



Digital Twin Identifiers: Options for External References

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Challenge

- Use an MBOM to define an engineering detail for an EBOM
 1. Define EBOM assembly
 2. Export parts requiring detail into MBOM
 3. Use a CAD to detail to the MBOM
 4. *Link the EBOM to the MBOM using an external reference*

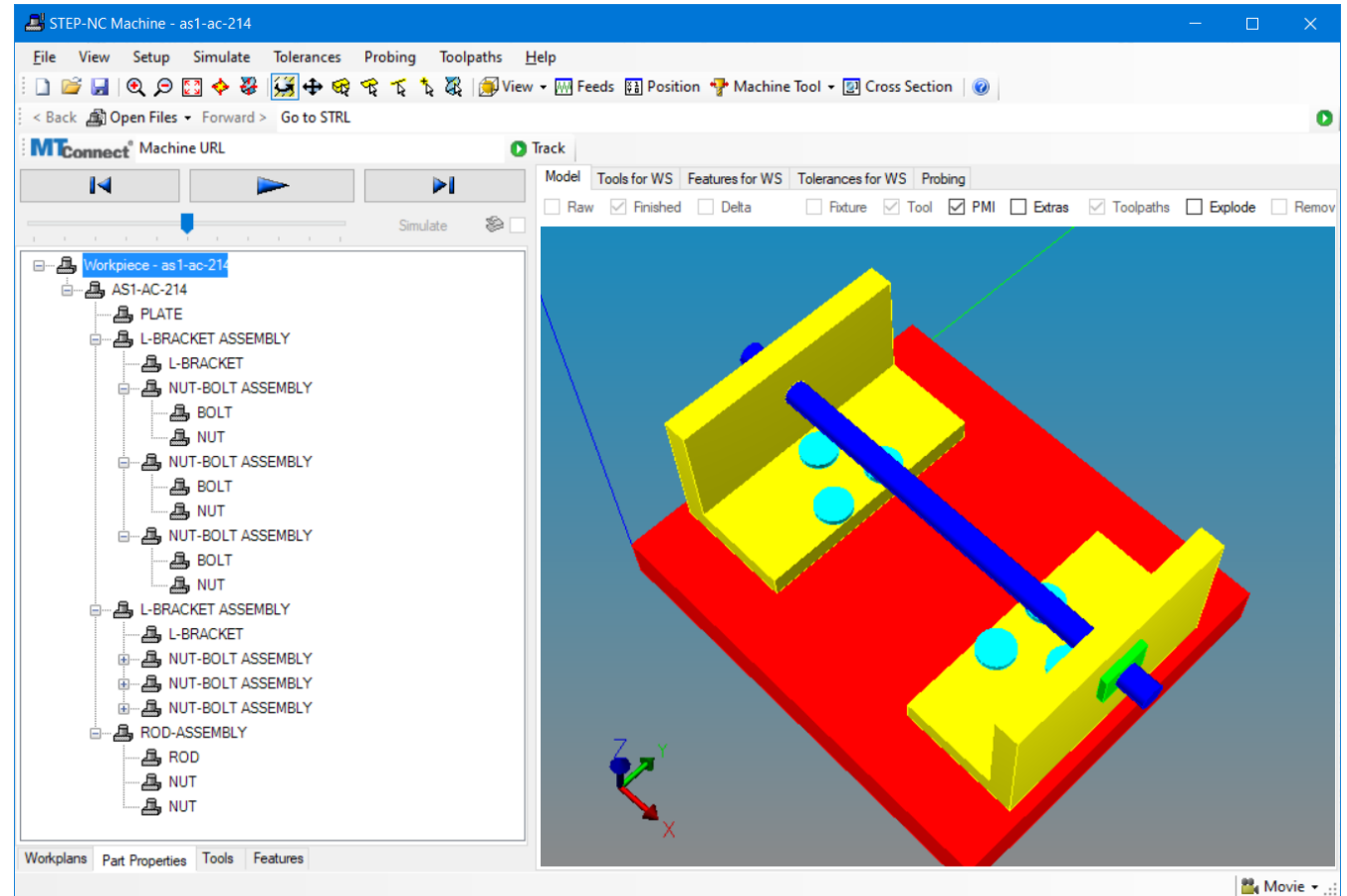


Test case

5 designed items have engineering requirements (plate, L-Bracket, nut, bolt, rod)

