



**General Guidelines
for the
CAX Implementor Forum**

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1 Introduction

The CAx Implementor Forum is a joint testing effort between AFNeT, PDES, Inc. and the prostep ivip association. The objective of the forum is to accelerate CAx translator development and ensure that users' requirements are satisfied. The CAx Implementor Forum is an approach to establish common test activities in two domains:

- Computer Aided Design (CAD)
- Computer Aided Engineering (CAE)

The small 'x' in 'CAx' serves as placeholder. The guidelines given in this document apply to all domains supported by the project. Distinction between the domains is only given where necessary.

The goals of the CAx Implementor Forum are to:

- Implement functionality for today's needs
- Identify functionality for tomorrow's needs
- Avoid roadblocks by establishing agreed upon approaches
- Increase user confidence by providing system and AP interoperability testing
- Ensure new functionality does not adversely impact existing implementations
- Significantly improve STEP translator quality and decrease translator time-to-market

2 Test Campaigns

There are two test campaigns per year in each domain, so each campaign is about six months in duration. The test campaigns begin in April and October for the CAD domain, and July and January for the CAE domain. In general, a test campaign is:

- A round of distributed testing
- Followed by a test review meeting. This typically covers:
 - Detailed discussion of the results
 - Discussion of technical and standardization issues
 - Definition of the following round's scope and schedule
 - Joint meeting with users
 - Joint meeting with related project teams

Each campaign consists of a number of individual tests designed to meet / prove out requirements identified by the member companies for STEP interoperability testing. Each test campaign is comprised of:

- Definition of testing scope
- Development of testing instructions and criteria
- Selection of test cases
- Modeling of the test parts
- Preprocessing
- Transmission of files and statistics to the CAx Implementor Forum

- Checking files for syntax, structure, and semantics
- Distribution of “checked” files
- Post-processing
- Transmission of results for comparison
- Discussion of issues

An overview of an arbitrary test round is as follows:

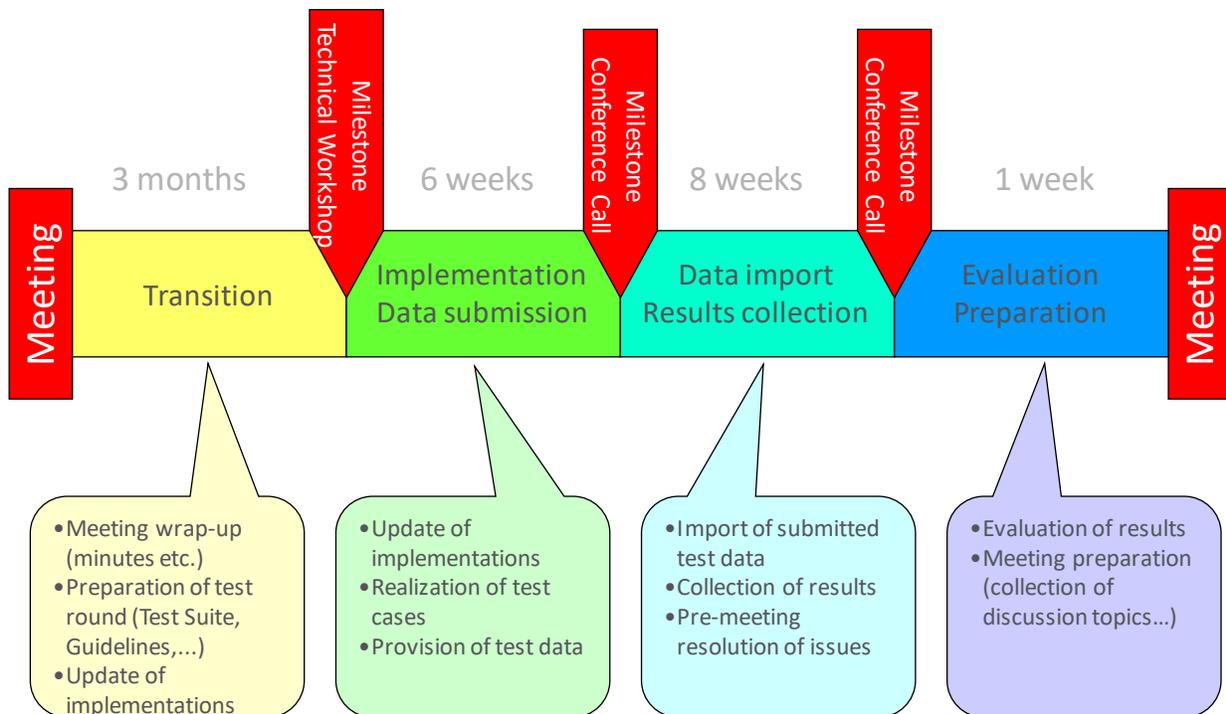


Figure 1: Schematic course of a CAx-IF Test Round

2.1 Prerequisites for Participation

A number of prerequisites have to be met before a CAx vendor can participate in the Implementor Forum. They are:

- The vendor must have a relatively mature STEP translator for either AP209 Edition 2 or AP242, and be able to:
 - post-process a test suite of representative STEP files successfully
 - provide STEP files which pass syntax, structure, and semantic checking
- The vendor must sign a non-disclosure agreement with AFNeT, PDES, Inc. or prostep ivip
- The vendor must agree to actively participate in the testing, which includes:
 - Pre- and post-processing test cases
 - Participating in conference calls
 - Identifying and discussing issues
 - Attending the meetings at the culmination of a round of testing

2.2 File Naming Conventions

2.2.1 For STEP Files

To insure proper configuration management of the test files, the following naming conventions are to be used for the STEP files from each vendor:

ccc-xx-yyy.stp	ccc = test case identifier per testing instructions xx = vendor code of creating system yyy = 209 or 242
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So for instance for the submitted STEP file from Autodesk Inventor for the solid assembly test case AS1 conforming to AP242, the proper file name would be:

as1-in-242.stp

Either the “*.stp” or “*.step” file extensions are permissible, but “*.stp” is recommended.

2.2.2 For native and target Models

Native and target models (i.e. models in the native format of the target system importing a STEP file) need to be exchanged to enable data transfer quality validation. Since many CAx systems automatically generate the file names from the id of the contained models, no naming convention for the models themselves is given. It is however recommended to rename the files (if possible) so that it becomes clear from the file name which system generated the model on the basis of what STEP file.

However, it is recommended to ZIP to model files before submitting them. The naming convention for these ZIP files is:

ccc-nnn-ttt.zip	ccc = test case identifier per testing instructions nnn = vendor code of the system that created the models ttt = use 'nat' for native models, 'tgt' for target models.
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As an example, the target models for the Production Models imported into Dassault Systèmes CATIA V5 would be contained in the archive named

pm14-c5-tgt.zip

Note: For Unix based systems it is allowed to submit .tgt.gz formatted archives instead of .zip.

2.2.3 For any other files

Since the introduction of CAESAR (see section 3.5), it is no longer necessary to provide statistics (either native or target), or screenshots, to the facilitators, since these can be uploaded directly to the web database. If any files are submitted for additional information, the following naming convention is suggested:

ccc-nnn-ttt.ext	ccc = test case identifier per testing instructions nnn = vendor code of the system that created the native model / STEP file ttt = 'nat' for native models, 'tgt' for target models, or target system's code ext = extension according to file type
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So for instance for a PNG-formatted screenshot showing the import of a PTC Creo production model into Datakit's CrossCad for SolidWorks, the proper file name would be:

pm20-cr-dw.png

2.3 Vendor Codes

For the vendor codes used in the file naming conventions and further documentation, the following two letter designations shall be used:

