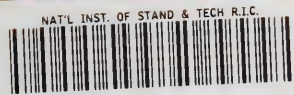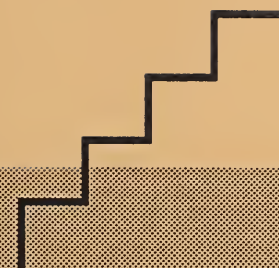NISTIR 5535

National PDES Testbed Report Series

Initial NIST Testing Policy for STEP - Beta Testing Program for AP 203 Implementations

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Mary J. Mitchell

November 3, 1994

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Initial NIST Testing Policy for STEP - Beta Testing Program for AP 203 Implementations

Mary J. Mitchell

Initial NIST Testing Policy for STEP -
Beta Testing Program for AP 203 Implementations

November 3, 1994

Please send comments to:
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Abstract:
The standard for Product Data Representation and Exchange, ISO 10303, defines a neutral, computer-interpretable representation for describing product data in a manner that is independent from any particular system. This standard is more commonly known as STEP, STandard for the Exchange of Product model data and it is designed to support a wide range of design, engineering, and product support applications. Support for specific applications is provided through an Application Protocol.

This document describes the policy and procedures for a "beta" conformance testing program for one of these application protocols: *Configuration Controlled 3D Design for Mechanical Parts and Assemblies* (ISO 10303-203). However, the concepts described are applicable to ISO 10303 in general and the characteristics of the longer term testing program are described.

The objective of conformance testing is to maximize the probability of successful exchange among systems which implement a standard. This document describes the policy and procedures used by the National Institute of Standards and Technology (NIST) and the Industrial Technology Institute (ITI) for the Beta STEP Conformance Testing Program. The objective of this beta program is to develop an acceptable degree of confidence in the test methods and procedures. Attaining this confidence will be accomplished by trial use of the test methods and procedures with developers of early implementations of ISO 10303-203. This testing program is being conducted under a cooperative agreement between NIST's Manufacturing Engineering Laboratory and the ITI's Center for Electronic Commerce.

Table of Contents

1. Introduction

The National Institute of Standards and Technology (NIST) works through voluntary industry standards organizations to develop standards that meet the needs of industry and government users. To be viable, it is important that these standards meet a real industrial need. One such standard is ISO 10303, Product Data Representation and Exchange, which is more commonly referred to as STEP, STandard for the Exchange of Product model data. This standard specifies functional and data requirements for product data exchange.

To effectively use commercial off-the-shelf products which implement this standard and to achieve interoperability among these systems, conformance testing is required to reduce the risks and raise the consumer confidence in these systems. This document is specifically directed at developers of commercial off-the-shelf products which implement STEP and testing laboratories, but users of such systems may also be interested in the planned STEP conformance testing program.

The objectives of the NIST STEP Conformance Policy are:

● To reduce the total information systems costs by making it more predictable and less expensive to maintain software applications and to transfer compatible information among applications using different information systems, including replacement systems.

● To protect the capital investment of users of the standard by ensuring to the extent possible that commercial off-the-shelf products meet the requirements in the standard, thereby providing a known capability which can be expected of any certified product.

● To identify competent testing laboratories to assist users of the standard in the procurement of commercial off-the-shelf products.

The STEP conformance testing program is being designed to be as barrier-free as possible for suppliers of commercial off-the-shelf products. Some of the barriers to suppliers which must be guarded against include high cost (e.g. testing fees, time required, and logistic arrangements), lack of useful test results, lack of acceptance of test results internationally, and lack of awareness by users of the benefits of conformance testing. Self-testing by vendors during their product development cycle is encouraged and an information kit and tools are available for this purpose. For further information relating to this new paradigm for software conformance assessment, refer to *Issues, Requirements, and Recommendations for a STEP Conformance Testing Program.*[1]

The beta testing program seeks collaborations with U.S. developers of STEP-based software products to ensure delivery of value-added testing services. Strong vendor involvement is

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[1] See Appendix A for a list of document sources.

needed to obtain feedback on all aspects of the proposed test program. The objective of the STEP beta testing program is to accelerate the introduction of high-quality commercial off-the-shelf products which meet the industrial needs specified in STEP.