28 nodes in assembly tree

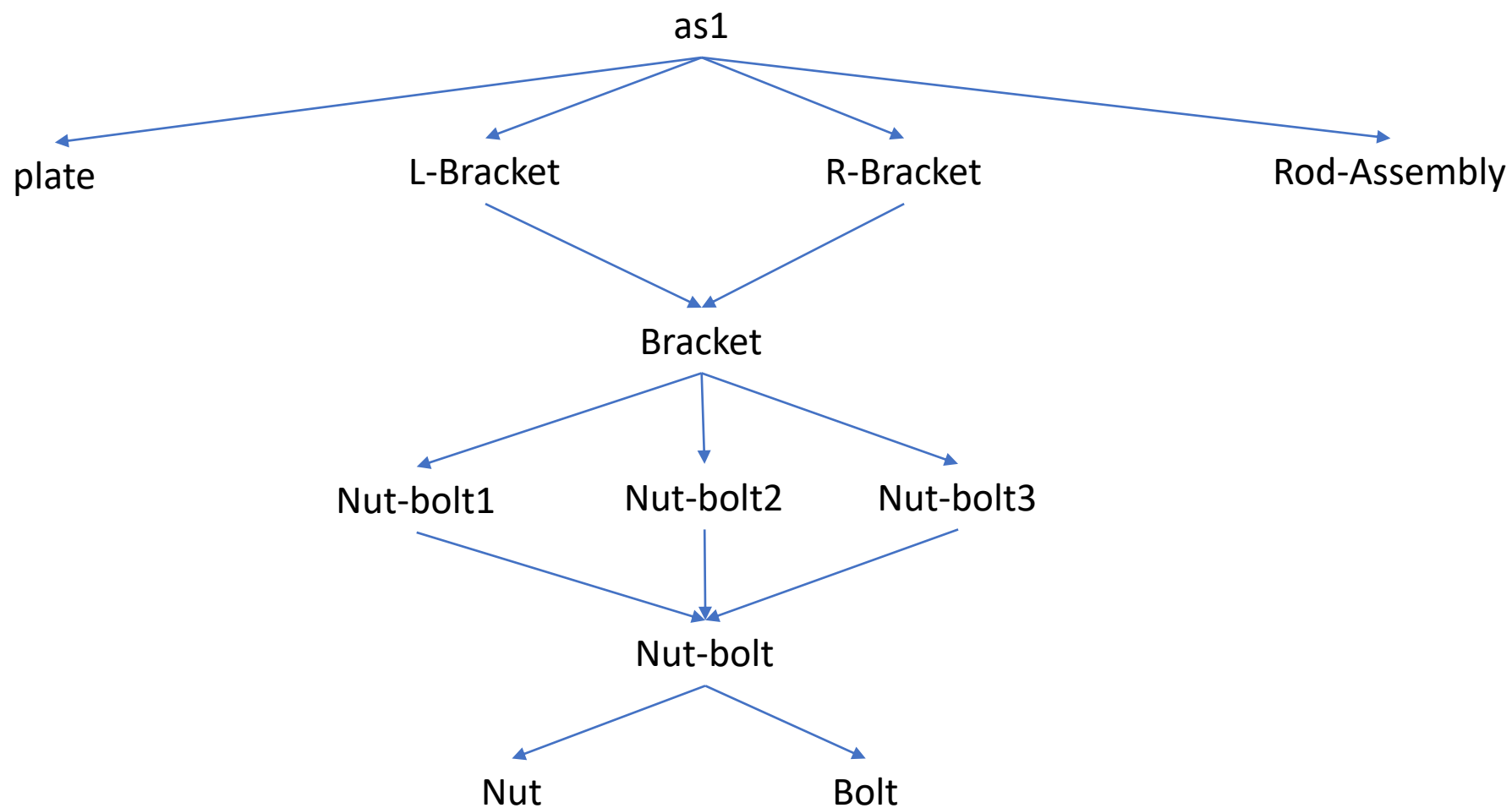
18 machined items (8 nuts, 6 bolt, 2 brackets, 1 plate, 1 rod)



