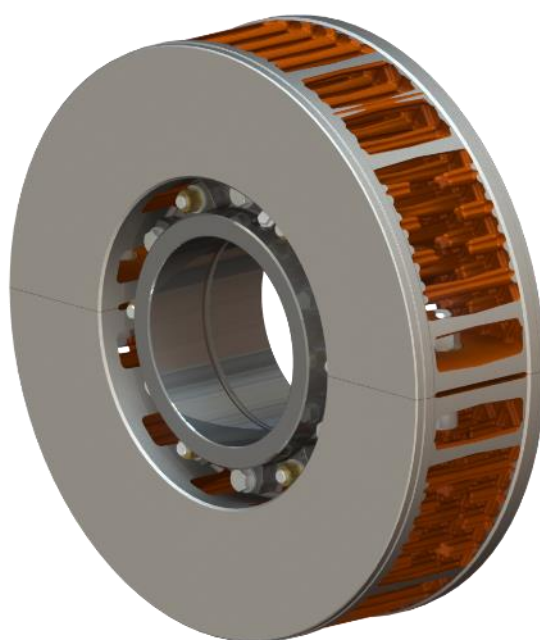




WORK PACKAGE 1 (WP1)
Optimization of DRFB disc
crown

PROJECT DELIVERABLE 1.5
MINUTES OF EXPERT MEETINGS



FUTUre RAil freight transport: cost-effective, safe, quiet and green! – FUTURA



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DRFB Divided rail freight brake

UIC International Union of Railways

1 INTRODUCTION

The scope of the document is to present meetings of consortium experts to discuss technical solutions, prototypes, and other contents of project.

In totally, five expert meetings were held, two intermediate meetings during the optimization phase, and three after optimization of prototypes, after testing in laboratory, and after testing in real environment. In addition to meetings, communication with consortium partners was held in oral and written form (like e-mail, telephone conversation, and Skype conferences).

2 1ST EXPERT MEETING

First intermediate expert meeting was held on 6th of July, 2016. Meetings were held separately with experts from Omnia, and separately with VUD. Things discussed with VUD were which laboratory tests were still needed to be performed for validation of DRFB disc against requirements. With Omnia, time schedule for delivery of first prototypes of DRFB disc hub was discussed.