This document describes requirements for the conformance assessment of STEP-based software systems. This document specifically lays out the requirements for the conformance testing of implementations of the first standardized STEP Application Protocol (AP): *Configuration Controlled 3D Design for Mechanical Parts and Assemblies*, commonly referred to as AP 203.

The objective of any conformance testing program is to maximize the probability of successful exchange among systems which implement a standard. Conformance testing does not ensure interoperability; it only evaluates a system to determine if it faithfully implements the requirements specified by a standard. It improves the probability that systems will interoperate and helps to isolate the source of problems. Any conformance testing program must also ensure comparability of test results (i.e. testing of the same system at different sites and testing laboratories produces the same test results).

This document describes a beta testing program for STEP and also describes the planned testing policy for a STEP conformance testing program. The objective of a beta testing program is to achieve an acceptable degree of confidence in:

- how conformance testing is performed which includes the test methods and test procedures;
- what is used in the testing which includes the test suite and testing system software; and
- what is being produced to provide repeatable results and meaningful test reports.

The National Institute of Standards and Technology's (NIST) National PDES Testbed within the Manufacturing Engineering Laboratory(MEL) and the Industrial Technology Institute's (ITI) Center for Electronic Commerce (CEC) are conducting the beta conformance testing program for AP 203. The beta testing program is being executed to establish a known baseline of testing capability. The beta testing program is being performed using ISO/DIS 10303-203 as the reference standard. The international standard ISO 10303 has been approved and the publication should be available by December 1994. This test program will transition to the international standard version after some reasonable period of time to allow for implementations to be developed.

This document is organized in the following manner. Section Two of this document provides many of the testing terms that are used within ISO 10303. Section Three provides additional background information and identifies the reference standards which are the basis for testing. Section Four states policies relating to both the beta testing program and the STEP testing program. Section Five provides specific information about the beta testing program. Finally,

section Six describes the procedures and reporting requirements for the beta testing program. Appendix A provides a list of references and identifies where any of the documents referenced can be obtained.

2. Terms and Abbreviations

The following terms used within this document are defined in ISO 10303-1, *Overview and fundamental principles*, or ISO 10303-31, *Conformance testing methodology and framework: General concepts*:

abstract test case (ATC): a specification, encapsulating at least one test purpose, that provides the formal basis for deriving an executable test.

abstract test suite (ATS): the complete set of abstract test cases necessary to perform conformance testing of an implementation against a standard or group of standards.

(laboratory) accreditation: the process of ensuring a testing laboratory is competent to carry out specific (types of) tests. The term covers the recognition of both the technical competence and the impartiality of a testing laboratory.[2]

Application Protocol (AP): a part of ISO 10303 that specifies the data structures and semantics which satisfy the scope and information requirements of a specific application.

assertion: A logical expression specifying a set of conditions that program variables must satisfy or a program state that must exist at a particular point during program execution.

certificate of conformance: a document issued by an impartial body indicating that a product meets the requirements of a specific standard as determined through use of an approved test method.

certification authority: an administrative activity which establishes conformance testing program policies and procedures and which issues certificates of conformity for products.

conformance assessment process: the process of accomplishing the conformance testing activities needed to determine the conformance of an implementation to an Application Protocol.

conformance class: a subset of an Application Protocol for which conformance may be claimed.

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[2] Accreditation is normally awarded following successful laboratory assessment and this is followed by appropriate surveillance.

conformance requirement: a precise definition of a characteristic required to be present in a conforming implementation.

conformance log: a record of information, produced as a result of a test campaign, that is sufficient to make and verify the assignment of test verdicts.

conformance testing: the testing of a product for the existence of specific characteristics required by a standard in order to determine the extent to which that product is a conforming implementation.

data exchange: the storing, accessing, transferring, and archiving of data.

exchange structure: a computer-interpretable format used for storing, accessing, transferring, and archiving data.

implementation method: a representation technique used by computer systems to exchange product data as described with the EXPRESS data specification language (ISO 10303-11).

fail (verdict): a test verdict given when the observed test outcome demonstrates non-conformance with respect to either the test purpose or at least one of the conformance requirements in the relevant standard(s).