Want to define an assembly method for each nut-bolt



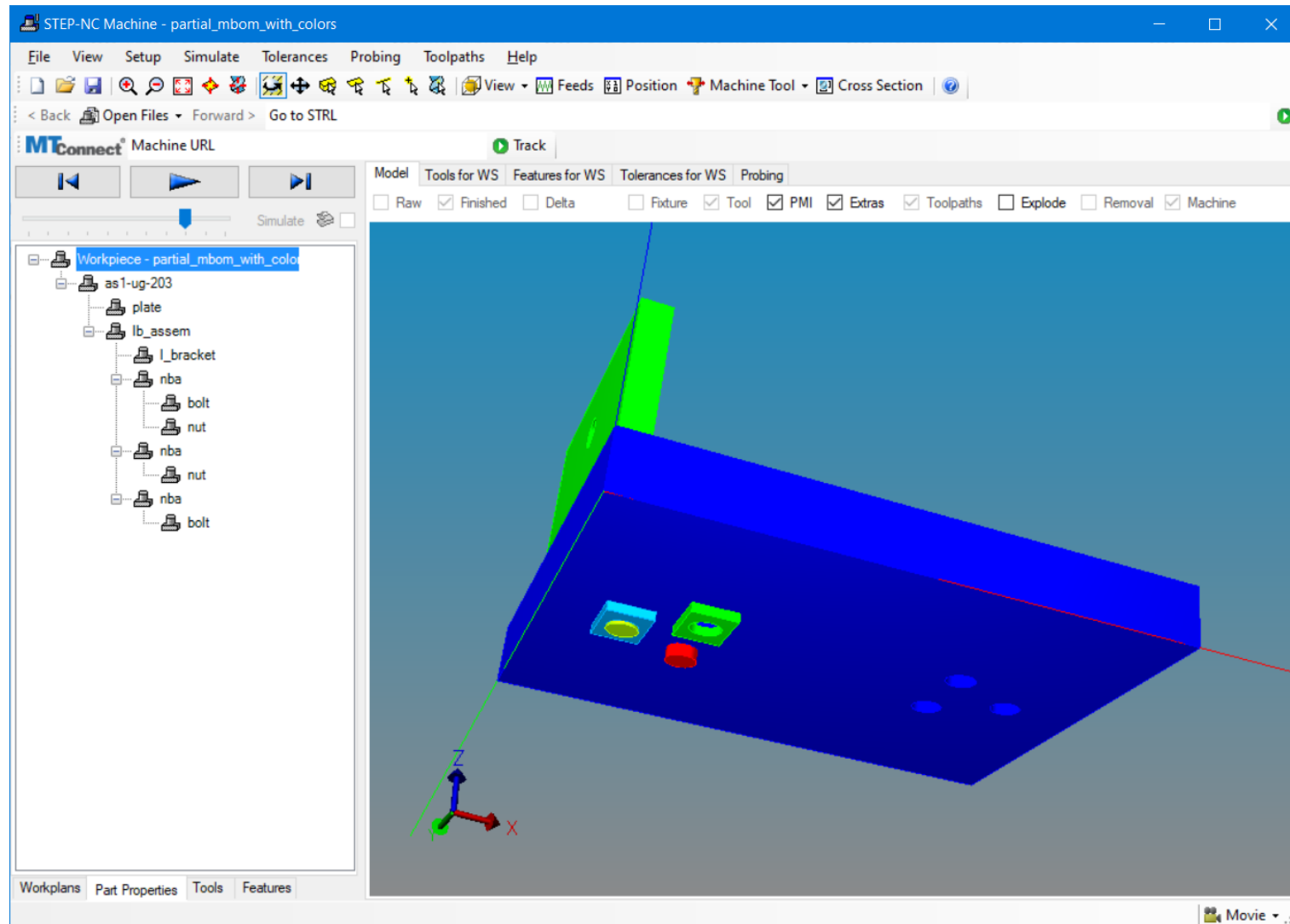
EBOM Assembly