Code	System	Vendor
3de	3D Evolution	CT CoreTechnologie
c3e	3DExperience	Dassault Systèmes
c5	CATIA V5	Dassault Systèmes
cg	CgiStepCamp	Cg interActive
cr	Creo	PTC
d5	CrossCad (CATIA V5)	Datakit
dc	CrossCad	Datakit
di	CrossCad (Inventor)	Datakit
do	CrossCad (Creo)	Datakit
dw	CrossCad (SolidWorks)	Datakit
dx	CrossCad (NX)	Datakit
ec	CadDoctor	Elysium
ex	Asfalis (NX)	Elysium
fs	FiberSim	Vistagy
h3	HOOPS 3D Exchange	TechSoft 3D
h5	HOOPS 3D (CATIA V5)	TechSoft 3D
hc	HOOPS 3D (Creo)	TechSoft 3D
hx	HOOPS 3D (NX)	TechSoft 3D
i5	CADfix (CATIA V5)	International TechneGroup
ic	CADfix (Creo)	International TechneGroup
id	NX I-DEAS	Siemens PLM Software
if	CADfix	International TechneGroup
in	Inventor	Autodesk
iq	CADIQ	International TechneGroup
iw	CADfix (SolidWorks)	International TechneGroup
ix	CADfix (NX)	International TechneGroup
jn	NASTRAN	Jotne EPM

Code	System	Vendor
jo	openSimDM	Jotne EPM
lk	IDA-STEP	LKSoft
nas	NASTRAN	CAE-IF <i>(for reference data)</i>
nx	NX	Siemens PLM Software
oc	CrossCad (OpenCascade)	Datakit
se	SolidEdge	Siemens PLM Software
sp	ACIS	Spatial
sw	SolidWorks	Dassault Systèmes
t5	Cadverter (CATIA V5)	Theorem Solutions
to	Cadverter (Creo)	Theorem Solutions
ts	Cadverter (I-DEAS)	Theorem Solutions
tx	Cadverter (NX)	Theorem Solutions

Please note that for historic reasons,

- Siemens NX is occasionally listed as “UG” or “Unigraphics”
- PTC Creo is occasionally still referred to as “Pro/E” or “Pro/Engineer”

Deprecated Codes

The following vendor codes are no longer used, but appear in earlier CAx-IF statistics:

Code	System	Vendor
a3	Acrobat 3D	Adobe
a5	Acrobat 3D (CATIA V5)	Adobe
ac	AutoCAD	Autodesk
al	AliasStudio	Autodesk
ap	Acrobat 3D (Pro/E)	Adobe
au	Acrobat 3D (NX)	Adobe
c4	CATIA V4	Dassault Systèmes
cm	CoCreate Modeling	PTC
dp	CrossCad (Pro/Engineer)	Dataki
eb	<i>(for AP209 testing)</i>	Electric Boat
i4	CADfix (CATIA V4)	International TechneGroup
ip	CADfix (Pro/Engineer)	International TechneGroup
kc	KeyCreator	Kubotek

Code	System	Vendor
kr	REALyze	Kubotek
mp	(for AP209 testing)	MSC Patran
pc	CADDS	PTC
pe	Pro/Engineer	PTC
s4	COM/STEP (CATIA V4)	T-Systems
s5	COM/FOX (CATIA V5)	T-Systems
t4	Cadverter (CATIA V4)	Theorem Solutions
tc	Cadverter (CADDS)	Theorem Solutions
tp	Cadverter (Pro/Engineer)	Theorem Solutions

2.4 Checking of STEP Files for Syntax and Structure

STEP files from the various vendors will be checked for syntax and structure by the CAx-IF facilitators in close cooperation with NIST. Syntax checking tools used in this context are, among others, the EXPRESS Data Manager provided by Jotne EPM, ST-Developer provided by STEP Tools, and the Express Engine available on SourceForge (originally developed as “NIST Espresso”). Online versions of the checking tools are not available due to licensing reasons.

Validation of the files relative to the respective Recommended Practices will be done by the facilitators as required, manually or using the NIST STEP File Analyzer. This tool that can be used by anyone for structure checking (as well as limited syntax checking). It is publicly available at: <http://www.nist.gov/el/msid/infotest/step-file-analyzer.cfm>

Please send any files to be checked to the testing facilitators (see 2.5.2), or use the file upload area for large files (see section 3.6).