Implementation Under Test (IUT): the product which is to be evaluated by testing and which implements the characteristics of the standard(s).

inconclusive (verdict): a test verdict given when the observed test outcome is such that neither a pass nor a fail verdict can be given.

pass (verdict): a test verdict given when the observed test outcome gives evidence of conformance to the conformance requirement on which the test purpose is focused and is valid with respect to the relevant standard(s) and with respect to the PICS.

PICS proforma: a standardized document in the form of a questionnaire, which, when completed for a particular implementation, becomes the protocol implementation conformance statement.

protocol implementation conformance statement (PICS): a statement of which capabilities and options are supported by an implementation of a given standard. See PICS proforma.

Protocol Implementation eXtra Information for Testing (PIXIT): a statement made by a supplier who desires testing laboratory services which contains information about the IUT and its computer environment that is needed by the testing laboratory to test the IUT.

System Under Test (SUT): the computer environment that includes the hardware, software

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and communication network required to support the IUT.

test campaign: the process of running an executable version of the abstract test suite against a particular IUT and capturing the test results.

(abstract) test method: the description of how an implementation is to be tested at an appropriate level of abstraction to make this description independent of any particular implementation of testing tools or procedures.

test purpose: a precise description of an objective which an abstract test case is designed to evaluate.

(conformance) test report : a document written at the end of the conformance assessment process, that provides the overall summary of the conformance of the IUT to the standard for which conformance testing was carried out, and that gives the details of the testing.

testing laboratory: an organization that carries out the conformance assessment process.[3]

(test) verdict: a statement assigned from the analysis of the test results from the execution of a test case by an IUT.

verdict criteria: information on the allowable states of conditions or values of variables that must exist in a test result to satisfy a program state defined within an abstract test case, enabling the assignment of a verdict to a particular test result.

3. Background

ISO 10303-203 is the reference standard for this beta testing program. This specification uses elements of other parts of ISO 10303 and other standards as appropriate.   An overview of ISO 10303 is provided in ISO 10303-1 which describes the relationships among the documents which make up the standard.[4] The list of references to these and other documents used by this beta testing program, along with their specific version is provided in Appendix A.

The draft international standard version (DIS) of ISO 10303-203 will be used initially. The testing will be upgraded to account for the minor differences in the international standard by early 1995.

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[3] A testing laboratory can be a third-party testing laboratory, a user organization, or an independent unit of a supplier organization.

[4] A full description of the series of documents within ISO 10303 is contained in ISO 10303-1, *Overview and Fundamental Principles*.

ISO 10303-203 is one of a series of documents called Application Protocols (AP). AP specifications (ISO 10303 200-series documents) were designed to be implemented to support end-user applications. APs specify the information requirements for data exchange. An AP specifies a data representation which is used to satisfy these requirements. Conformance requirements are also defined and these requirements may be grouped into conformance classes. A conforming implementation may not arbitrarily support some of the requirements. It must support all requirements within a conformance class. A companion document to each AP is the abstract test suite (ATS) (ISO 10303 1200-series documents). An ATS states the purposes for tests and the verdict criteria applied to each test result to determine if the implementation passed the test. Since ISO 10303 uses a formal data specification language, called EXPRESS (ISO 10303-11), most test purposes may be automatically derived.

An AP uses at least one implementation method (ISO 10303 20-series document) which specifies the requirements for formatting the data representation for exchange or data sharing. The beta testing program supports only the first of these, *Implementation Methods: Clear Text Encoding of the Exchange Structures* (ISO 10303-21). Support for other implementation methods will be added as they become part of the international standard.[5]

A supplier of an implementation may claim conformance to one or more of the portions of AP 203 as defined by conformance classes. The supplier of an implementation desiring testing services is requested to complete a statement that identifies which conformance classes are supported by their implementation, called a protocol implementation conformance statement (PICS). This statement is used to select which tests cases from the abstract test suite (ATS) are appropriate to use in determining a claim of conformance. An implementor may also use this statement to determine which test cases should be executed during self-testing.

The requirements for the conformance testing of implementations are specified in ISO 10303-31, *Conformance Testing Methodology and Framework: General Concepts.* Conformance testing is conducted via national testing programs. This beta testing program is being conducted to prepare for the creation of a national testing program for U.S. industry and government. The use of the testing program by industry is voluntary. Experience from other standards efforts has identified the importance of establishing a testing program that is timed to support the emergence of commercial products. The quality of the initial set of commercial products can significantly impact the rate at which a standard is adopted. The existence of a national testing program may also offer some competitive advantage to vendors of commercial products.