Figure 1: 1st expert meeting at Omnia

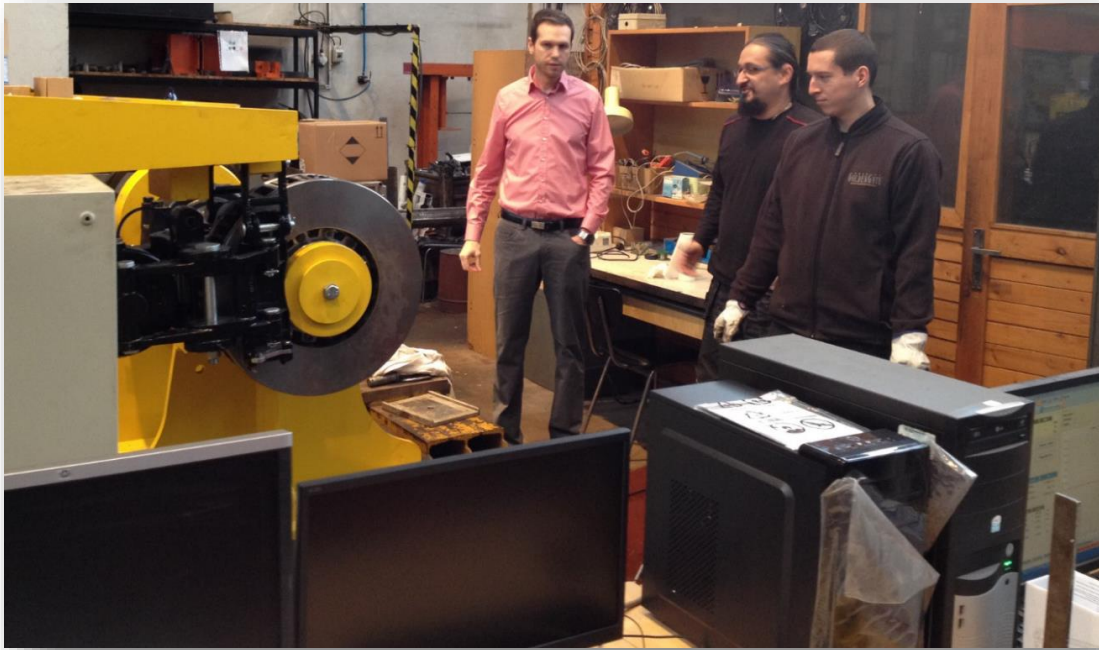


Figure 2: 1st expert meeting at VUD



Žilina, 2016-07-06

Minutes of Meeting

Subject: Report on progress, discuss further activities and deadlines

1. VUD

- Hub with dimension of 200H6 delivered to VUD.
- Information needed which tests from D1.1 will VUD be able to perform. Info needed by W34.
- Expected tests are:
 - Ventilation tests (power losses)
 - Noise generation tests
 - Heat dissipation tests
- VUD will check the procedure and necessary steps needed to obtain UIC label.

2. OMNIA-KLF

- Order and drawing for the Futura_1 hub prototypes has been sent to Omnia
- Omnia will send drawing of the forged hub by the end of W28
- Delivery of the 14 pieces of Futura_1 hubs in W31
- Omnia will continue with further optimization of the DRFB hub

3. OPERATIONAL PLAN

- Because of ZX-BENET, we need to make smaller adaptation in operational plan
- Updated operational plan will be sent to all consortium partners

ATTENDANCES:

Alen Šinko

Ivan Smolej

Mitja Črpič

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Ondrej Smatana

Kovis

Kovis

Kovis

VUD

VUD

OMNIA KLF

OMNIA KLF

OMNIA KLF

Figure 3: 1st expert meeting minutes

3 2ND EXPERT MEETING

Second intermediate expert meeting was held in VUD on 27th of July, 2016. Participants of meeting were experts from VUD and Kovis. Topic was on update of demands from last meeting. During this period from last meeting, VUD performed additional laboratory tests, which were needed for validation of DRFB disc against requirements.

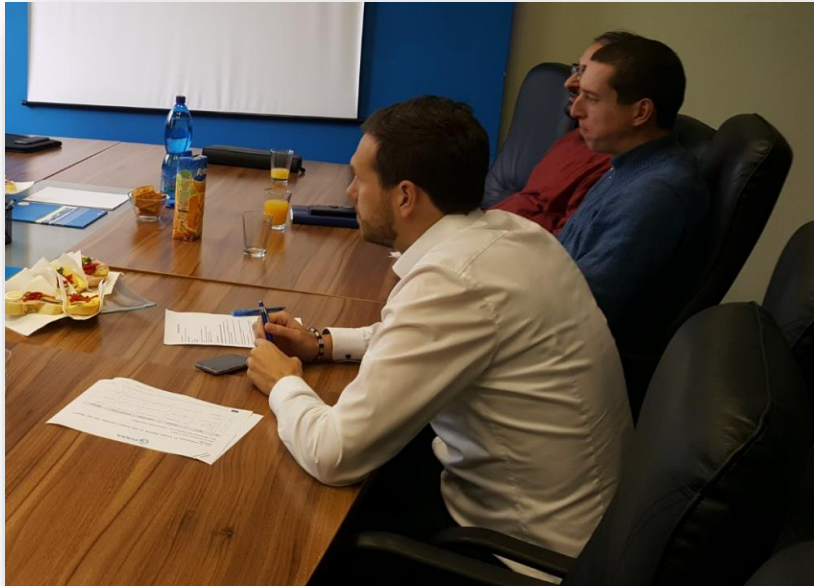


Figure 4: 2nd expert meeting at VUD



Figure 5: DRFB disc after laboratory tests



Žilina, 2016-07-27

Minutes of Meeting

Subject: Report on testing of initial DRFB disc

1. VUD

- Test of initial QSK was done:
 - Modified 2A2 program,
 - Heat dissipation test
 - DB-175 regulated braking
- Conclusion: some of the results of the dyno tests are acceptable according D1.1.
 - The temperatures are in acceptable range
 - The weight of the DRFB disc should be decreased
 - To increase lifetime of the disc, we think that we need to improve heat dissipation by changing the geometry of the disc.
- VUD still need to perform
 - Ventilation tests (power losses)
 - Noise generation tests
 - Heat dissipation tests

