

Milestone Report

Test beam, EDMS and DAQ commissioning

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03 March 2014



The research leading to these results has received funding from the European Commission under the FP7 Research Infrastructures project AIDA, grant agreement no. 262025.

This work is part of AIDA Work Package 8: **Improvement and equipment of irradiation and test beam lines.**

The electronic version of this AIDA Publication is available via the AIDA web site
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Grant Agreement No: 262025

AIDA

Advanced European Infrastructures for Detectors at Accelerators

Seventh Framework Programme, Capacities Specific Programme, Research Infrastructures,
Combination of Collaborative Project and Coordination and Support Action

MILESTONE REPORT

TEST BEAM, EDMS AND DAQ COMMISSIONING

MILESTONE: MS34

Document identifier:	AIDA-MS34-EDMS
Due date of deliverable:	End of Month 36 (January 2014)
Report release date:	03/03/14
Work package:	WP8: Improvement and equipment of irradiation and test beam lines
Lead beneficiary:	DESY, CERN
Document status:	Final

Abstract:

In this document we report on the commissioning of the test beams, the EDMS systems used for the AIDA project and on the development of a dedicated website aimed at providing an easy and up-to-date access to the public documents stored in the EDMS systems at DESY and CERN.

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The Advanced European Infrastructures for Detectors at Accelerators (AIDA) is a project co-funded by the European Commission under FP7 Research Infrastructures, grant agreement no 262025. AIDA began in February 2011 and will run for 4 years.

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Delivery Slip

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Approved by	Steering Committee		03/03/14

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Executive summary

During the years 2011 and 2012 several test beam campaigns have been completed at CERN, that provided important data for the operation of the analog and digital hadron calorimeters developed by the CALICE collaboration for the detectors at the future linear collider.

The large quantities of data required for the design, building and operation of the infrastructures developed within the AIDA project require consistent data management and storage. An engineering data management system (EDMS) is used within AIDA to handle the workflow of the engineering tasks, including 3D CAD design models, technical reports and specifications.

Effective information sharing within the experimental community is provided through a dedicated web portal at <http://flc-edms.desy.de> that embeds information stored in the DESY and CERN EDMS systems. It is aimed at becoming the central documentation portal for AIDA partners as well as for the outside world. The deployment and the maintenance of this portal is provided by DESY.

The future steps relate to the storage and structuring of further information within the DESY and CERN EDMS systems.

1. INTRODUCTION

Infrastructures developed within the AIDA project are used to test the feasibility and performance of different key detector technologies developed for the detectors at the future electron positron linear collider.

The design, construction and operation of the AIDA infrastructures generate large amounts of data. This data comprise documents and other sources of information such as CAD drawings, technical reports, simulation and analysis results, calibration data, software source code, meeting minutes and slides, detector images, etc. Data production is performed at many different institutes, located all over the world using a whole variety of methods and tools, ranging from word-processors to CAD systems. The need for ease of access, for consistency, maintenance and long-term availability, dictates the use of an Engineering Data Management System (EDMS). Such a system will drastically reduce the time spent on search for information and lead to improve quality by ensuring use of the correct information.

In the following we report on the commissioning of the test beams, the EDMS systems used for the AIDA project and on the development of a dedicated website aimed at providing an easy and up-to-date common access to the public documents stored in the EDMS systems at DESY and CERN.

2. TEST BEAMS

In 2011 and 2012 several test beam campaigns were held. A tungsten stack and tail catcher have been equipped with several different sensor and electronics technologies, notably the analog and digital hadronic calorimeter (HCAL) technologies from the CALICE collaboration. These have successfully been tested in beam lines at the PS and SPS areas at CERN.

The set up of the beam tests is described in [1]. Additional commissioning of the Cherenkov chambers used for particle identification is described in [2]. Preparations for the digital HCAL were reported on in [3].

The commissioning and subsequent data-taking were a success: the analyses of the test beam data have been on-going, resulting in one publication for the analog HCAL analysis in JINST, see [4], and a second publication which is being prepared, see [5].

In 2013 the CERN test beams were shut down for maintenance and repairs. As a result, the CERN Linear Collider Detector (LCD) group used the DESY II beam line 21 with electrons of 5-5.6 GeV momentum to perform characterization measurements of hybrid pixel-detector assemblies in the context of R&D for the CLIC vertex detector. Concurrently the LCD group participated in the hardware and software developments to the DESY EUDAQ test-beam infrastructure.

