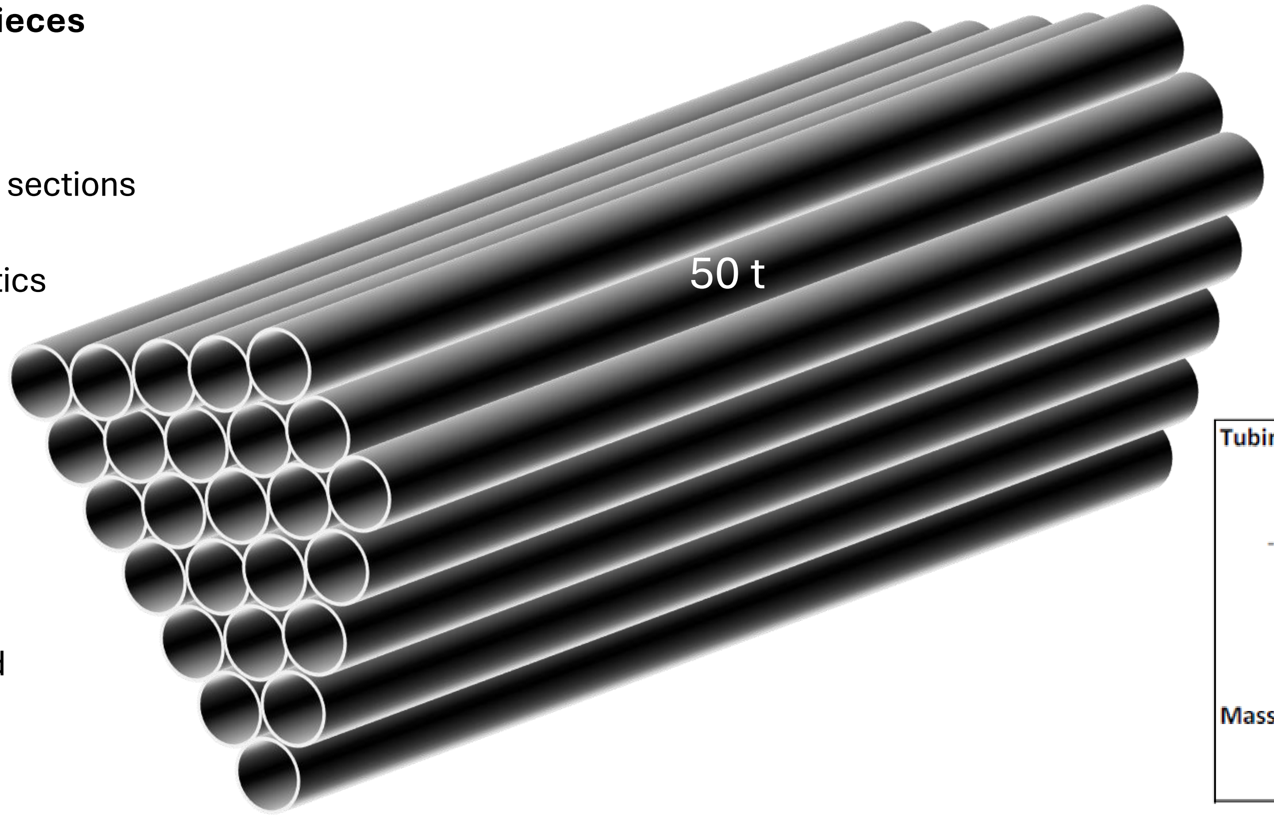
6000 days (~16,4 years)

5988 manual joints at 20 m pieces

reduction to 228 at 500 m pieces

- Less effort to connect the individual sections
- Significantly reduced effort for logistics
  - To the underground
  - Inside the tunnels
- Lower risk for defects by continuous automatic processing (in particular welding)
- Pipe sections get to their designated location faster





Coil :		
with :	mm	3.140,00
thickness :	mm	4,00
length:	m	510,00
Weight appr. :	Ton	50,80