ATTENDANCES:

Alen Šinko

Ivan Smolej

Juraj Sloboda

Michal Kais

Kovis

Kovis

VUD

VUD

Figure 6: 2nd expert meeting minutes

4 3RD EXPERT MEETING – after optimization of prototypes

Third expert meeting was held in Kovis on 19th of September, 2017, after optimization of prototypes. Participants of meeting were experts from Kovis, Omnia and VUD. Topics were presentation of optimization results, discussion on optimization results and any other business. Description of discussed topics can be seen from minutes of meeting report.

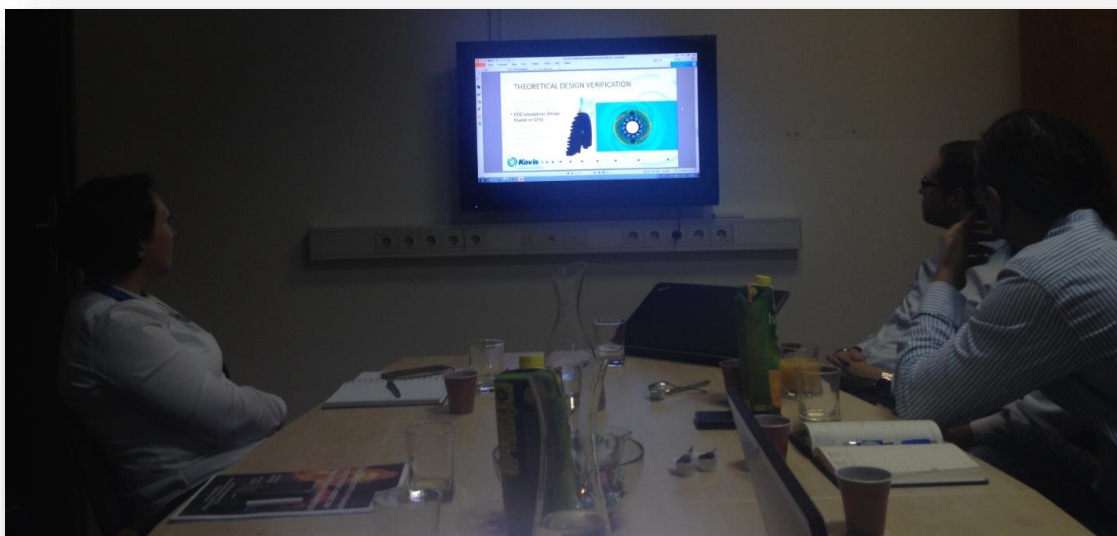


Figure 7: 3rd expert meeting at Kovis



Kovis, 2017-09-19

Minutes of Meeting

Subject: 3rd Expert meeting

1. PRESENTATION OF OPTIMIZATION RESULTS (CALCULATIONS, SIMULATIONS)

- At the beginning of the meeting, followed by introductory speech of development manager, the Kovis business unit Velika Dolina was presented to partners.
- Presentation of results, and process of optimization was done by engineering department of Kovis. Presentation in details described simulation process of all prototypes.
- Presentation of design process of hub was presented by Omnia.
- Presentations were held in purpose for partners to understand how optimization for all seven prototypes was done, and what kind of results were needed for successful validation of final design.

2. DISCUSSION ON OPTIMIZATION RESULTS

- Discussion was on how analysis were performed, and which tools were used for optimization of shape of cooling ribs and hub, and also which parameters were crucial for choosing the best design. The debate was on parametric modelling and temperature measurement while performing FEM analysis. Those methods were discussed and compared to methods of laboratory tests.

3. ANY OTHER BUSINESS

- Draft and content of scientific article was presented to consortium partners
- Followed by this, the tour around production facility was performed.