Only one nut-bolt so cannot give it six assembly methods

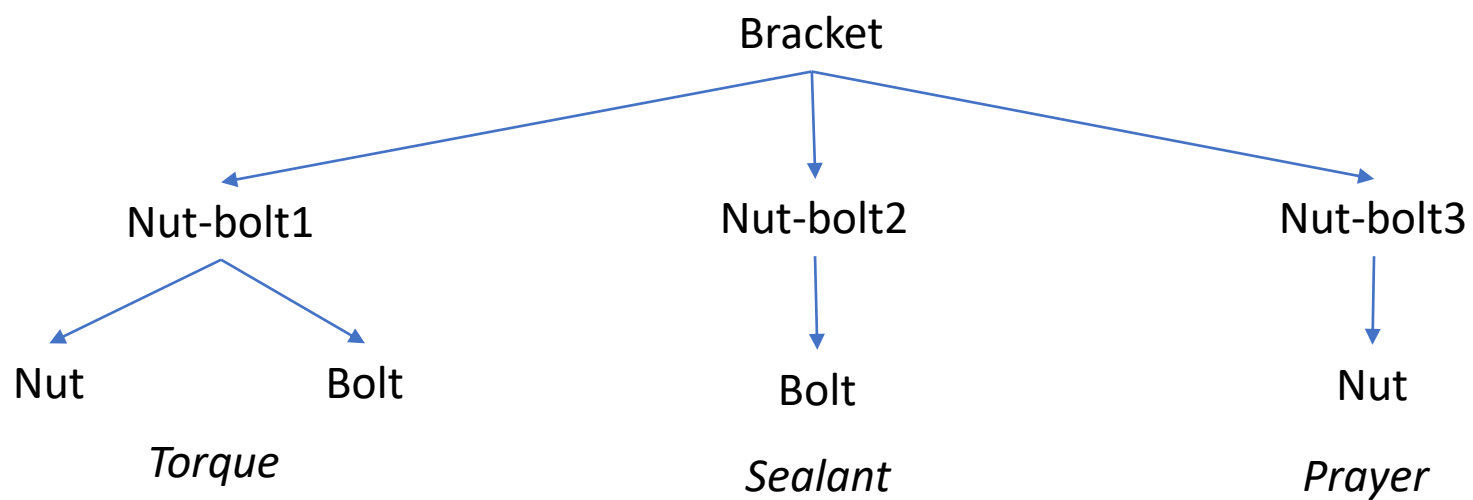