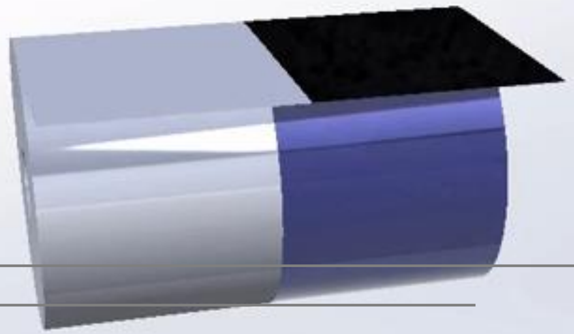
Coil Ton:		50,80
with :	mm	3.140,00
inner diamater	mm	610,00
outer diameter	mm	1.715,00

Tubing :		
with :	mm	3.140,00
thickness :	mm	4,00
- double sheet -		
diameter :	mm	1.000,00
Mass:		
running meter:	kg/m	99,60

Our findings – Part 1: Bending

Bending top to bottom

- Welding in flat position
- Welding on the inside

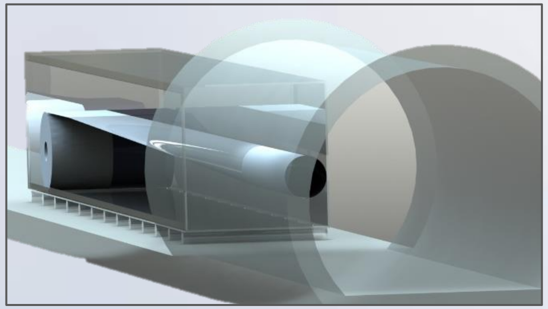


Prewelded coil

- max. coil width = 2 m
- welding on two positions & both PA
  → larger machinery in length & height

Mobile equipment

- move either pipe section (500 m) or machines (~20 m)
- Assumption: rails in tunnels from tunnel construction



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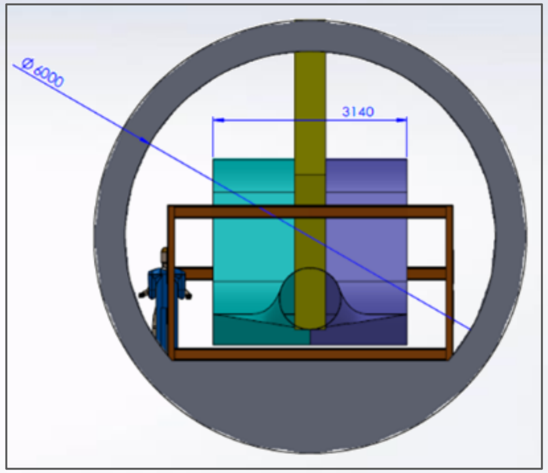


Source (all images and videos): Author: Jef Hoste, Werkhuizen Hengelhoef, 23.03.2023