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[5] For example, ISO 10303-22, *Implementation Methods: Standard Data Access Interface,* is an application program interface specification which has completed its first international ballot.

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4. Testing Program Policy

The STEP beta testing program will be used to achieve an acceptable degree of confidence in the test procedures, the conformance testing system, and the test methods. Together, these components provide a means of testing an implementation for conformance to a standard. Confidence in these components must be attained before a recognized testing program can commence and certificates of conformity can be issued.

To obtain the feedback necessary to obtain this confidence, testing will be conducted by ITI/CEC and NIST/MEL for the duration of the beta testing program. ITI/CEC is coordinating the beta conformance testing program. All functions relating to the audit of test results will be conducted by NIST/MEL. NIST/MEL and ITI/CEC reserve the right to limit the number of systems evaluated during the beta testing program.

Until a recognized testing program is initiated, commercial systems which have successfully completed the conformance assessment process will be recognized in an appropriate publication in place of receiving a certificate of conformance.

The beta testing program will continue until confidence in the test system, test suite and test procedures has been achieved. There is no fixed duration for the beta testing program but NIST and ITI have estimated the duration of the program to be about one year. NIST plans to create a national STEP testing program for government users but this testing program may also be used by industry. The authority for establishing such services was provided under the Federal Property and Administrative Services Act of 1949, as amended by Public Law 100-235. A Federal Information Processing Standard (FIPS) which aids in procuring conforming systems is being pursued for ISO 10303. NIST plans to initiate a STEP conformance testing service and the FIPS will require conformance testing. After the initial start up costs, the testing program will be funded from user fees.

The intent is to transition the use of testing laboratories which have been accredited through the National Voluntary Laboratory Accreditation Program (NVLAP). NIST/MEL will be responsible for the review of test reports and the issuance of certificates of conformity. Certificates will be issued only after the successful completion of the conformance assessment process as defined in ISO 10303-31.

4.1 Client Confidentiality

As with other testing programs of this nature, any information relating to a supplier (e.g. the client for testing services) whose system is under test remains confidential until testing is completed and the client agrees to the release of test results.

The remainder of this section provides the planned process and policies for the national testing program for STEP (as opposed to the less formal beta testing program). Section 5 and section 6 contain information and policies specific to the beta testing program.

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4.2 Organizational Model and Conformance Testing Process Overview

There are two perspectives that must be supported by a conformance testing policy. The policy must support both the conducting of the testing and the evaluation of the capabilities of the organization performing the testing.

Accreditation is the administrative activity of recognizing a testing laboratory is qualified to conduct conformance testing.

Certification is the administrative activity of recognizing a system has demonstrated conformance to a standard, and of publicly registering the test results.

The organizational model consists of clients who seek certification of their software product, testing laboratories who set up the testing and generate the test reports, and a certification authority who issues certificates after an administrative review. The organizational model is consistent with the model described in ISO 10303-32, *Conformance Testing: Requirements for Testing Laboratories and Clients*, and the model used in other NIST Testing Programs.[6]

Conformance Testing Process

1. Client contacts NVLAP or NIST/MEL for list of accredited Testing Laboratories.[7]

2. Client contacts an accredited Testing Laboratory and states services needed.

3. Client and Testing Laboratory agree on services and a contract is written to specify fees and services.

4. Client provides product to be tested and supporting documentation.

5. Testing Laboratory provides testing services and expertise as needed.

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[6] The NIST model is described in a public notice titled "Conformance Testing Policy and Procedures" in the *Federal Register* dated August 3, 1988.

[7] The National Voluntary Laboratory Accreditation Program produces a quarterly report that lists accredited testing laboratories. Copies can be obtained from NIST, NVLAP Office, Building TFR Room A162, Gaithersburg, MD 20899, telephone:(301) 975-4017.
NIST/MEL maintains the STEP On-line Information System (SOLIS) which contains documents and current information on ISO 10303. When testing laboratories for ISO 10303 are established and accredited, an area will be created on SOLIS that contains a listing of these laboratories.