A low-weight fixation for the Timepix device under test (DUT) was designed and produced using 3d-printing technology. The fixation connects via a quick-release mechanism to the translation and rotation stages inside the EUDET telescopes. It allows for rotation scans with minimised distance between the DUT and the neighbouring reference planes and for fast and safe exchanges of DUTs. The blueprint of the fixation was made available for other test-beam users, serving as a template for similar designs.

An FPGA-based trigger synchronisation board (MiM-TLU) was developed. The MiM-TLU board groups a selectable number of hardware triggers from the EUDAQ Trigger Logic Unit (TLU) into longer readout frames for the DUT. The use of the MiM-TLU board largely improves the data-taking efficiency for DUTs with shutter-based readout and long dead times. The readout rate for the Timepix ASICs with Fitpix readout was increased by a factor of 15 when using the MiM-TLU board. The LCD group also developed and commissioned the corresponding readout drivers (producers) in the EUDAQ framework, both for the Timepix device under test and for the MiM-TLU. The MiM-TLU hardware and the readout software were documented and made available for other test-beam groups with similar requirements.

The MiM-TLU has become part of a test setup for qualifying new TLUs in the DESY test beam.

The test beams have thus successfully been commissioned.

3. EDMS FOR THE AIDA PROJECT

An essential success factor of any project is the existence of up-to-date, complete and consistent information that is readily accessible throughout the project. An Engineering Data Management System (EDMS) will be used to manage the complexity of the design and manufacturing information, as well as the processes, of the future linear electron – positron collider and its detectors [6].

An EDMS is an information system that serves as a central information management platform for world-wide collaborations. It provides functionality for managing documents and 3D-CAD data and for performing configuration and change management. It can control complex information structures and keep track of their dependencies and history. It has powerful capabilities to control the information access, being able to manage authorization and responsibilities in large and complex projects.

An EDMS will be used to manage, store and control all the information relevant for the design, construction and exploitation of the infrastructures developed within the AIDA project during their whole life cycle. The DESY and CERN EDMS systems have been extended for the needs of the linear collider collaboration. The DESY EDMS has been configured specially for this project by defining dedicated document and relation types, implementing workflows for reviewing, approval and change activities, configuring navigational structures, providing interfaces to external applications and many other issues. DESY EDMS is used in this configuration also for the AIDA project to document the infrastructure developed for the detectors at the planned electron positron linear collider. The configuration of the EDMS is an ongoing effort throughout the project lifetime since new requirements can appear as the project evolves.

The following activities have been successfully accomplished for the AIDA project:

- Document management, including drawings, 3D-models, versioning and configuration management.
- Structure management, including attaching documents to the structure, 2D and 3D viewing.

We therefore conclude that the EDMS systems used for the AIDA project are successfully commissioned.

4. WEBSITE FLC-EDMS

A website has been developed to provide a transparent, easy and common access to the DESY and CERN EDMS systems for the experimental community. It uses a web-based interface that allows access to the structures and the public accessible documents attached to it, in order to produce dynamically the web page information.

The system is physically hosted at DESY under the URL: <http://flc-edms.desy.de>. The system is fully operational and regularly maintained. It is based on the ZMS content management system. This content management system allows an easy inclusion of new information, as

well as easy maintenance, through a simple web-based interface.

The majority of the pages are generated dynamically via web-based interfaces from the public information stored in the EDMS systems at DESY and CERN. Examples are shown in Figures 1 and 2. When there is no documentation currently stored in EDMS, documentation pages from other dedicated sites are embedded into FLC-EDMS website. An example is shown in Figure 3. During the remaining time of the project, the system will be continuously improved aiming of providing exclusively information stored in the EDMS systems.

5. FUTURE PLANS

The EDMS systems at DESY and CERN were configured for the AIDA project and a website to access the documentation of the test beam infrastructures has been set up. The next steps relate to the further storage and structuring of the information within the DESY and CERN EDMS.

The overall milestone MS34 had been achieved. Now the project is on its way and will be completed within the AIDA time schedule.