MBOM for left bracket





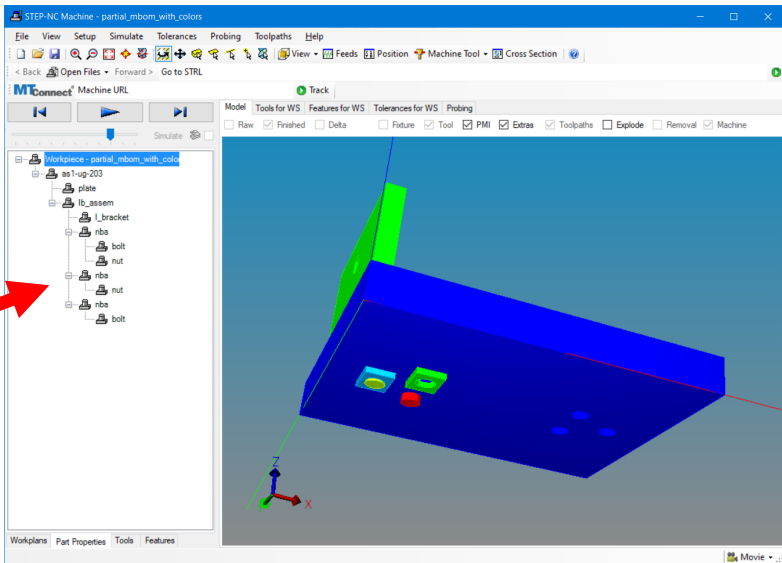
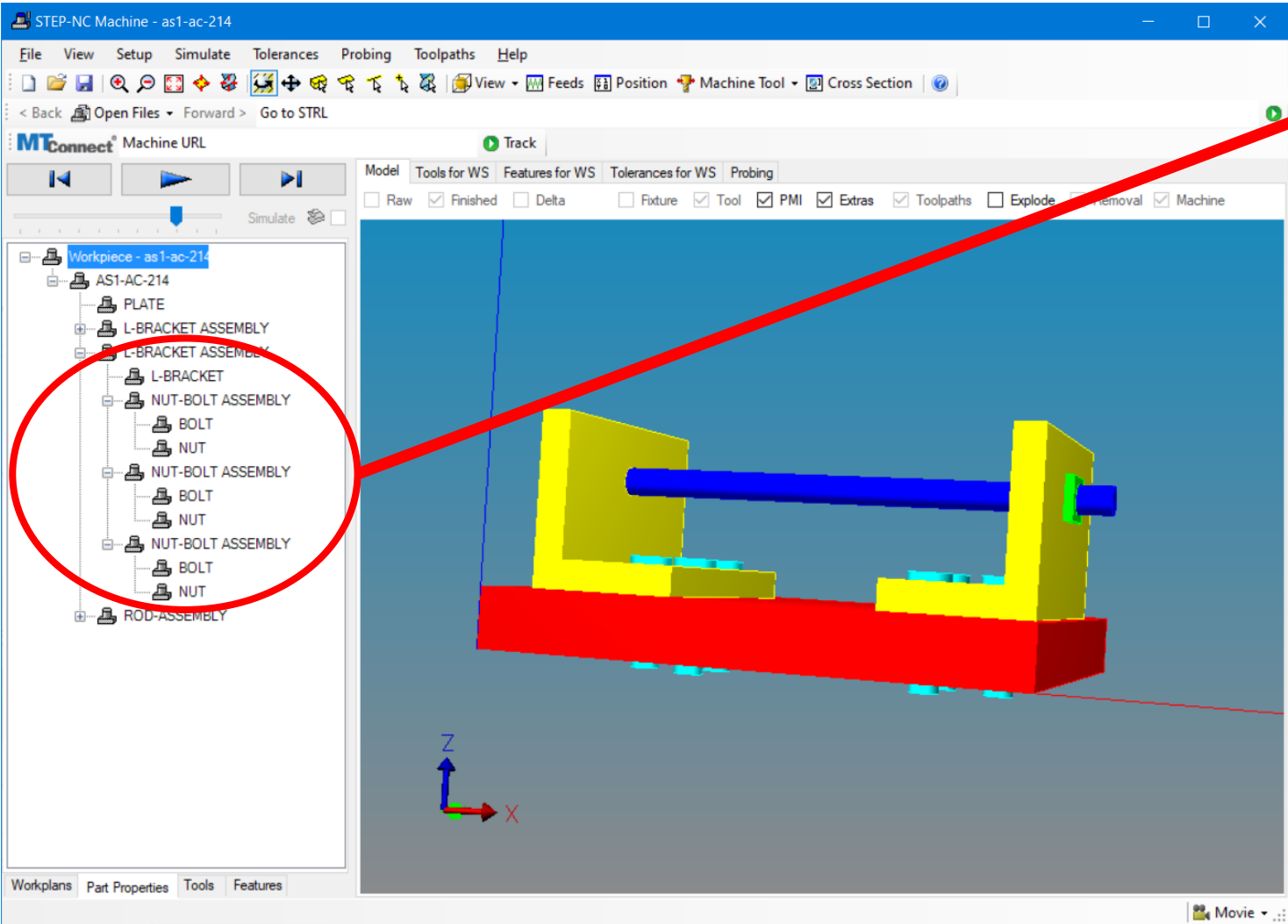
MBOM Assembly