6. If a certificate of conformance is the objective of testing, the Testing Laboratory forwards the test results and supporting documentation to NIST for evaluation.

7. NIST evaluates the test results and, if acceptable, issues a certificate of conformance.

4.3 NIST STEP Certification Policy

NIST will provide the overall direction for organizing managing, and administering the STEP conformance testing and certification program. NIST responsibilities in this capacity will include:

a) establishing and maintaining the conformance testing program policies and procedures;

b) approving the test methods used to determine the compliance of products;

c) insuring that the test methods are maintained;

d) evaluating and resolving disputes on all matters concerning conformance testing;

e) establishing, with the National Voluntary Laboratory Accreditation Program (NVLAP), the accreditation criteria for testing laboratories;

f) maintaining and publishing a list of recognized testing laboratories;

g) establishing the fees or rates for NIST provided services or products;

h) coordinating with other certification authorities to review certification criteria for the purpose of harmonizing procedures and fostering mutual recognition of certification;

i) developing and maintaining procedures for clients to follow in order to receive a Certificate of Conformity;

j) issuing the Certificate of Conformity based on the satisfactory evaluation of test reports and supporting documentation;

k) maintaining and publishing a register of products on the *Validated Products List* that have received a Certificate of Conformity; and

l) periodically assessing the need for a conformance testing program and maintenance of test methods.

4.4 NIST STEP Accreditation Policy for Testing Laboratories

NIST will carry out its responsibilities for conformance certification through testing laboratories judged to be competent and objective. NIST will draw on the National Voluntary Laboratory Accreditation Program (NVLAP) for accrediting testing laboratories. The process and requirements are described in the *NVLAP Procedures*. Testing Laboratory responsibilities include:

a) obtaining and maintaining laboratory accreditation;

b) conducting conformance testing in accordance with the current test methods, using approved tools and procedures;

c) preparing test results in accordance with the requirements specified in ISO 10303-32, *Conformance Testing - Requirements for Testing Laboratory and Clients*, and specified in the NIST testing policy on certificates of conformity;

d) providing feedback on problems and improvements to the test suites, test methods, test system, and conformance testing procedures;

e) conforming to the guidelines for testing laboratories provided in the NVLAP *Program Handbook*;

f) treating all test results confidentially;

g) paying all relevant fees and establishing fees for Laboratory provided services or products; and

h) participating in training sessions and reviewing material as required to address changes to testing methods and conformance testing procedures.

Testing Laboratories have the right to publish and advertise their accredited status as long as the advertising does not imply product certification by NIST or the U.S. Government.

4.5 Disputed Test Results

As with other testing programs of this nature, a Test Method Control Board will be formed to arbitrate any disputes arising from the performance of testing in accordance with the planned FIPS and the approved test method. It will be the responsibility of NIST to insure that the test method is properly maintained and that any changes are properly coordinated.

The Control Board procedures will include provisions for:

a) handling disputes over the validity of the test method;

b) approving changes to the test method;

c) validating and releasing new versions of the test method;

d) coordinating any problems associated with the STEP standard back into the appropriate standard's project and any changes to the test methods to accredited Testing Laboratories; and

e) assisting Testing Laboratories and Clients in the proper use of the test method.

4.6 Summary of Proposed Testing Program Implementation and Administration

The STEP testing program, when fully operational, will have the following characteristics:

- testing will be conducted by accredited Testing Laboratories;

- NIST will review test results and issue certificates of conformance. (A fee to cover administrative costs will be assessed);

- the test suite and other supporting documentation (see 5.3 for the list for the beta testing program) will be available for a fee from NIST or an organization providing this service for NIST;

- NIST will distribute "fixes" to the test suite and "interpretations" to the testing policy or procedures as required.

5. Beta Testing Program

5.1 Availability

The beta testing program for AP 203 is designed to meet the general requirements defined in ISO 10303-31, *Conformance Testing Methodology and Framework: General Concepts*. The program evaluates implementations for conformance to ISO/DIS 10303-203, *Application Protocol: Configuration Controlled 3D Design for Mechanical Parts and Assemblies*, based on the test methods specified in ISO 10303-34, *Conformance Testing Methodology and Framework: Abstract Test Methods*.