2.5 File Transmission

2.5.1 Distribution and Confidentiality of Test Models



Many aspects of the CAx Implementor Forum are closed to the outside world. This means that all information including test models (native CAD or CAE, and STEP), results, and issues, remain within the group and shall not be used for any other purpose than CAx-IF testing. Adhering to this rule on the one hand allows the members of the group to openly discuss their findings in order to help to advance their development activities, and on the other hand enables user companies to provide test models which may contain intellectual property in a way that ensures that access to this data is strictly limited. All detailed information will be handled within the password-protected member area of the CAx-IF web sites.

The only exception to this rule are screenshots, management summary presentations, recommended practices, and synthetic STEP files the group agrees on publishing in the public area of the CAx-IF web site.

2.5.2 STEP Files

Any STEP files to be tested in a CAx-IF Test Round need to be sent to the testing administrators. E-mail the files to the testing facilitators:

- Jochen Boy (jochen.bpy@prostep.com)
- Jean-Marc Crepel (jean-marc.crepel@afnet.fr)
- Phil Rosché (phil.rosche@accr-llc.com).

The files will be run through the syntax and structure checks by the facilitators to confirm the correctness of the file (see 2.4). In case there are issues with the STEP files, the testing administrators will get in touch with the originating vendor.

Once all files for a test round are submitted and checked, they will be made available in the member area of the CAx-IF web sites.

2.5.3 Native and target Statistics

For each test case, a set of statistics to validate the success of the exchange will be defined in the corresponding test suite document. There are two types of statistics:

- **native statistics** are submitted along with the STEP files and contain the key values as calculated by the native system.
- **target statistics** are generated after importing a STEP file, and represent the key values as calculated by the target system.

All statistics are handled by the CAx-IF Evaluation, Statistics And Results (CAESAR) system; an online web data base which collects the statistics and renders immediate results for the submitted test cases.

The statistics may be entered manually using a web form, or by uploading a .csv file (text file with comma-separated values) in the format specified in the test suite document. For registration and use of CAESAR, see section 3.5.

2.5.4 Native and target Models

The native and target models required for data transfer quality validation will be exchanged using the joint up- and download area described in section 3.6.

3 Communication

The CAx-IF provides a number of means of communication, in order to keep its members and associated working groups up to date on current testing activities and agreements.

3.1 Web Sites

The CAx Implementor Forum maintains an internet homepage, which is mirrored at two URLs:

- <https://www.cax-if.de/>
- <https://www.cax-if.org/>

The contents at both locations are identical. Only in the context of updates it may happen that the two sites are out of sync temporarily, depending on the availability of the respective web master.

The main sections of the homepage relevant for testing are:

- **Joint Testing Information:** This section contains all public documentation produced or required by CAx-IF testing. This includes schedules and test suites, Recommended Practices, and EXPRESS schemas.
- **Models to be Tested:** Screenshots of all models tested in the current round of testing.
- **Member area:** All information about current and past rounds of testing is available. STEP files, statistics and detailed results are published here. This section is available only to active participants of the CAx-IF.

3.2 Mailing Lists

The following mailing lists have been established in the context of CAx-IF testing:

- cax-contact@lists.purdue.edu – The AFNeT, PDES, Inc. and prostep ivip facilitators of the CAx-IF
- cax-current-round@lists.purdue.edu – Closed mailing list exclusively for the active participants of the current CAD round of testing.
- cae-current-round@lists.purdue.edu – Closed mailing list exclusively for the active participants of the current CAE round of testing.

3.3 Meetings

Currently, there are four CAx-IF meetings planned per year. The exact date and location of each meeting will be announced at the beginning of each test round at the latest.

In order to balance the workload for vendors participating in CAD as well as CAE testing, the test rounds of the two domains are offset by three months.