- **Consortium - BeamPipes4ET**

RWTH Aachen University

Werkhuizen Hengelhoef

FEF Besser fügen

UHasselt

University of Antwerp

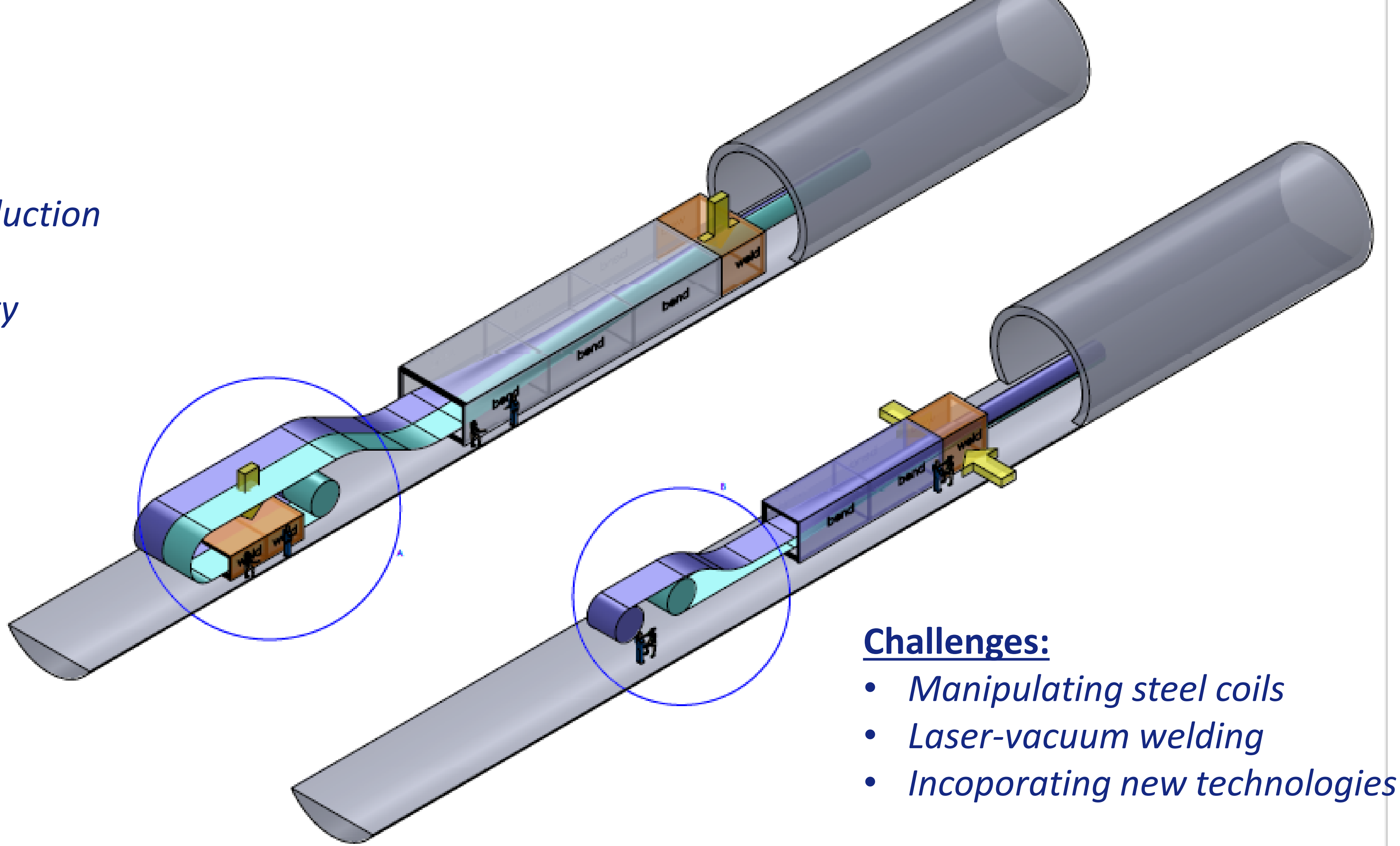
SBE

Aperam

- **BeamPipes4ET**
  - **→ Doel : bouwen prototype robot !**

Goals :

- *Proto-type*
- *Small batch production*
- *demonstrate manufacturability*



Einstein Telescope

Challenges:

- *Manipulating steel coils*
- *Laser-vacuum welding*
- *Incoporating new technologies*

provincie Limburg
met steun van limburg.be

AGENTSCHAP INNOVEREN & ONDERNEMEN

Vlaanderen is ondernemen

Interreg Co-funded by the European Union
Meuse – Rhine (NL – BE – DE)
BeamPipes4ET

- <u>**Subsidie :**</u>
  - **Totaal 2,85 Miljoen €**
    - **Verdeeld over 7 partners**

Interreg

Co-funded by the European Union

Meuse – Rhine (NL – BE – DE)

BeamPipes4ET

Budget

EU-bijdrage
€ 1.424.353,52

Regionale cofinanciering
€ 747.549,95

Bijdrage projectpartners
€ 676.803,60

Onze cofinanciers

Provincie Limburg (BE)

Vlaanderen

Land NRW

Provincie Limburg (NL)

Een slimmer Maas-Rijn-gebied

BEAMPIPES4ET