The STEP Conformance Test System is designed to test conformance to any STEP AP . The beta AP 203 Conformance Test Suite specifically tests the assertions applicable to ISO/DIS 10303-203. The test suite for the version of ISO 10303-203 that is an international standard should be available in early 1995. The released version of the test suite covers the majority of the requirements in ISO 10303-203 and efforts are continuing to increase the coverage of this test suite.

The beta testing program will provide the STEP Conformance Test System, the AP 203 Test Suite, documentation and the testing policy and procedures (see Appendix A). The test

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system interface is designed to operate in a computer-aided software engineering (CASE) environment to facilitate its use for self-testing by vendors. Updates to the test suite or procedures will also be provided, as they occur, via electronic distribution. Implementors who successfully complete self-testing should be confident in their ability to pass conformance testing with an independent test laboratory. Implementors who wish to participate in the beta testing program should send a request to:

Robert Matthews
Industrial Technology Institute
Hubbard Drive
Ann Arbor, MI
e-mail: rsm@iti.com
(313) 769-4573

ITI/CEC or NIST/MEL will contact the requesting organization to arrange for a mutually agreeable time to conduct this testing.

5.2 Implementor Collaboration

In an effort to maximize the effectiveness of AP 203 beta testing, ITI and NIST will provide to participants in the program the following:
- the STEP Beta Conformance Testing Kit and testing procedures;
- updates to test suite and test procedures as they occur;
- published announcement of the IUT's successful completion of ISO DIS 10303-203 beta testing; and
- highest priority consideration for conformance testing when the formal AP 203 service is up and running.

In return, the implementor is requested to provide:
- copies of the reports generated under 5.4 and 6.3 below; and
- feedback on any test suite or test procedure deficiencies.

5.3 Testing Resources

The following resources are available for performing conformance testing of AP 203:

- STEP Beta Conformance Testing Kit which includes:
  - a "READ-ME" sheet explaining what is in the kit, and why it is there;
  - registration forms for scheduling testing under the "beta" program;
  - a list of points of contact;
  - a pre-test preparation checklist and a description on how to prepare for testing;
  - the AP 203 Test Suite (distributed on electronic media);
  - sample reports (See 5.4) with an explanation on what each means;
  - a sample of a test case with a description of how the testing is conducted;

- the system to be tested, called the Implementation Under Test (IUT);

- sufficient disk space to load the AP 203 Test Suite;

- the ability to input and generate STEP exchange structures;

- an operator who is proficient with the IUT and the environment in which the IUT runs (he/she will be required to follow a set of instructions for entering data into the IUT and answer a set of questions about the IUT treatment of this data); and

- adequate time to install and execute the test suite.[8]

If the IUT is receiving testing services at one of the beta testing laboratories, the STEP Conformance Test System is not required. An implementor will need the following, in addition to the items list above, for the STEP Conformance Test System:

- the STEP Conformance Test System software (distributed on electronic media), and its supporting documentation;

- the instructions on how to interface the system to be tested to the STEP Conformance Test System; interface requirements and options are also defined; and

- sufficient disk space to load compile and run the STEP Conformance Test System.

5.4 Test Reports

Two reports are to be generated by the organization requesting testing services. These are:

- a PICS which is generated using the Proforma PICS; and

- a PIXIT.

Three reports are generated during the conformity assessment process. These are:

- Installation Report: Captures any commands used to install and configure the test system;

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[8] For estimation purposes, installation typically requires less than 3 hours and the test suite is designed to be executed in 8 hours or less. These estimates may vary significantly depending upon the computer hardware and system under test.

- Conformance Log: Provides a step-by-step record of what tests were performed, what preparations were taken, and what result was achieved for each test; and

- (Conformance) Test Report: Provides the identification of each test executed, the status of each test, and the verdict assigned to each test result.

The installation report and conformance log provide supporting documentation that may be used to isolate the conditions of a particular test or test campaign.

6. Testing Procedures

6.1 Requirements

The current AP 203 Conformance Test Suite shall be used whenever conformance testing for AP 203 is performed. The most recent release of the test suite is to be used in conjunction with any enhancements that are available. An implementor may utilize the test suite as he/she sees fit, modifying or enhancing it to provide added value. However, when a test for conformance is to be performed, the UNEDITED version of the test suite must be used.