The general schedule is:

- **March:**
 - CAE Technical Workshop / Round(2n)S Kickoff-Meeting
 - CAD Round(2n+1)J Review Meeting
 - Location: USA
 - In conjunction with
 - LOTAR 1st Qtr. Workshop
 - PDES, Inc. Spring Offsite
 - Duration: 4 days (Monday – Thursday)
- **June:**
 - CAE Round(2n)S Review Meeting,
 - CAD Technical Workshop / Round(2n)J Kickoff-Meeting
 - Location: Europe (France)
 - In conjunction with
 - LOTAR 2nd Qtr. Workshop
 - Duration: 2 days (Tuesday – Wednesday)

- **September:**
 - CAE Technical Workshop / Round(2n+1)S Kickoff-Meeting,
 - CAD Round(2n)J Review Meeting
 - Location: USA
 - In conjunction with
 - LOTAR 3rd Qtr. Workshop, embedded into
 - PDES, Inc. Fall Offsite
 - Duration: 4 days (Monday – Thursday)

- **December:**
 - CAE Round(2n+1)S Review Meeting,
 - CAD Technical Workshop / Round(2n+1)J Kickoff-Meeting
 - Location: Europe (Germany)
 - In conjunction with
 - LOTAR 4th Qtr. Workshop
 - Duration: 2 days (Tuesday – Wednesday)

For all meetings, remote attendance by conference call and web session is partially provided. However, all CAx-IF members are strongly encouraged to attend the meetings in person to better support the technical discussions and coordination with other teams.

