

Committee on WIPO Standards (CWS)

Fourteenth Session
Geneva, November 23 to 27, 2026

PROPOSAL FOR THE REVISION OF WIPO STANDARD ST.91

Document prepared by the Secretariat

SUMMARY

1. The 3D Task Force is proposing a revision to WIPO Standard ST.91. The proposed revision comprises the addition of Annex II "3D Model Search" to the Standard, and certain editorial changes.

BACKGROUND

2. The 3D Task Force is responsible for revising WIPO Standard ST.91, under the framework of Task No. 61 whose description reads:

"Ensure the necessary revisions and updates of WIPO Standard ST.91, including methods of search for 3D models and 3D images."

3. At its ninth session, the CWS adopted WIPO Standard ST.91, entitled "Recommendations on Digital Three-Dimensional (3D) Models and 3D Images" (see paragraph 31 of CWS/9/25). This Standard provides recommendations for intellectual property (IP) offices and other interested parties that manage, store, process, exchange or disseminate IP data using digital 3D models and 3D images.

4. At its eleventh session, the CWS approved the revision to WIPO Standard ST.91, including addition of a new Annex on "Criteria for selecting 3D formats" and the removal of the definition of X3D (see paragraph 106 of document CWS/12/29).

5. At its thirteenth session, the CWS considered a working draft for a new Annex to WIPO Standard ST.91, presented by the 3D Task Force, which sets out recommendations for 3D-to-3D search systems. The CWS noted that the 3D Task Force would continue refining the draft and submit a final proposal for consideration (See paragraphs 68 and 71 of document CWS/13/33.)

6. The WIPO Standard ST.91 does not, however, provide any recommendation concerning search for 3D models by IP offices. As IP offices increasingly accept and publish 3D models, the ability to search for such content for the purposes of examination is becoming essential to making effective use of the 3D model data captured and published by IP offices.

PROPOSAL FOR THE REVISION OF WIPO STANDARD ST.91

7. To address the current absence of recommendations on the search of 3D models, the 3D Task Force has prepared a proposal to revise WIPO Standard ST.91 for consideration and, where appropriate, approval by the CWS. The proposed revision adds a new Annex II to WIPO Standard ST.91, entitled "3D Model Search". All proposed changes are set out in the Annex to the present document, where strikethrough text indicates deletions and underlined text indicates additions.

8. The 3D Task Force reviewed the working draft of Annex II presented at the thirteenth session of the CWS. During the preparation of the revision, additional comments were received from the International Bureau's Hague Registry, raising considerations as to whether the term "3D model description" refers to the existing "Description" data element or contemplates a new, distinct data element, and suggesting that the proposed recommendations should extend beyond 3D-to-3D comparisons to encompass comparisons between 3D and 2D representations. In response, the 3D Task Force incorporated the suggestion into the revised draft, which was the main change to the draft. The Task Force subsequently prepared a final version for submission to the fourteenth session of the CWS for consideration and, if appropriate, approval.

9. The proposed Annex II of WIPO Standard ST.91, provides recommendations for the development and implementation of search systems for 3D models included in IP documents. It identifies two main categories of 3D model search methods:

- Text-based methods, in which users enter keywords or phrases describing the object; and
- Content-based (shape-based) methods, in which 3D models are compared based on their geometry.

10. While text-based search methods are straightforward to implement, they depend on manually entered 3D model descriptions and metadata, which are not well suited to full automation, and may prove less effective since a 3D model's conceptual description does not always correlate with its visual similarity to other objects. For these reasons, the proposed Annex II recommends content-based (shape-based) methods, which remain effective even when a 3D model lacks accurate metadata but possesses a distinctive shape. The Annex nonetheless recognizes that text-based methods may be usefully employed alongside content-based methods where an Office stores 3D model descriptions.

11. With respect to content-based (shape-based) methods, the proposed Annex II recommends the use of geometry-based search across 3D model arrays to identify similarities between 3D models included in the patent, trademark, or industrial design applications. The Annex II describes a search process comprising three steps:

- i. Pre-processing of the search query and extraction of geometric data;
- ii. Creation of a geometric descriptor; and
- iii. Comparison of the descriptor against those of existing models in the database.

12. The 3D model formats recommended in WIPO Standard ST.91, are either mesh-based or solid-based. The proposed Annex II builds upon the recommended formats by specifying how geometric data may be extracted from each type of format, including the conversion of solid-based formats to a mesh representation and, where appropriate, to point-cloud data, thereby ensuring that the search recommendations remain technically consistent with the formats already adopted under the Standard. The proposed Annex II further recommends that each part of the 3D model be processed and analyzed individually.

