

产权组织标准委员会（标准委）

第十四届会议

2026 年 11 月 23 日至 27 日，日内瓦

关于修订产权组织标准 ST. 91 的提案

秘书处编拟的文件

概 述

1. 立体工作队建议修订产权组织标准 ST. 91。拟议的修订包括增加标准附件二“立体模型检索”和若干文字上的修改。

背 景

2. 立体工作队负责在第 61 号任务框架下修订产权组织标准 ST. 91，该任务说明如下：

“确保对产权组织标准 ST. 91 进行必要的修订和更新，包括检索立体模型和立体图像的方法。”

3. 在第九届会议上，标准委通过了产权组织标准 ST. 91，题为“关于数字立体模型和立体图像的建议”（见文件 CWS/9/25 第 31 段）。这一标准为使用数字立体模型和立体图像管理、存储、处理、交换或传播知识产权数据的知识产权局和其他相关方提供了建议。

4. 在第十一届会议上，标准委批准了对产权组织标准 ST. 91 的修订，包括增加关于“立体格式的选择标准”的新附件，以及删除 X3D 的定义（见文件 CWS/12/29 第 106 段）。

5. 在第十三届会议上，标准委审议了由立体工作队提交的关于产权组织标准 ST. 91 新附件的工作草案，该草案就立体对立体检索系统提出了建议。标准委注意到，立体工作队将继续完善草案，并提交最终提案供审议（见文件 CWS/13/33 第 68 和 71 段）。

6. 但是，产权组织标准 ST. 91 未就知识产权局检索立体模型提出任何建议。随着知识产权局越来越广泛地受理和公布立体模型，为审查目的而检索此类内容的能力，对于有效利用知识产权局采集和公布的立体模型数据而言，正变得至关重要。

产权组织标准 ST. 91 修订提案

7. 为解决目前在立体模型检索方面缺乏相关建议的问题，立体工作队编写了一份修订产权组织标准 ST. 91 的提案，供标准委审议并酌情批准。拟议的修订在产权组织标准 ST. 91 中新增了题为“立体模型检索”的附件二。所有拟议改动均载于本文件附件，其中标注删除线的内容表示删除，标注下划线的内容表示增加。

8. 立体工作队审查了在标准委第十三届会议上提交的附件二工作草案。在修订草案的准备过程中，收到了国际局海牙注册处的补充意见，该意见就“立体模型描述”一词是指现有的“描述”数据元素，还是指一个新的、独立的数据元素提出了疑问，并提出拟议的建议应不仅限于立体对立体比较，还应涵盖立体与二维图样之间的比较。对此，立体工作队将该提议纳入了修订草案，这也是草案的主要修改内容。随后，工作队编制了最终版本，提交给标准委第十四届会议审议并酌情予以批准。

9. 产权组织标准 ST. 91 拟议的附件二，就知识产权文献中包含的立体模型检索系统的开发和实施提出了建议。该附件将立体模型检索方法分为两大类：

- 基于文本的方法，即用户输入描述物体的关键词或短语；
- 基于内容（基于形状）的方法，即根据立体模型的几何特征对其进行比对。

10. 虽然基于文本的检索方法易于实施，但它们依赖于人工输入立体模型描述和元数据，这些内容不适合完全自动化，且可能效果较差，因为立体模型的概念性描述不总是与其与其他物体的视觉相似性相关。基于这些原因，拟议的附件二推荐采用基于内容（基于形状）的方法，即使立体模型缺乏准确的元数据但具有独特的形状，该方法仍然有效。不过，该附件也承认，在相关局存储立体模型描述的情况下，基于文本的方法可与基于内容的方法结合使用，从而发挥有益作用。

11. 关于基于内容（基于形状）的方法，拟议的附件二建议在立体模型阵列中采用基于几何的搜索，以识别专利、商标或工业品外观设计申请中包含的立体模型之间的近似性。附件二描述了一个由三个步骤组成的检索流程：

- i. 预处理检索语句和提取几何数据；
- ii. 生成几何描述符；
- iii. 将描述符与数据库中现有模型的描述符进行比对。

12. 产权组织标准 ST. 91 中推荐的立体模型格式分为网格型和实体型两种。拟议的附件二在推荐格式的基础上，具体规定了如何从每种格式中提取几何数据，包括将实体型格式转换为网格表示形式，并在适当情况下转换为点云数据，从而确保检索建议在技术上与该标准下已采用的格式保持一致。拟议的附件二还建议对立体模型的每个部分分别进行处理和分析。

13. 拟议的附件二还建议，从立体模型中收集或提取二维图像且具备相应能力的知识产权局，除基于内容的立体对立体检索外，还可实施二维图像检索。

14. 标准中还提出了若干编辑修改建议，包括在“参考文献”部分增加产权组织标准 ST. 92 和 ST. 97。

15. 由于该标准没有版本号，因此不必建议新版本号，发布日期被认为足以作为唯一参考。

关于修订第 61 号任务的建议

16. 一旦产权组织标准 ST. 91 的拟议修订获得批准，第 61 号任务即可视为部分完成。立体工作队将继续开展讨论，以确保该标准的进一步完善，同时支持知识产权局对其的实施。因此，建议将第 61 号任务的说明修订如下：

“确保对产权组织标准 ST. 91 进行必要的修订和更新，并支持该标准的实施。”

17. 请标准委：

(a) 注意本文件及本文件附件的内容；

(b) 审议并批准上文第 7 至 15 段所述并转录于本文件附件的产权组织标准 ST. 91 的拟议修订；并

(c) 审议和批准上文第 16 段所述的第 61 号任务的拟议新说明。

[后接附件]

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.

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[Annex I 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]

[附件和文件完]