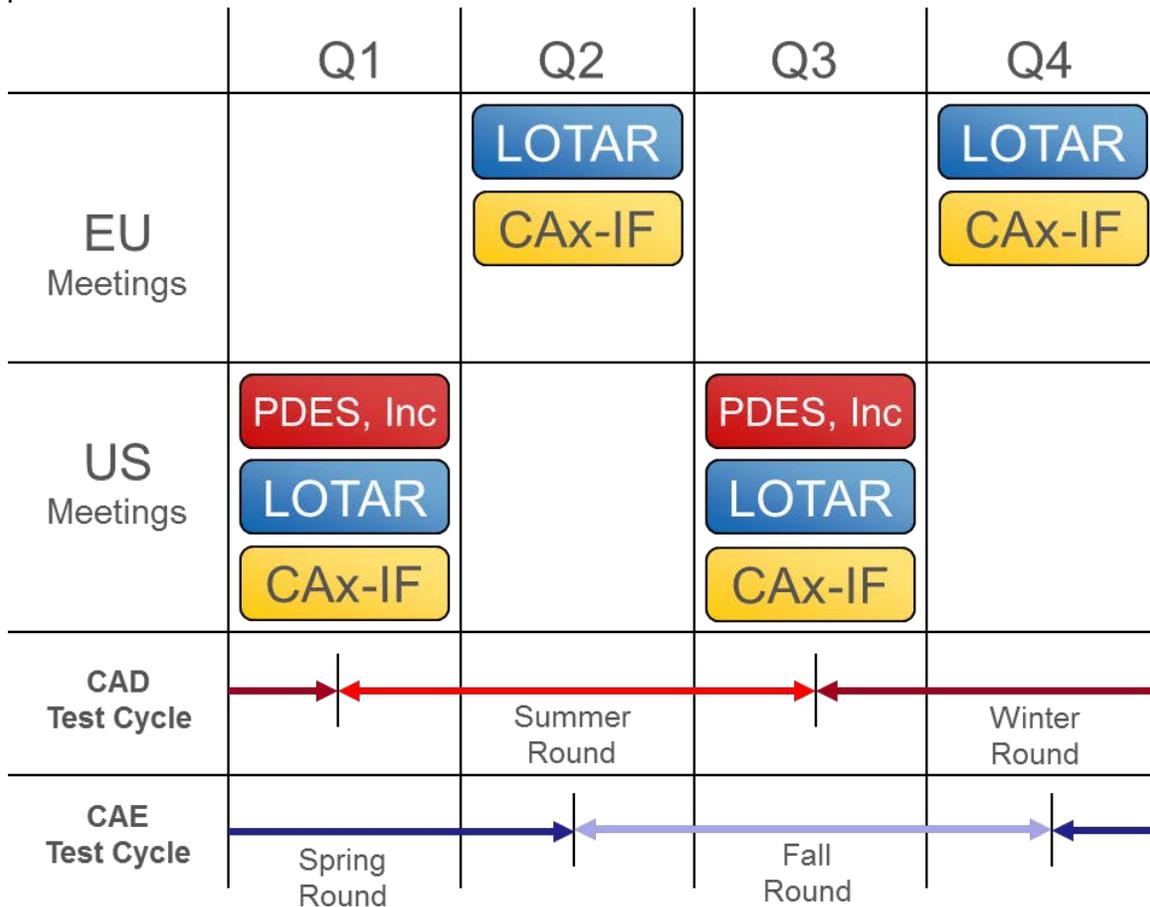


Figure 2: CAx-IF Test Cycle and Meetings

3.4 Conference Calls

Conference calls are scheduled on a regular basis as part of the Test Round progress. They are announced in the respective schedule.

A few days before the call, the necessary information, such as exact time and date, number to dial in, conference code, and a tentative agenda, are sent out via the respective CAD or CAE mailing list (see section 3.2).

The conference calls are usually accompanied by a web session to share documents and discuss them. The software mainly used for these calls is either Microsoft Skype4Business (formerly Lync), or GoTo Meeting. Both platforms allow for participation via phone (dial-in) or computer / headset (VoIP).

3.5 CAESAR

CAESAR is a web-based database which handles all statistics as defined in the respective test suite documents, and derives the test results in a comprehensive and concise way. CAESAR is available in the member area of the CAx-IF homepage (see Figure 3 below). The direct URL is:

<https://www.cax-if.de/secure/caesar/>

Note that since CAESAR depends on the database server, this system is available on the .DE domain only. A link is available on the .ORG site.

Note, Since CAESAR is located within the member area, you may get prompted for a login (pop-up window) first – this is the member area login. The CAESAR login is only requested on the CAESAR welcome page, in a yellow box.

CAESAR stores all CAx-IF statistics and results starting in Round20J. For detailed information on prior test rounds, please contact the facilitators.

3.5.1 Registration

In addition to the member area login, CAESAR requires an individual login for each user. To register, go to the link mentioned above, and use the “[Register]” link. After activating the account via a confirmation email, all statistics and additional information stored in CAESAR can be accessed.

In case of problems while registering or using CAESAR, please contact the CAx-IF facilitators (see section 2.5.2).

3.5.2 Using CAESAR

After registering to CAESAR, detailed user documentation is available on the start page (main menu), section 4.

