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NOTE

HySEA Newsletter #2

Second HySEA Newsletter

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This note is a deliverable from a project that has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 671461. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme and United Kingdom, Italy, Belgium and Norway.

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1 HySEA – Second newsletter

This note describes the second newsletter from the HySEA project. The newsletter represents deliverable D4.08 in the HySEA project.

1.1 Distribution

University of Pisa distributed the newsletter to 2150 recipients on 29 November 2016. The distribution included the partners in the HySEA project, as well as the distribution lists for the International Conference on Hydrogen Safety (ICHS – 783 subscribers) and the World Hydrogen Technologies Convention (WHTC – 1439 subscribers). The newsletter can also be downloaded in PDF format from the HySEA website: www.hysea.eu

2 Appendix: Second HySEA Newsletter

The Second HySEA Newsletter is included on the following pages.

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HySEA Newsletter

Improving Hydrogen Safety for Energy Applications (HySEA) through pre-normative research on vented deflagrations

Newsletter
2
November 2016

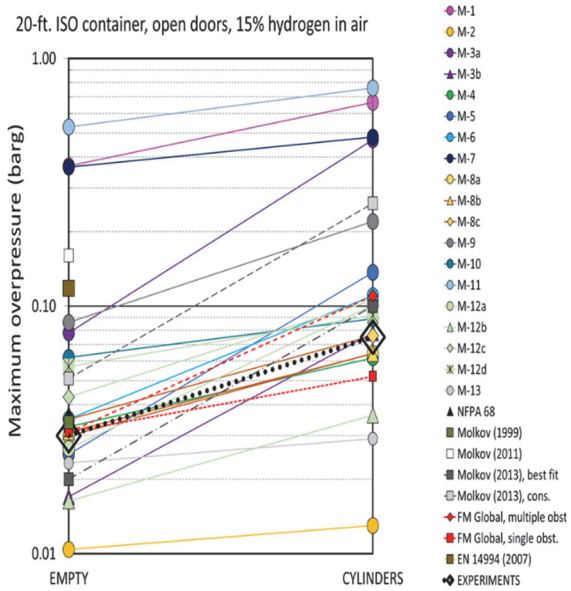


PARTNERS

The partners in the HySEA consortium are Gexcon (coordinator), University of Warwick, Universita di Pisa, Impetus, Fike Europe and Hefei University of Technology (HFUT).

ADVANCED MODELLING: CFD & FE

FIRST BLIND PREDICTION STUDY



Preliminary results from first blind-prediction study

The experimental test program has been carried out with 20-feet ISO containers that include internal geometry elements representative of typical refuelling stations. Whereas the entire test program with homogeneous mixtures includes about 30 tests, the first blind-prediction study is limited to two scenarios with homogeneous mixtures, and three repetitions of each scenario (i.e. six tests in total). The tests with 20-ft. ISO containers have carried out at the Gexcon test site at the island Sotra outside Bergen.

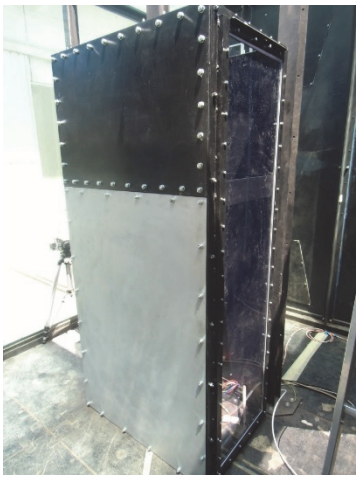
Preliminary results of the first blind-prediction study are summarized in the figure on the left.

The participants to the first HySEA blind prediction study were:

- INERIS
- NCSRD
- University of Ulster
- DNV GL Oil & Gas
- KIT
- Baker Engineering and Risk Consultants Inc.
- HSL
- CEA
- Fluidyn
- Impetus
- Lloyd's Register

EXPERIMENTAL CAMPAIGNS

HOMOGENEOUS MIXTURE IN SMALL SCALE ENCLOSURE



Small scale enclosure

University of Pisa has performed a series of experimental hydrogen deflagration tests in homogeneous conditions using a 1 m^3 enclosure called SSE (Small Scale Enclosure). The shape and dimensions of SSE resemble the ones of a commercial gas cabinet.

The first experimental campaign was composed by 39 tests involving homogeneous concentration of hydrogen in the range from 10 to 18 %. During the release, the internal atmosphere was homogenized using a fan, while H_2 concentration was sampled in five different positions inside the facility and measured by five different concentration analysers.

Videos were recorded at 240 frame per second by two cameras placed inside and outside the facility respectively, the internal camera was placed in the middle of the floor close to the back-wall and facing the upper vent, while the external camera was located in different position depending on the phenomena to be studied, namely: vent opening characteristics, test plate displacement, flame behaviour.