13. The proposed Annex II also recommends that IP offices which collect or extract 2D images from 3D models, and have the capacity to do so, may implement 2D image search in addition to content-based 3D-to-3D search.

14. Several editorial changes are also proposed in the Standard, including the addition of WIPO Standards ST.92 and ST.97 to the “References” section.

15. As this Standard does not have a version number, there is no need to propose a new version number, and the date of publication is considered sufficient as a unique reference.

PROPOSAL FOR THE REVISION OF TASK NO. 61

16. Once the proposed revision of WIPO Standard ST.91 is approved, Task No. 61 could be considered partially complete. The 3D Task Force will continue its discussions to ensure further improvement of the Standard while also supporting its implementation by IP offices. In this case, it is therefore suggested that the description of Task No. 61 be revised as follows:

“Ensure the necessary revisions and updates of WIPO Standard ST.91 and support the implementation of this Standard.”

17. *The CWS is invited to:*

(a) note the contents of this document and the Annex to the present document;

(b) consider and approve the proposed revisions to WIPO Standard ST.91 as referred to in paragraphs 7 to 15 above and reproduced in the Annex to the present document; and

(c) consider and approve the proposed new description of Task No. 61, as indicated in paragraph 16 above.

[Annex follows]

STANDARD ST. 91

RECOMMENDATIONS ON DIGITAL THREE-DIMENSIONAL (3D) MODELS AND 3D IMAGES

*Proposal presented for approval by the Committee on WIPO Standards (CWS)
at its fourteenth session*

INTRODUCTION

1. This Standard provides recommendations for Intellectual Property Offices (IPOs) and other interested parties that manage, store, process, exchange or disseminate IP data using digital three-dimensional (3D) models and 3D images.
2. This Standard has the following objectives:
 - (a) determination of formats that are available, compatible or interoperable with different software used by applicants in order to facilitate their efforts to prepare application materials before filing;
 - (b) reducing the time of IP application processing by IPOs;
 - (c) facilitating IP application filing to different IPOs due to adoption of recommended formats among IPOs;
 - (d) harmonization of requirements for data exchange on subjects for IP rights protection with digital 3D visual representations among IPOs and other organizations; and
 - (e) set of requirements for the publication of information on subjects for IP rights protection with digital 3D visual representations.

DEFINITIONS

3. For the purposes of this Standard, unless otherwise specified:
 - (a) 3D model – An electronic file that is created by specialized software, for mathematically representing the surface of an object's visual representation in three dimensions;
 - (b) 3D Images – Digital images that represent objects displayed in three dimensions such as 3D photos and stereoscopy;
 - (c) CAD – Computer Aided Design;
 - (d) 3D PDF – A PDF document that contains 3D models;
 - (e) IGES – Initial Graphics Exchange Specification;
 - (f) OBJ – An open geometry vertex file format used for CAD and 3D printing;
 - (g) MOL/CDX – A text-based chemical file format that describes molecules and chemical reactions;
 - (h) PDF – The Portable Document Format is a file format developed by Adobe;
 - (i) Raster image – An image that is composed of a map of points (pixels), referred to as a bitmap. Typical file formats for raster images include JPEG, TIFF, PNG and BMP;
 - (j) STL – Standard Tessellation Language – a file format native to the stereolithography CAD software created by 3D Systems;
 - (k) STEP – Standard for the Exchange of Product model data – an open ISO Standard which can represent 3D objects in Computer-aided design (CAD) and related information;
 - (l) U3D – Universal 3D (U3D) is a compressed file format standard for 3D computer graphics data;
 - (m) Vector graphics – An image file that is composed of shapes formed of mathematical formulas and coordinates on a 2D plane. As opposed to raster images, vector graphics have the property of scaling infinitely without any degradation of quality; and

REFERENCES

4. The following WIPO Standards and other documents are relevant to the present Standard:

WIPO Standard ST.9	Bibliographic data on and relating to patents and SPCs
WIPO Standard ST.10	Published patent documents
WIPO Standard ST.60	Bibliographic data relating to marks
WIPO Standard ST.63	Content and layout of trademark gazettes
WIPO Standard ST.67	Electronic management of the figurative elements of trademarks
WIPO Standard ST.80	Bibliographic data relating to industrial designs
WIPO Standard ST.81	Content and layout of industrial designs gazettes
WIPO Standard ST.88	Electronic representation of industrial designs
WIPO Standard ST.92	Recommendations on the Data Package Format for the Electronic Exchange of Priority Documents
WIPO Standard ST.96	Processing of Industrial Property information using XML
WIPO Standard ST.97	Recommendation for Processing of Intellectual Property Data Using JSON
ISO Standard 10303	Product data representation and exchange standard