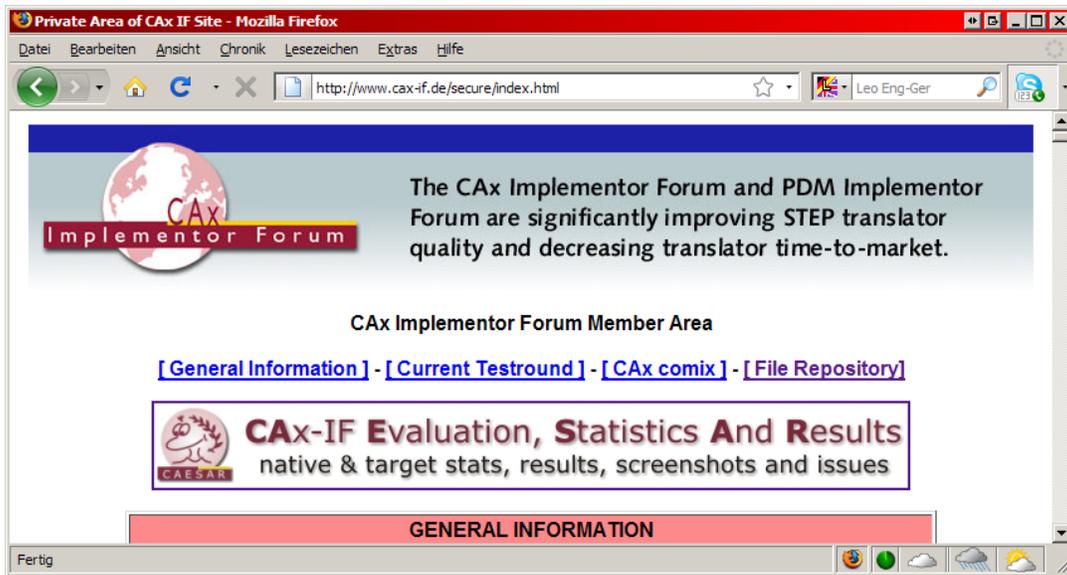


Figure 3: CAx-IF Member Area with link to CAESAR

3.6 File Repository

A joint file repository has been set up to simplify the exchange of files among the CAx-IF members. This platform is intended to share larger files during test rounds, such as native files for production models, packages of STEP files for checking, or target CAD models for quality validation purposes.

The link to the file repository can be found in the member area of both CAx-IF web sites (see section 3.1 or Figure 3 above). The direct URL is:

<http://cax-if.org/secure/filemanager/filemanager.php>

Note that if you logged in to the member area of the .DE site first, you will be queried for the login again when going to the file repository, since the files are hosted on the .ORG site only.

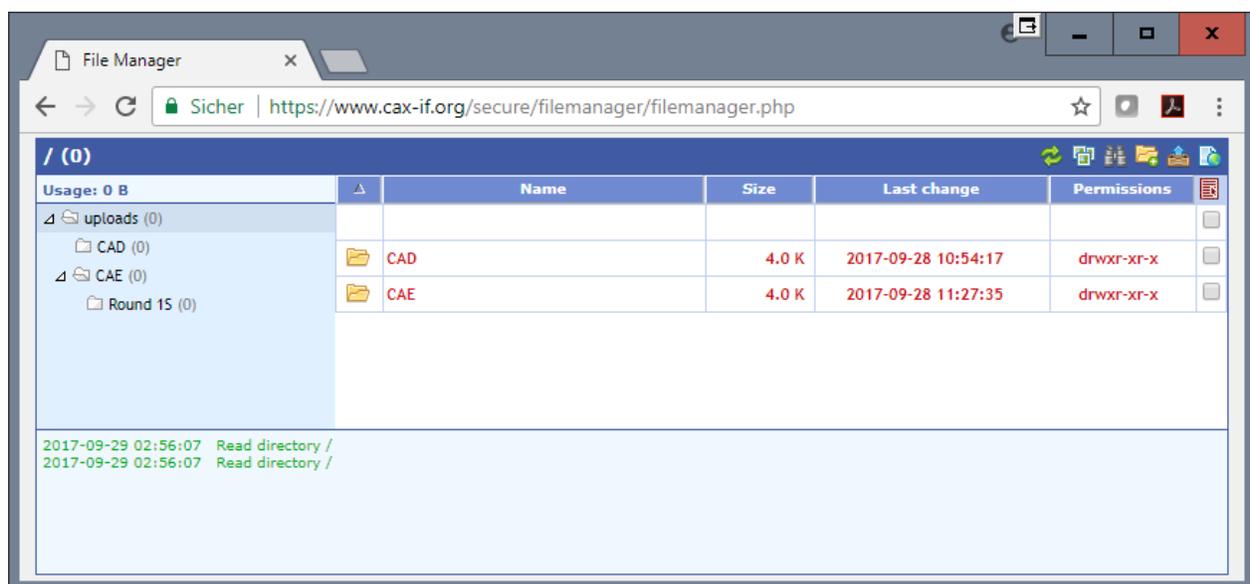


Figure 4: Screenshot of the CAx-IF File Repository