

# PROGRAM

## Workshop/Training Course

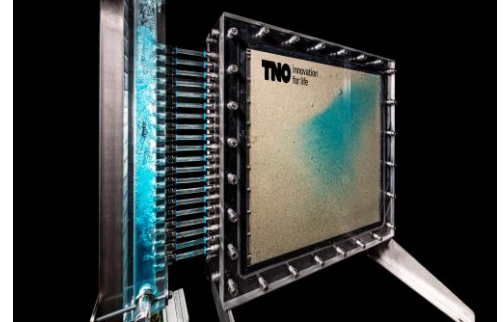
### 'Pulsation and Vibration Control in Process Installations'

TNO Delft, 4-5 April, 2022

Monday April 4

#### Plenary

- 08.30 - 09.00 Welcome coffee  
09.00 - 09.15 Introduction to TNO - Fluid Dynamics  
09.15 - 09.30 Introduction to the PVC course  
09.30 - 10.15 Pulsation and Vibration effects in Process Installation  
10.15 - 10.30 Coffee break  
10.30 - 11.30 Fundamentals of wave propagation in piping  
11.30 - 12.00 Lab Tour
- 12.00 - 13.00 Lunch buffet



#### Parallel sessions

##### Positive displacement

- 13.00 - 14.45 Pulsations in Reciprocating Compressor/Pump systems, part I  
14.45 - 15.00 Tea break  
15.00 - 16.00 Pulsations in Reciprocating Compressor/Pump systems, part II  
16.00 - 16.30 Pulsations in Screw compressors  
16.30 - 17.00 Application to Hydrogen compression systems

##### Process Dynamics and FIV

- 13.00 - 14.00 Pressure Surge  
14.00 - 14.45 ESD and Compressor Surge  
14.45 - 15.00 Tea break  
15.00 - 16.15 Multiphase forcing  
16.15 - 17.00 Flow induced Pulsations

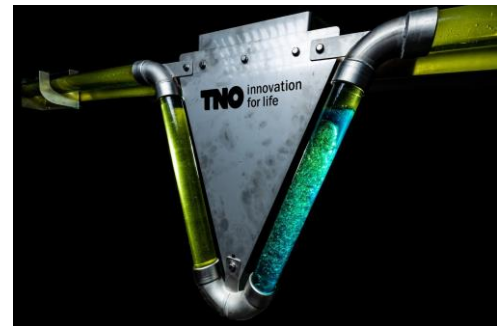
#### Plenary

- 19.00 - 22.00 Dinner in the city centre of Delft at Restaurant 'Van der Dussen'

Tuesday April 5

#### Plenary

- 08.30 - 08.50 Welcome coffee  
08.50 - 09.00 Review day 1 and preview day 2  
09.00 - 10.00 Introduction to pipe vibrations  
10.00 - 10.15 Coffee break  
10.15 - 11.15 Measuring pulsations and vibrations  
11.15 - 12.15 Introduction to fatigue  
12.15 - 12.30 Introduction to standards
- 12.30 - 13.30 Lunch buffet



#### Parallel sessions

##### Positive displacement

- 13.30 - 14.45 API Workflow, part I  
14.30 - 14.45 Tea break  
14.45 - 16.15 API Workflow, part II

##### Process Dynamics and FIV (AVIFF)

- 13.30 - 14.30 AVIFF evaluation, part I  
14.30 - 14.45 Tea break  
14.45 - 16.15 AVIFF evaluation, part II

#### Plenary

- 16.30 - 16.45 Closing session

# PRESENTERS LIST

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### 'Pulsation and Vibration Control in Process Installations'

TNO Delft, 4-5 April, 2022

#### *Stefan Belfroid*

Studied applied physics at the Technical University of Eindhoven. After 4 years at Stork Product Engineering now works for over 20 years as senior scientist for TNO on topics on Flow-Induced Pulsations and Dynamic Multiphase Flow. His current interests are in CO<sub>2</sub> storage and on the intersection of multiphase flow and pipe vibrations.

#### *Leonard van Lier*

Studied physics at the Technical University of Eindhoven. In his 20 year career at TNO, he specialized in Pulsations, Vibrations and Noise. In addition, he is taskforce leader of the Working Group Trainings, for the European Forum for Reciprocating Compressors (EFRC).

#### *Pieter van Beek*

Technical Lead on Fluid Dynamics, Acoustics and Asset Integrity at TNO. More than 20 years of experience in contract research, consultancy and Root Cause Analysis (RCA) on pulsation, vibration & noise and mechanical integrity of rotating & reciprocating equipment and adjacent process installations.

#### *Lennert Buijs*

Project manager and program manager for Energy Infrastructure Integrity studies within TNO Energy Transition. Over 10 years of experience as consultant in projects related to fluid structure interaction related, API compliance studies and process dynamics.

#### *Néstor González Díez*

Senior project leader with a focus on questions connected to flow-induced vibration and turbomachinery in the energy infrastructure.

#### *Can Tümer*

Scientist at the Heat Transfer and Fluid Dynamics department. His focal area is unsteady flows and any eventual fluid structure interaction problem that unsteady flows lead to. Also regularly conducts technical consultancy and is a lead developer of the TNO simulation tool, Pulsim.

#### *Hajo Pereboom*

Project engineer at the Heat Transfer and Fluid Dynamics department. Specialist on vibration and mechanical integrity of mechanical structures. Studied precision and microsystems engineering at the Technical University of Delft.

#### *Swen Konings*

Project engineer at the Heat Transfer and Fluid Dynamics department. Specialist on pulsation and vibration control for positive displacement machines in accordance with API-618 and API-674 studies. Studied fluid dynamics at the Technical University of Delft.