Each nut-bolt has own assembly method



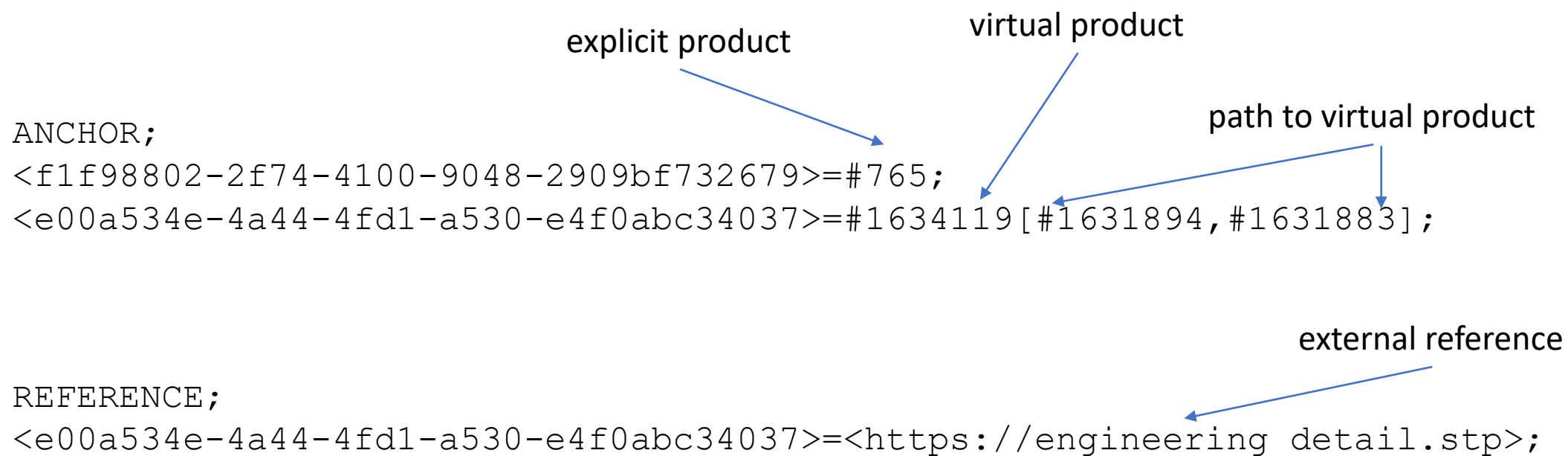
Link the engineering detail



“Engineering detail for assembly methods”

UUIDs to link the data

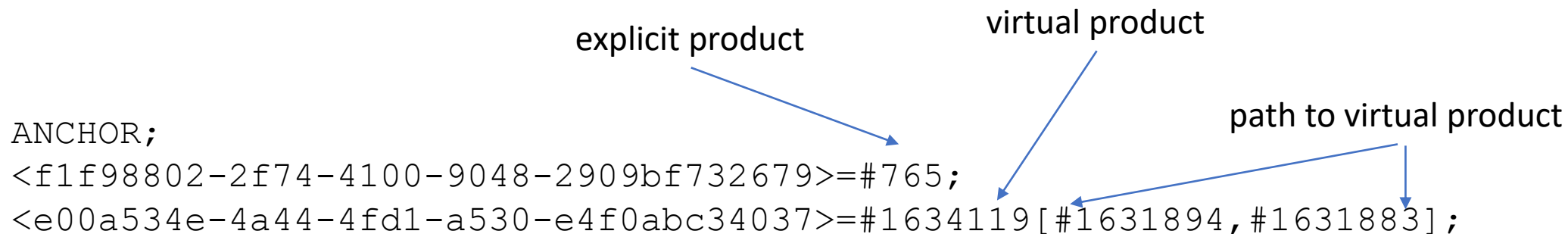
- Anchor section defines a UUID for each referenceable item
- Reference section uses the anchors to link items



System notation for path

explicit product virtual product path to virtual product

```
ANCHOR;  
<f1f98802-2f74-4100-9048-2909bf732679>=#765;  
<e00a534e-4a44-4fd1-a530-e4f0abc34037>=#1634119[#1631894,#1631883];
```



Option 1

User notation for path

```
ANCHOR;  
<f1f98802-2f74-4100-9048-2909bf732679>='Plate';  
<e00a534e-4a44-4fd1-a530-e4f0abc34037>=  
    'Nut' ['NUT-BOLT_ASSEMBLY_3','L-Bracket Assembly_1'];
```

Do we want a user notation?