The main variables analysed in the experimental campaign are summarized in the table below:

Test #	H_2 concentration range [%vol]	Vent location	Vent type	Ignition location	Obstacle configuration	Test plate thickness [mm]
1…39	10-18	-Top -Front	-Plastic sheet (3 configurations) -FIKE vent (3 opening pressures)	-Top -Centre -Bottom	-Empty -1 bottle -3 bottles	2 5

HOMOGENEOUS MIXTURE IN CONTAINERS



20 ft. ISO container

By the end of November 2016, Gexcon has completed 14 full-scale explosion tests with homogeneous hydrogen-air mixtures in 20 ft. ISO containers, including the six tests that were part of the first HySEA blind-prediction study. These 14 tests involve venting trough the regular doors of the containers, and included tests with various obstacle configurations and fuel concentrations. The remaining 16 tests in Phase 1 will be performed with either plastic film or commercial pressure relief panels, installed on the roof of the containers. These tests will explore the effect of obstacle configuration, fuel concentration, vent area and ignition position. The results from Phase 1 of the container tests in the HySEA project will be published in 2017.

EVENTS

1 September 2015 Official start-up of the HySEA project. The project duration is three years.

14-16 September 2015 Gexcon hosted the kick-off meeting for the HySEA project in Bergen, Norway, on 14-16 September 2015.

19-21 October 2015 Partners from the HySEA project presented the project during the Sixth International Conference on Hydrogen Safety (ICHS) in Yokohama, Japan. The dissemination activities included a poster, flyers and mentioning during oral presentations during the conference.

23 October 2015 Gexcon presented the status for the HySEA project during the International Energy Agency Hydrogen Implementation Agreement (IEA-HIA) Task 37 on Hydrogen Safety meeting in Tokyo.

30 October 2015 Gexcon presented the HySEA project during the Fifty-fourth UKELG Discussion Meeting "Advances in Explosion Modelling" at University of Warwick.

28 November 2015 Università di Pisa distributed the first HySEA Newsletter.

16-18 December 2015 Università di Pisa promoted the HySEA project at the Piero Lunghi Conference (EFC15) in Naples.

3-5 April 2016 Fike Europe hosted the First Progress Meeting in the HySEA project in Herentals, Belgium.

25 April 2016 Gexcon and University of Warwick visited University of Science and Technology of China (USTC), State Key Laboratory of Fire Science, in connection with the Eight International Seminar on Fire and Explosion Hazards in Hefei, China, on 25-28 April 2016.

29 April 2016 Gexcon visited Hefei University of Technology and presented the HySEA project in connection with the Eight International Seminar on Fire and Explosion Hazards in Hefei, China, on 25-28 April 2016.

30 May 2016 Gexcon and Universita di Pisa announced the first HySEA blind prediction study and the First HySEA Workshop on 8-9 September 2016.

31 May - 1 June 2016 Gexcon presented the HySEA project at the FLACS User Group (FLUG) meeting in Bergen, Norway.

17 June 2016 Gexcon presented the HySEA project at the IEA HIA Task 37 meeting in San Sebastian, Spain.

24-29 August 2016 Gexcon presented a paper describing the modelling in FLACS-Hydrogen and the evaluation protocol for HySEA at the Eleventh International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions (11 ISHPMIE) in Dalian, China.

6-7 September 2016 Gexcon organized the Second Progress Meeting in the HySEA project in Bergen, Norway. Four members of the Advisory Board attended the meeting.

8 September 2016 Gexcon organized live demonstration experiments of hydrogen explosions in containers for the HySEA consortium and the modellers that participated in the first blind-prediction study in the HySEA project.

8 September 2016 The newspaper SYSLA published an article on the HySEA project. The article includes a video that contains an interview with the coordinator and shows a hydrogen-air explosion in a 20 ft. ISO container, and an interview with two members of the advisory board.

9 September 2016 Gexcon organized the first HySEA Workshop in Bergen, Norway. The event included an overview of the HySEA project, a summary of the results from the first blind-prediction study in HySEA, an overview of the modelling in FLACS-Hydrogen v10.5 (first released on 30 May 2016), and some prospects for further development and validation towards the next release.

23 September 2016 Gexcon presented the HySEA project at Green Energy Day in Bergen, Norway.

26-28 September 2016 Gexcon presented the HySEA project at the HySafe Research Priority Workshop and HySafe General Assembly in Petten, the Netherlands.

8-9 November 2016 Gexcon presented the HySEA project at the FLACS User Group (FLUG) meeting in Paris, France.

18 November 2016 The European Commission approved an amendment to the HySEA Grant Agreement (AMD-671461-3) where the University of Science and Technology of China (USTC) is replaced by Hefei University of Technology (HFUT) as non-funded Chinese partner in the HySEA consortium.

21 November 2016 Gexcon presented the HySEA project during the FCH 2 JU Programme Review Days in Brussels, Belgium (21-22 November 2016).

28-29 November 2016 Gexcon will present the HySEA project at the IEA HIA Task 37 meeting in Bethesda, Maryland, USA.

30 July - 4 August 2017 Partners in the HySEA consortium will present results from the project at the Twenty-sixth International Colloquium on the Dynamics of Explosions and Reactive Systems (26 ICDERS) in Boston, USA

11-13 September 2017 Partners in the HySEA consortium will present results from the project at the Seventh International Conference on Hydrogen Safety (ICHS 2017) in Hamburg, Germany.

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HySEA WEBSITE <<<<<<<<<<<

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