The STEP Conformance Test System was designed to also be used during the development of the implementation.

Documentation of the system environment is required and a questionnaire is provided which asks for relevant information on the hardware and software configuration. A combination of software components may be used together to form the IUT. If these components are distinguishable and each has its own software release revision identification, a list of these components and their release identification are required.

6.2 Establishing a Test Environment

The *User Manual for the STEP Conformance Test System* provides the documentation required to install, configure and execute the AP 203 Conformance Test Suite. It is the responsibility of the implementor to configure the IUT and the environment in which it operates so adequate information can be captured during testing to assign a verdict.

In the beta release of the STEP Conformance Test System and the AP 203 Test Suite, some operations are performed manually by the operator. Based on observations recorded, the test system is used to assign a verdict to each test case. An implementation must pass all test cases associated with a conformance class or option for which a claim of conformance is made to be recognized as successfully completing the conformance assessment process.

If an error is determined in the configuration, the AP 203 Conformance Test Suite must be rerun in its entirety.

6.3 Documentation Requirements

When testing services are desired, a documentation review is performed by the test laboratory (for the beta testing program NIST/MEL or ITI/CEC) of the PICS and PIXIT to determine their completeness prior to agreeing to initiating a test campaign[9]. The PICS identifies if a claim of conformance is being made for each conformance class. Each test case in the test suite identifies the conformance class to which it applies. This identification is used to select which tests are appropriate to execute.

6.4 Test Reports

The Installation Report is completed by the operator of the system under test. It should be given a filename of *install.log*.

The Conformance Log provides sufficient detail to isolate failures. An entry is produced for each element tested. Results are stored in a filename of *campaign.log*.

The Conformance Test Report contains a verdict assigned to a test result of each test executed based on pre-established verdict criteria. The possible verdict assignments are:

       pass   –   successful test of an assertion;

       fail   –   unsuccessful test of an assertion;

       inconclusive   –   verdict could not be assigned due to failure of a related test or error in the test suite;

       untested   –   could not exercise the test assertion.

6.5 Recognition of Conformance to ISO 10303-203

During the beta conformance testing program, NIST will announce products which have successfully completed conformance assessment through the *US Pro Exchange* newsletter under the article title *Register of Tested STEP Products*. NIST will also maintain an on-line listing of these products on SOLIS.

Certificates of conformance will only be issued by NIST once the STEP Conformance Testing Service is established. Successfully tested products will be listed in the *Validated Products List*.

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[9] For self-testing, NIST would like the PICS and PIXIT to be included with the test results.

7. Summary

NIST plans to provide the overall direction for organizing managing and administering a national STEP conformance testing and certification program. The testing program will be available to government agencies and industry. NIST will issue certificates of conformity to suppliers who meet the requirements of the testing program. This program is being undertaken to encourage the availability of high-quality implementations of STEP, thereby accelerating the broad adoption of the standard by industry. The STEP conformance testing program may be used by both government and industry but the use of the testing program by industry is voluntary.

A beta testing program is being initiated to develop confidence in the test methods and procedures. The beta testing program will accomplish this through the trial use of these test methods and procedures with suppliers of early implementations of ISO 10303-203. Strong vendor involvement is needed to obtain feedback on all aspects of the proposed test program to ensure value-added testing services.

Appendix A   Sources of Documents

US PRO, care of National Computer Graphics Association, P.O. Box #S, 2722 Merrilee Drive, Suite 200, Merrifield VA, telephone: (703)698-9600, ext. 325, FAX (703) 560-2752.

- ISO 10303-1:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 1: Overview and fundamental principles.*

- ISO 10303-21:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 21 Implementation methods: Clear text encoding of the exchange structure;.*

- ISO 10303-31:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 31 Conformance testing methodology and framework: General concepts;.*

- ISO/DIS 10303-203:1993, *Industrial automation systems and integration — Product data representation and exchange — Part 203 Application Protocol:Configuration Controlled 3D Design for Mechanical Parts and Assemblies*

- *US PRO Exchange* Newsletter

National Institute of Standards and Technology (NIST), Manufacturing Engineering Laboratory, Building 220 Room A127, Gaithersburg, MD 20899, telephone:(301) 975-3983, FAX (301) 258-9749.

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