GENERAL RECOMMENDATIONS

5. An application for IP protection may contain a 3D visual representation of an object in the form of a digital 3D model or 3D image in accordance with the requirements of the IPO receiving the application. Applicants can be encouraged to provide a 3D visual representation of the object as supplementary material to the application or as the main visual representation of the object, if specified by the requirements of the receiving IPO.

6. Formats and other characteristics of the received image files (e.g., file size) accepted by each IPO should be according to the recommendations of this Standard. These formats were selected in accordance with the criteria set out in the Annex.

7. If an IPO has previously established its preferred image formats and other characteristics, it is recommended that the IPO announce in its official publications at regular intervals and/or on its websites, the image formats, sizes and other specific characteristics that are acceptable in application filings.

RECOMMENDATIONS FOR 3D MODELS AND 3D IMAGES FORMATS AND FILE SIZE

8. The following recommendations apply to providing application materials for the indicated type of IP rights.

Patent for invention or utility model

9. 3D visual representation of an invention or utility model should preferably be formatted as at least one of the formats: STEP, IGES, U3D, OBJ or STL. Maximum file size should not exceed 50 MB. If required, at an applicant's request the receiving IPO can accept files larger than the said maximum.

10. For chemical structures that are included in patent applications, 3D visual representation should preferably be formatted as CDX or MOL. Maximum file size should not exceed 50 MB.

Industrial design

11. 3D visual representation of an industrial design should preferably be formatted as at least one of the formats: STEP, IGES, U3D, OBJ or STL. Maximum file size should not exceed 50 MB. If required, at an applicant's request the receiving IPO can accept files larger than the said maximum.

Trademark

12. 3D visual representation of a trademark should preferably be formatted as at least one of the formats: STEP, IGES, U3D, OBJ or STL. Maximum file size should not exceed 50 MB. If required, at an applicant's request the receiving IPO can accept files larger than the said maximum.

Integrated circuit topography

13. 3D visual representation of an integrated circuit topography should preferably be formatted as at least one of the formats: STEP, IGES, U3D, OBJ or STL. Maximum file size should not exceed 50 MB. If required, at an applicant's request the receiving IPO can accept files larger than the said maximum.

PROCEDURAL RECOMMENDATIONS FOR FILING AND PROCESSING OF 3D MODELS AND 3D IMAGES

14. If an IPO converts a 3D model or 3D image from formats originally submitted by applicants to formats other than recommended above, or transforms from one storage format to another (e.g. STEP to STL), it is recommended that the IPO retain the original format as well as the transformed format for archival purposes.

15. If an IPO receives a 3D model or 3D image as the only visual representation of an object in an application for IP right protection and needs 2D images, it is recommended to make 2D views of the 3D model in order to ensure compatibility with the IPO's internal systems and processes where only 2D images of objects are required.

- (a) For patent applications for inventions or utility models, it is recommended to make seven 2D views of the 3D model, i.e., front, rear, right, left, top, bottom, and perspective views, in an electronic format corresponding to the requirements established by the IPO for 2D images of inventions or utility models.
- (b) For industrial design applications, it is recommended to make six 2D views of the 3D model, i.e., front, back, left, right, top, and bottom views, in an electronic format corresponding to the requirements established by the IPO for 2D images of industrial designs.
- (c) For trademark applications, it is recommended to make one 2D view of the 3D model, i.e., front view, in an electronic format corresponding to the requirements established by the IPO for 2D images of figurative trademarks.

16. It is recommended that an IPO define a set of guidelines and procedures for converting models and images from 3D to 2D formats.

RECOMMENDATIONS FOR DATA EXCHANGE

17. When IPOs exchange 3D model and/or 3D image data, file formats can be converted from the original formats, if such is established by an IPO. The conversion or transformation from the original file formats should be conducted in accordance with the guidelines and procedures established by the IPOs involved. The following additional requirements are recommended when exchanging application data for the indicated type of IP rights.