Figure 8: 3rd expert meeting minutes

5 4TH EXPERT MEETING – after testing in laboratory

Fourth expert meeting took place in VUD on 10th of October, 2017, after testing in laboratory. Participants of meeting were experts from VUD, Kovis, Kovis Livarna and ZX-Benet. Topics were presentation of laboratory testing results, discussion on testing results and any other business. Description of discussed topics can be seen from minutes of meeting report.



Figure 9: 4th expert meeting at VUD



Výskumný ústav dopravný, 2017-10-04

Minutes of Meeting

Subject: 4th Expert meeting

1. PRESENTATION OF TESTING RESULTS UNDER LABORATORY CONDITIONS (MATERIAL TESTING, TYPE TESTING)

- At the beginning of the meeting, followed by introductory speech of Deputy director general, the business of company was presented to partners.
- Presentation of results, and process of testing results was presented by Testing laboratory of machine parts strength measurements. Presentation in details described testing of DRFB disc prototypes (tensile tests, hardness tests, fatigue material tests, Charpy impact tests, local noise measurements during breaking, temperature measurements during breaking, measurement of the coefficient of friction at material degradation, and other tests in accordance to D1.1).
- Presentations were held in purpose for partners to understand how the material testing and type testing of five prototypes was performed, and what kind of results have been discussed with KOVIS for successful validation of final prototypes Futura 4 prototype (width 170 mm) and Futura 5 prototype (width 110 mm).

2. DISCUSSION ON TESTING RESULTS UNDER LABORATORY CONDITIONS

- Discussion was on how the material testing and type testing were performed, and which technical specification/testing methods were applied in way to reach necessary outputs for optimization of final prototypes made by KOVIS. Those methods of laboratory tests were discussed and compared to analysis used for optimization of prototypes Futura 1 prototype to Futura 5 prototype.

3. ANY OTHER BUSINESS

- Final version and content for professional article was presented to consortium partners.
- Followed by this, the tour around laboratory was performed.

Figure 10: 4th expert meeting minutes

6 5TH EXPERT MEETING – after testing in real environment

Fifth expert meeting took place at Mělník Container Terminal on 16th of November, 2017, after testing in real environment. Prior to meeting, 11th inspection of wagon was conducted according inspection protocol.

Followed by inspection of the wagon, meeting was held. Participants of meeting were experts from VUD, Kovis, and ZX-Benet. Topics were presentation of real environment test flow and results, detailed presentation of CALIPRI measuring equipment, discussion on testing results and any other business. Description of discussed topics can be seen from minutes of meeting report.



Figure 11: 5th expert meeting at Mělník



Mělník Container Terminal, Czech Republic ,2017-11-16

Minutes of Meeting

Subject: 5th Expert meeting

1. 11TH INSPECTION OF THE WAGON AND NOISE MEASUREMENT

- 11th inspection took place at Mělník Container Terminal.
- Inspections were done according inspection sheet and values were written in control and measurement sheet,
- Noise measurement was conducted with two wagons, one with brake blocks and one with DRFB discs.
- The results from noise measurement were saved in Extech HD600 Datalogging Sound Level Meter, and then exported to computer for final analysis.

2. DISCUSSION ON TESTING RESULTS AND OTHER MEASUREMENTS

2.1. Presentation of real environment test results

- Fifth expert meeting took place at Mělník Container Terminal. In the beginning of the meeting, introductory speech was done from side of project manager.
- Presentation of real environment test flow and results was done by ZX-Benet. Presentation in detailed described each inspection procedure and result of the same.
- Beside above mentioned, presentation of CALIPRI measuring equipment and measurement process of DRFB disc wear rate was done by ZX-Benet.

2.2. Discussion on test results

- During the meeting, discussion was on analysis of DRFB disc wear rate, and calculation of life cycle of DRFB disc against driven kilometers.
- Debate was on next steps needed for WP4 (fourth work package) within FUTURA project.

3. ANY OTHER BUSINESS

- Structure and content of deliverable D4.2 was discussed between ZX-Benet and Kovis.

Figure 12: 5th expert meeting minutes