Wistron Material and Mesh Property Preprocess Plug-in

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摘要

本成果針對Wistron自行開發的材料與網格基本設定之Abaqus Plugin應用進行介紹。此Plugin為一整合的使用者圖示化界面，支援名稱篩選與複選設定功能，能夠有效減少工程師對於多物件模擬的前處理時間與錯誤率。材料方面支援連接到雲端的材料資料庫，方便不同工程師能夠使用與維護同一材料資料庫，並且依照幾何(實體/曲面)設定不同的材料屬性給對應的計算物件。網格部份支援快速全局網格大小設定、以及常用的數種網格類型選擇，最後能夠一鍵針對所有選取的物件進行試建模，得到視覺化內建的網格品質方便工程師進行後續修整網格之工作。

關鍵字：流程改善、插件、材料、網格、自動化

ABSTRACT

This study introduces a Wistron self-develop material/mesh preprocess plugin. It is an integral GUI that allows the user to filter out or/and multi-select the objects and it contributes to engineers' efficiency improvement and error rate decreasing. On the material side, the material data is connecting to the cloudy database which each one can maintain. And it will set the proper section by its geometry. On the mesh side, users can input the global seed size and choose some common mesh type by the button click. It provides a button click function for users to mesh whole selected objects and gives a visualize mesh quality result for engineers.

Keywords : Process Improvement、Plug-in、Material、Mesh、Automatic

In simulation, it's necessary to assign material to each part. But there are more than hundreds parts with about 10~20 kind of materials in NB or DT case. Sometimes, we have to modify the mass density specific part to satisfy the limitation. In fact, it is a routine job that need time and patient.
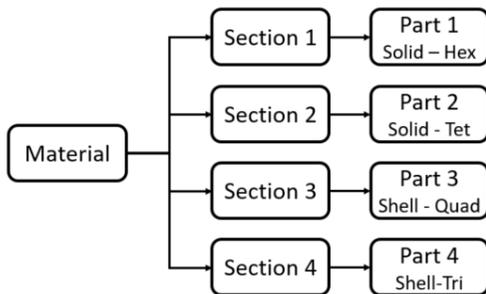

Figure 1. Relation between material property, section and part.

How we did was to set a material property that extend many sections and each section correspond to different part manually. Hence we always want to design a GUI plug-in that can handle the material property, section

and mesh setting easily. Therefore some functions are essential for this plug-in.

1. Global material database for different engineer.
2. Clear and intuitive graphic interface to select the material.
3. To set different kind of sections with different mesh type automatically.
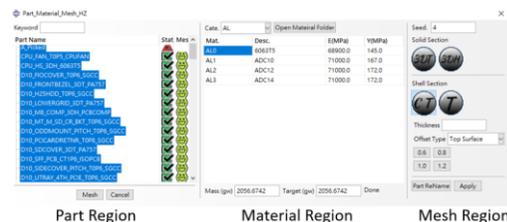4. Executing the trial mesh and gathering the mesh quality data numerously.

Figure 2. GUI overview of Plug-in.

The plug-in is divided into three main region (Figure 2). The first one is part region. In this region, the plug-in will get many kind of data as figure 3. Based on these information it will describe the material status, the mesh quality and the total mass. For the other two regions,

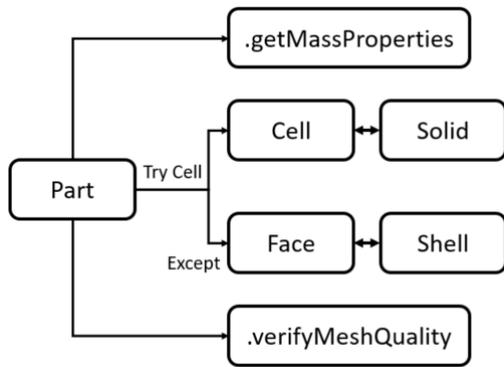part region will provide a name list that user selected.

Figure 3. Logic flow of part region

The second region is material region. In this region, we choose our cloudy excel to be the shared material database. There are so many way that can gather excel data in python. And the way that the plug-in used is "xlrd". The trick to get the material data classified is double layers dictionaries structure as figure 4. It is a basic data structure to make sure the data is unique and access to the data by "name" in python.
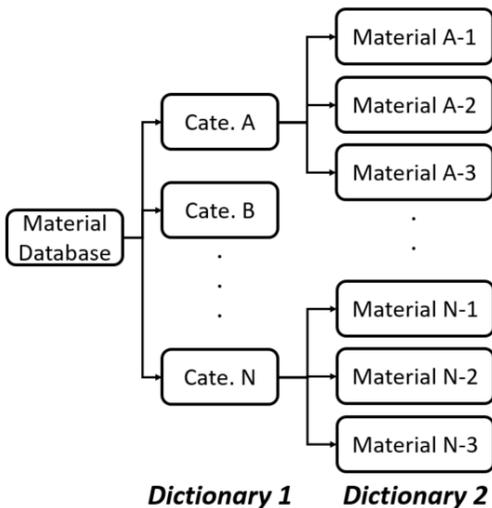

Figure 4. Double layers of dictionary

The third region is mesh region. The way to code the mesh setting is by .setElementType and .setMeshControl. And it is easy to get the whole part of cells or faces by .getSequenceFromMask and cells.getMask. What we need to consider more here is error handle that can avoid the wrong mesh type for solid or shell geometry.

This plug-in also provide two buttons that can execute the parameters assignment or mesh generation. After choosing all parts that share the same material and mesh type, user can directly finish these parts.

In conclusion, this plug-in provide user a convenience GUI that can handle most of the using situation. All user can share and maintain the same material database easily and get the material property classifiable. The material property will be assigned with its correct type of section automatically. The common mesh parameters will be set in trial process. After execute the mesh button, user can understand the mesh quality by visualize icon in plug-in. The plug-in allow user switch into different part by double-click.