Patents for inventions or utility models

18. It is recommended that IPOs and other organizations comply with the following requirements when exchanging 3D models and/or 3D images data incorporated in patent documents:

- At least one of the file formats: U3D, OBJ or STL, STEP, IGES; and
- Maximum file size: 50 MB.

19. For the chemical structures in the patent application, it is recommended that IPOs and other organizations comply with the following requirements when exchanging 3D models and/or 3D images:

- At least one of the file formats: MOL, CDX

Industrial designs

20. It is recommended that IPOs and other organizations comply with the following requirements when exchanging 3D models and/or 3D images incorporated in industrial design applications:

- At least one of the file formats: U3D, OBJ or STL, STEP, IGES; and
- Maximum file size: 50 MB.

Trademarks

21. It is recommended that IPOs and other organizations comply with the following requirements when exchanging 3D models and/or 3D images incorporated in trademark applications:

- At least one of the file formats: U3D, OBJ or STL, STEP, IGES; and
- Maximum file size: 50 MB.

RECOMMENDATIONS FOR ELECTRONIC PUBLICATION AND ONLINE DISPLAY

22. It is recommended that an electronic publication of an object in an IP application or IP right include 3D model and/or 3D image files received by the IPO in the list of published documents relating to the IP application or IP right.
23. Formats of published 3D files can be converted from the original formats, if desired by the IPO. Any conversions or transformations should be conducted in accordance with the guidelines and procedures established by the IPO.
24. For online display of 3D visual representation of an object, the following requirements are recommended:
- At least one of the file formats: U3D, OBJ or STL, STEP, IGES, MOL, CDX: OBJ or STL; and
 - Maximum file size: 50 MB.
25. For electronic publication of 3D visual representations of an object in PDF format, it is recommended to create files in 3D PDF embedding the 3D models and/or 3D images in one of the 3D file formats recommended under this Standard. If the original 3D model cannot be embedded in 3D PDF in its original format, then it is recommended to convert the 3D model to one of the 3D file formats recommended under this Standard, or to embed 2D image(s) of the object, preferably as received from the applicant, or as converted by the IPO from 3D formats submitted by the applicant.
26. Paper publication should contain a 2D visual representation of a 3D object and/or a link to the 3D object online.

RECOMMENDATIONS FOR PARTIAL CLAIMING, PARTIAL DESIGN, PORTION DESIGN

27. It is recommended that appropriate depiction of partial claiming of design, partial design, or portion design should be feasible in a relevant 3D format, and disclaimed features in designs should be readily recognizable and understandable.
28. The depictions of partial claiming of design, partial design, and portion design featured in relevant 3D format should be robustly maintained during processing of applications with 3D models or 3D images, e.g., when publishing the applications.

|

[Annex | follows]

ANNEX I

CRITERIA FOR SELECTING 3D FORMATS

*Proposal presented for approval by the Committee on WIPO Standards (CWS)
at its fourteenth session*

The file formats described in this Standard were selected after assessing potential formats that may be recommended according to the five basic criteria set out below, where all criteria were considered equal.

1- Wide-spread adoption

Objective: This criterion ensures a selection of formats that are widely used by applicants.

Solution: In order to determine widely adopted 3D formats a survey¹ was conducted among IPOs and Industry, where the respondents indicated the formats currently used for processing visual representations of objects for IP right protection.

2- Openness/accessibility/standardization

Objective: This criterion ensures the format is reproducible in the long-term. For example, some unstandardized formats require the support of certain software and are not intended for long-term use.

Solution: The preference for open formats over proprietary formats was based on this objective for long term use with additionally making sure these formats are accessible to a wide range of users. The standardization is an advantage, and correlates with the long-term storage capabilities of formats, although in some cases standardized formats may be protected by patents.

3- Specific requirements/stored information

Objective: This criterion ensures the ability to store the mandatory elements of an IP right.

Solution: Various 3D formats have been analyzed to assess their comprehensiveness in storing information about an IP right, including the surface of the 3D object, textures, the possibility of containing several separate parts that can be considered separately during the examination process, etc. Some information relevant to IP right protection, such as chemical formulas and genetic sequences, was considered separately, since 3D visualisation of such objects can be useful both for examination purposes and for the publication of such data, but such objects may differ from the 3D models created using CAD systems or graphic editors.

4- Cross-platform /software accessibility

Objective: This criterion ensures that the applicant will be able to submit a visual representation in one of the recommended formats and that such published data will be viewable by the general public.