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 **AIDA**

Test Beam Documentation

Large TPC Prototype

Last updated on: 2014-01-31 18:22

- ☰ [TPC Large Prototype\(41\)](#)
 - ☰ [The Linear Collider TPC of the ILD](#) 
Description of the R&D activities for the LCTPC. 2013-04-25
[D*1017825.A.1.1](#) 
 - ☰ [Computing and Analysis\(7\)](#)
 - ☰ [Analysis\(6\)](#)
 - ☰ [Simulation and Reconstruction\(1\)](#)
 - ☰ [Latest developments in the MarlinTPC software package](#) 
Description of the MarlinTPC package that is a simulation, digitisation, reconstruction and analysis package for a pad and a pixelated TPC 2013-04-23
 - ☰ [Integration and Installation\(3\)](#)
 - ☰ [Large Prototype Subsystems\(29\)](#)
 - ☰ [Status of the Large TPC Prototype](#) 
Description of the Large Prototype of a TPC based on Micro Pattern Gas Detector for the ILD detector 2013-04-24
[D*1015985.A.1.1](#) 
 - ☰ [The large prototype TPC](#) 
Status report of the preparations for a prototype TPC 2013-04-23
[D*1016105.A.1.1](#) 
 - ☰ [TPC Task: the Past and the Present](#) 
Description of the Large Prototype of a TPC based on Micro Pattern Gas Detector for the ILD detector 2013-04-23
[D*1015845.A.1.1](#) 
 - ☰ [TPC Task Status Report](#) 
Description of the Large Prototype of a TPC based on Micro Pattern Gas Detector for the ILD detector 2013-04-23
[D*1015785.A.1.1](#) 
 - ☰ [Data Acquisition System\(3\)](#)
 - ☰ [End plates\(3\)](#)

Mission

The goal of this website is to ensure a complete documentation of the infrastructures developed within the AIDA project and an up-to-date access to public information stored in the DESY and CERN EDMS.

Links

[CERN EDMS](#)
[DESY EDMS](#)
[AIDA at CERN](#)
[DESY](#)


Feedback

Make us a suggestion about how we can improve the documentation.

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Fig 1: Documentation of the tracking detectors in the DESY EDMS.

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Test Beam Documentation

HCAL prototype

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- HCAL prototype
- └─ mechanical systems
- └─ readout and electronics



EDMS Project Page

[EDMS Portal](#) | [Hide Navigator](#) | [Search](#) | [Help](#) | [Login](#)

Proj. Id: **CERN-0000079481 v.0**

Eq. code: -

In Work

HCAL prototype

Responsible
ELSENER

Summary
Structure
Documents
Used in
Access Rights
Versions & other info

Actions:

Documents in this node: 24

Sort by: Position Ascending Display: Default Obsolete: Hide

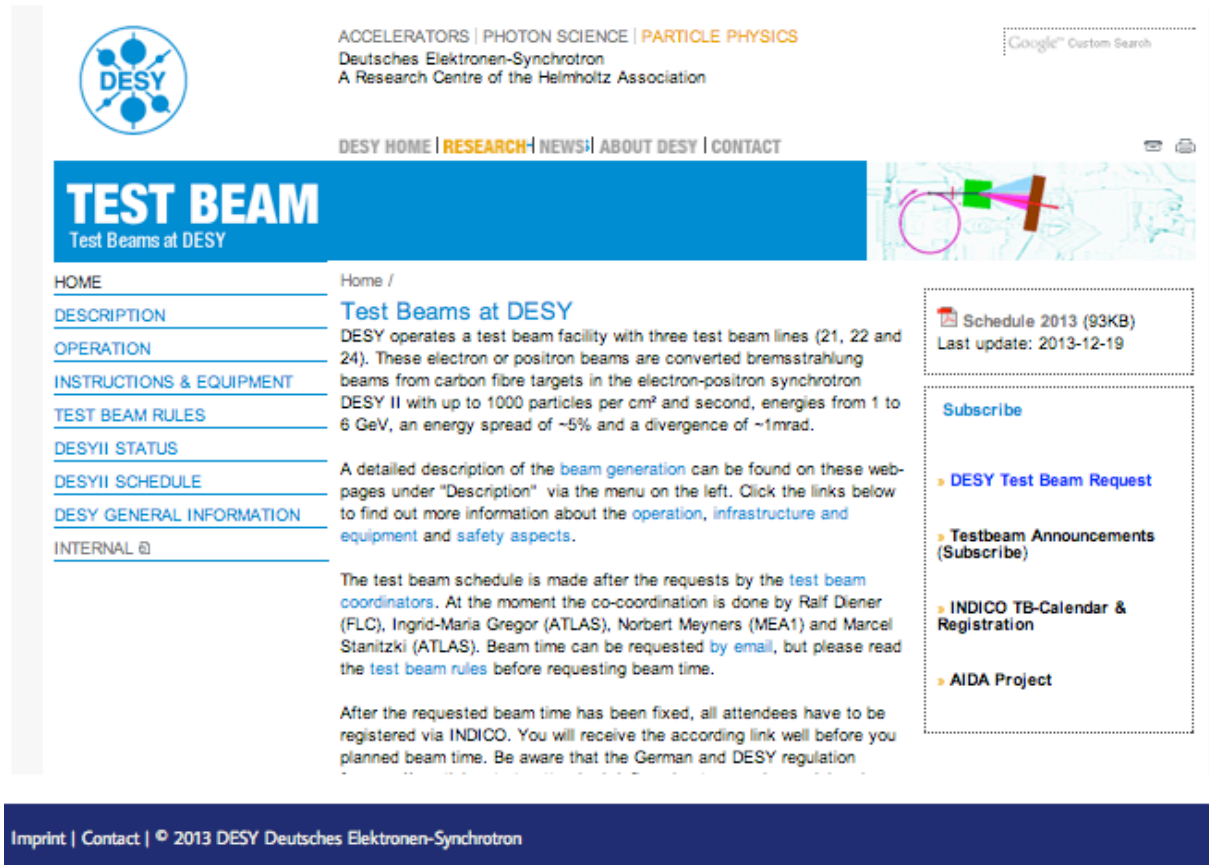
1064370 v.1	Tungsten HCAL prototype meeting at DESY, 2 March 2010	In Work
Doc. page	KGadow_Tungsten_HCAL_meets_CALICE_V3 ppt (8 Mb) WKlempert_Tungsten_supply_and_testbeam_set up ppt (1 Mb) Electronics_readout_calibration_Tungsten_AHCAL_reinecke ppt (8 Mb) EGarutti_HCAL_installation_experience ppt (9 Mb) A_Lucaci-dataFlow-2March2010 pdf (78 Kb)	
1065063 v.1	Tungsten HCAL prototype meeting at Anecny, 24 Sept 2009	In Work
Doc. page	KGadow_first_ideas pdf (1 Mb) Commercially_Available_Tungsten pdf (293 Kb) minutesWHCAL_Anecny_workshop pdf (74 Kb) list_of_participants pdf (20 Kb)	

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Fig 2: Documentation of the hadron calorimeter prototypes in the CERN EDMS.

Test Beam Documentation

DESY Test Beam Facility



The screenshot shows the DESY Test Beam Facility website. At the top left is the DESY logo. To its right, the text reads: "ACCELERATORS | PHOTON SCIENCE | PARTICLE PHYSICS", "Deutsches Elektronen-Synchrotron", and "A Research Centre of the Helmholtz Association". A "Google Custom Search" box is visible. Below this is a navigation bar with "DESY HOME | RESEARCH | NEWS | ABOUT DESY | CONTACT". A large blue banner features the text "TEST BEAM" and "Test Beams at DESY". On the left is a vertical menu with links: HOME, DESCRIPTION, OPERATION, INSTRUCTIONS & EQUIPMENT, TEST BEAM RULES, DESYII STATUS, DESYII SCHEDULE, DESY GENERAL INFORMATION, and INTERNAL @. The main content area starts with "Home / Test Beams at DESY" and a paragraph: "DESY operates a test beam facility with three test beam lines (21, 22 and 24). These electron or positron beams are converted bremsstrahlung beams from carbon fibre targets in the electron-positron synchrotron DESY II with up to 1000 particles per cm² and second, energies from 1 to 6 GeV, an energy spread of ~5% and a divergence of ~1mrad." This is followed by a detailed description of beam generation and a note about registration via INDICO. On the right side, there are two boxes: one for "Schedule 2013 (93KB)" with a last update of "2013-12-19", and another titled "Subscribe" containing links for "DESY Test Beam Request", "Testbeam Announcements (Subscribe)", "INDICO TB-Calendar & Registration", and "AIDA Project". At the bottom of the page, a dark blue bar contains "Imprint | Contact | © 2013 DESY Deutsches Elektronen-Synchrotron".

Fig 3: Documentation of the DESY test beam facility. Pages from the URL: <http://testbeam.desy.de> are embedded into the FLC-EDMS website.

6. REFERENCES

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