PQTO Operation Guide

Release 1.15

July 6, 2025

Overview

This Guide describes the sequence of operations for generating quantity take-off, using the accompanying **PQTO** program.

PQTO.exe is a quantity takeoff program for IFC 2x3 files, developed by Marcelo E. Giacaglia, for academic use only. Professional use is not supported nor recommended, and at your own risk.

> **PQTO** was developed in Embarcadero Delphi 10.2, for use in Windows PCs.
>
> For configuration and further detail read the **PQTO Reference Guide**

2 Operation

The expected workflow for generating quantity take-offs from Building Models IFC files is illustrated on Figure 1.

The IFC Model can be a native model, or it must be exported from the BIM authoring software. Until recently, only **IFC 2x3** was supported. **IFC 4** is supported, from release 1.14 on, although some BIM software vendors do not guarantee the integrity of the exported file. Keep in mind that the MVD chosen, as well as the BIM authoring software's particular export options, will affect information that can be extracted.

2.1 Treatment of accented letters

For models created using non-English terms it is necessary to convert accented letters from the **escaped Unicode STEP** format to the desired form. This is done by **PQTO.exe**, in two stages: from escaped Unicode to HTML, then from HTML to ASCII for a given Code Page, using the contents listed in **QTO-accents.txt**.

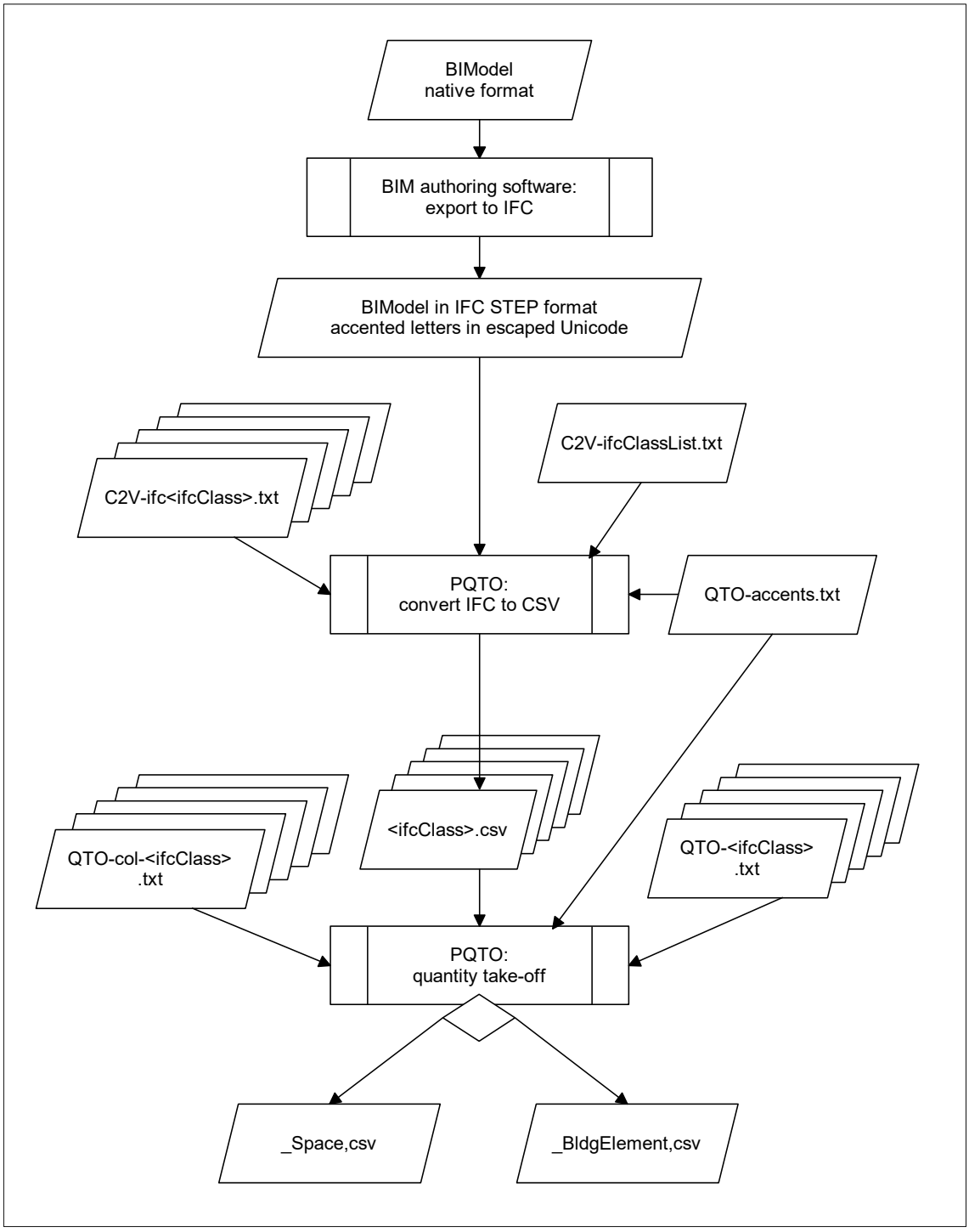
> Currently the contents of **QTO-accents.txt** are set for **Portuguese**. For other languages, necessary inclusions can be made by the user, provided the original structure is maintained.

2.2 First Stage: converts from IFC STEP format to CSV

Until release 1.11, PQTO required the use of a third-party software, NIST IFC File Analyser (LIPMAN, 2017; NIST, 2021), to convert the IFC STEP format, for a BIModel, into a set of CSV files, one for each IFC Class.

Because of this, quantity takeoffs aren't produced directly from the IFC File, as would be expected. However, such intermediary format can be useful for debugging purposes, and also offers a better understanding of the IFC schema. Such understanding isn't easy, considering the STEP format.

Figure 1 – expected work-flow for quantity take-offs using the BIM software cited in this Guide



2.3 Second Stage: Quantity take-off

After converting the IFC file to CSV files, **PQTO** can be used to see building spaces and supported building elements for each Building Storey. Then, to generate quantity takeoff for the building spaces and elements.

Exterior Spaces (not linked to a building storey) are currently not visible, but should appear in the quantity take-off output file **_Space.csv**.

PQTO will generate a quantity takeoff for building elements as **_BldgElement.csv**.

To read the CSV file set **PQTO** requires the selection of the desired **Project.csv** file.

Other required files are listed in the **PQTO Reference Guide**

Once a Project file is selected, it can be opened. Once it is opened and its contents, as well as the contents of the other files supported (especially those that are required), building spaces and supported building elements, associated with each building storey, can be partially viewed on screen. They can then be output with their relevant attributes and supported quantity data.

2.4 Current Limitations

Refer to the **PQTO Reference Guide**

3 References

Lipman, R. (2017), IFC File Analyzer Software, Journal of Research (NIST JRES), National Institute of Standards and Technology, Gaithersburg, MD, [online], https://doi.org/10.6028/jres.122.015 (Accessed May 11, 2021).

NIST (2021), IFC File Analyzer, National Institute of Standards and Technology, Gaithersburg, MD, [online] https://www.nist.gov/services-resources/software/ifc-file-analyzer (Accessed May 11, 2021).