Solution: The possibility of opening and saving such formats in widely-available software that is used to create a visual representation of the objects for IP right protection (CAD, graphic editors), as well as the availability of various software for processing and displaying such formats, was also analyzed.

5- File size

Objective: This criterion ensures the performance of data processing, storage and publishing information systems.

Solution: The restrictions on file-size for storing, processing, and publishing of such objects were taken into account. For some of the purposes mentioned, formats that stored the necessary information in smaller files were preferred.

[\[Annex II follows\]](#)

¹ See <https://www.wipo.int/documents/d/standards/docs-en-surveys-3dmodels-analysis.pdf>
<https://www.wipo.int/export/sites/www/standards/en/pdf/surveys/3dmodels/analysis.pdf>

ANNEX II

3D MODEL SEARCH

*Proposal presented for approval by the Committee on WIPO Standards (CWS)
at its fourteenth session*

1. This Annex is to provide recommendations for developing and implementing search systems for three-dimensional (3D) models included in patent, trademark or industrial design documents. There are two main categories of 3D model search methods: text-based and content-based (shape-based).

TEXT-BASED 3D-TO-3D SEARCH METHODS

2. These methods are the most common used for searching 3D models, where users enter keywords or phrases that describe the desired object. These methods are simple to implement, but at the same time, the efficiency of searching for similar models may decrease because the conceptual description of the objects does not always correlate with the visual similarity. These methods also involve manual input of object descriptions, the technical metadata that describes a three-dimensional object specifically for search purposes, which would not allow the complete automatization of the process. However, if an intellectual property (IP) office stores into the database the 3D model description, manually entering or using algorithm, a text-based search method may be used in addition to content-based (shape-based) method.

CONTENT-BASED (SHAPE-BASED) 3D-TO-3D SEARCH METHODS

3. Content-based (shape-based) search methods compare 3D models based on their shape on the geometry rather than relying on text descriptions. This allows users to find models with similar forms, even if their keywords or tags are different. It is especially useful when a model has little or no accurate metadata but a distinctive shape.

4. To identify similarities between 3D models that visually represent digital objects protected as a part of a patent, trademark or industrial design, it is recommended to use a geometry-based search in 3D model arrays, which is a type of content-based method.

5. When a 3D model is composed of multiple distinct parts, it is recommended to process and analyze each part individually. This approach facilitates part-level indexing and retrieval. Additionally, it complements whole-model processing by supporting detailed analysis, comparison and reuse of individual components.

6. When IP offices collect 2D images or extract 2D images from 3D models, and have the capacity, they may implement 2D image search in addition to content-based (shape-based) 3D-to-3D search method.

7. The geometric-based search system for 3D models processes the search query through the following steps:

Step 1: Pre-processing the search query

Extraction of geometric data

8. This step involves extracting geometric data from the 3D model provided as the search query.

9. The 3D model file formats recommended in this Standard are either mesh-based or solid-based formats.

- Mesh-based formats represent objects by describing their surfaces using interconnected polygons, forming a mesh that stores and represents the geometry of 3D models.
- Solid-based formats represent both the internal and external geometry of 3D models as solid volumes, using predefined shapes to define the model.

10. If the 3D model is in a mesh-based format, geometric data can be extracted directly. For solid-based formats, the 3D model must first be converted to a mesh-based representation before geometric data can be extracted.

11. The extracted geometric data can also be converted into a point cloud data format, which consists of a discrete set of data points in space, typically used to represent the shape or surface of a 3D object. Each point has a specific position defined by Cartesian coordinates (X, Y, Z). In addition to position, points may also store other attributes such as RGB color values, timestamps, and more.

Step 2: Descriptor creation

12. In this step, a geometric descriptor is generated from the 3D model's geometry. This descriptor is a compact numerical representation that captures the shape's key characteristics, enabling effective comparison.

13. The following mathematical and neural network techniques are recommended to be considered as a basis for creating the descriptor:

- Compute a shape descriptor from:
 - the mesh by analyzing vertex positions and/or the connectivity structure to produce a numeric representation; or
 - from the point cloud by analyzing point positions and their local spatial relationships.
- Generate embedding vectors from mesh or point cloud data using neural network techniques.

Step 3: Descriptor comparison

14. Once the descriptor of the query model is created, it is compared with the descriptors of existing 3D models in the database to find the models whose descriptors are most similar to the query. As a result, the system retrieves the most relevant 3D models that closely match the shape and features of the input 3D model.

[End of Annex II and of Standard]

[End of Annex and of document]