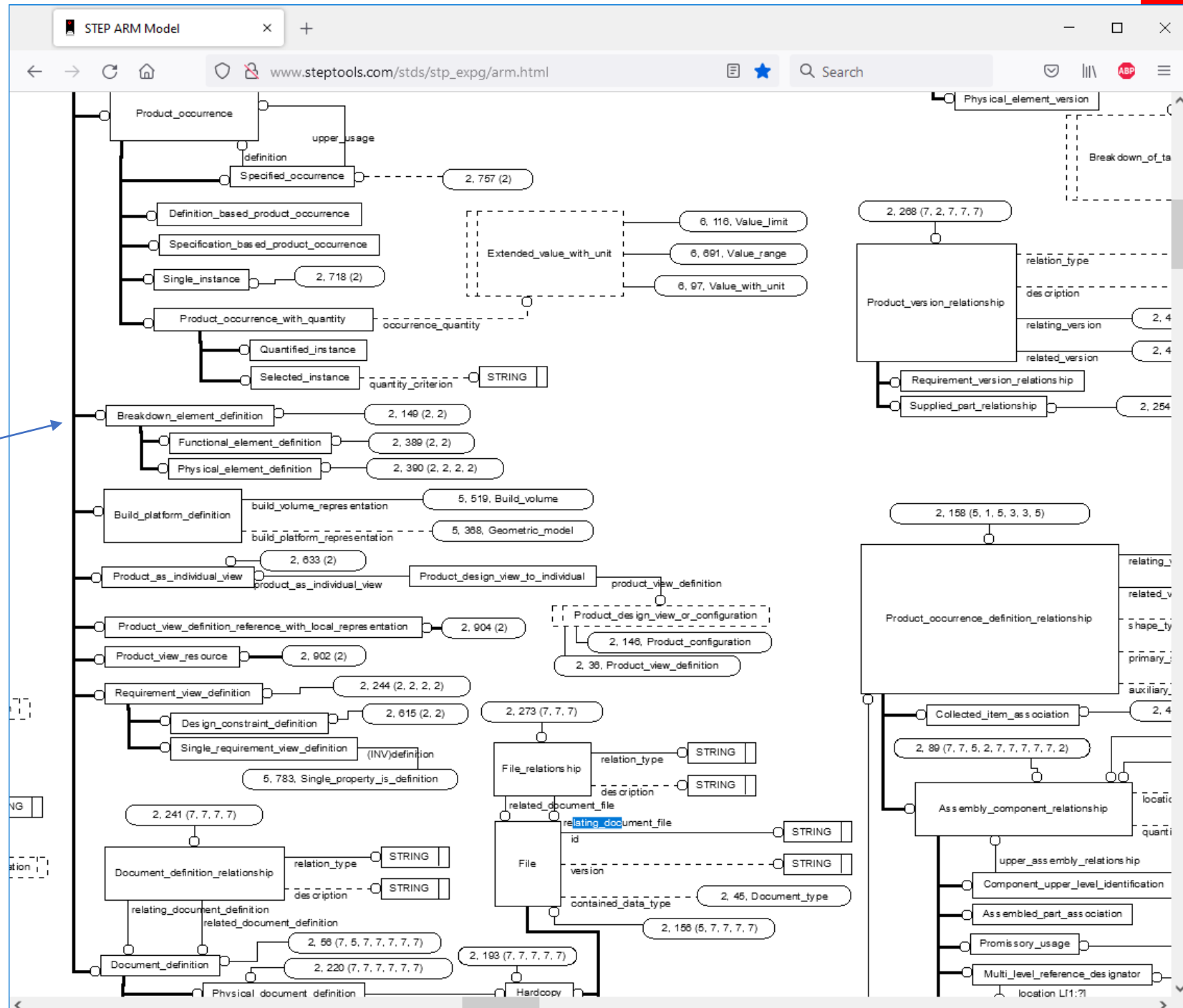


AP242 definitions for the engineering detail

Breakdown_element_definition can be added to enhance description of engineering_detail.stp

No action required to allow this

Option 2



Http descriptions for the end user

Option 3

[Hotel C Stockholm - book hotel in central Stockholm](http://hotelcstockholm.com)

`Hotel C Stockholm – book hotel in central Stockholm`

REFERENCE;

`<e00a534e-4a44-4fd1-a530-e4f0abc34037>=<https://engineering_detail.stp>;`

`<e00a534e-4a44-4fd1-a530-e4f0abc34037>=`

`Engineering detail for assembly methods`

No action required to allow this



Comparison

OT solution

- Large file containing all details
- Include many views in the file
- PLCS and MLRD to describe additions and exceptions
- Hard to detail
- Fragile
- Requires many extensions to CAD translators

IT solution

- Network of connected files
- Link a detail for each view
- Put additions and exceptions into own models
- Easy to detail
- Robust
- Requires users to link existing CAD files