

# The Value Proposition of Equipment Class Bill of Material (BOM)



**CEKAP TECHNICAL SERVICES SDN BHD** (Co. Reg: 295213-P)

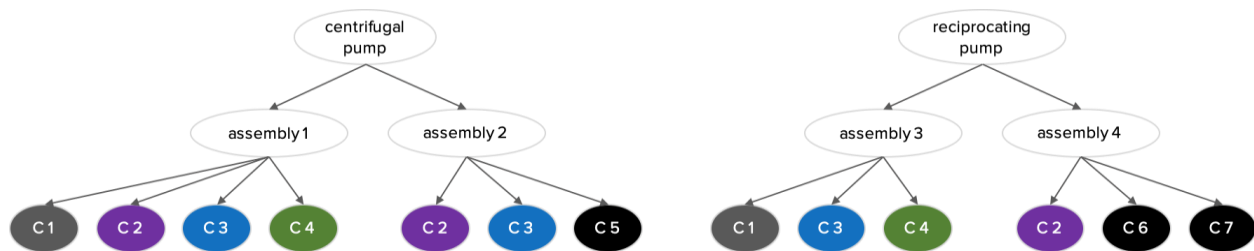
No. D-0-9, Setiawangsa Business Suite  
Jalan Setiawangsa 11, Taman Setiawangsa  
54200 Kuala Lumpur, Malaysia  
[headoffice@cekaptechnical.com](mailto:headoffice@cekaptechnical.com)

## The Value Proposition of Equipment Class BOMs

In our pillar page, “The Complete Guide to Bills of Materials for Excellence in Facility Operations and Maintenance” we introduced the concept of Equipment Class BOMs and indicated their value proposition. This blog post recaps what these BOMs are, and then illustrates possible use cases to demonstrate their value proposition.

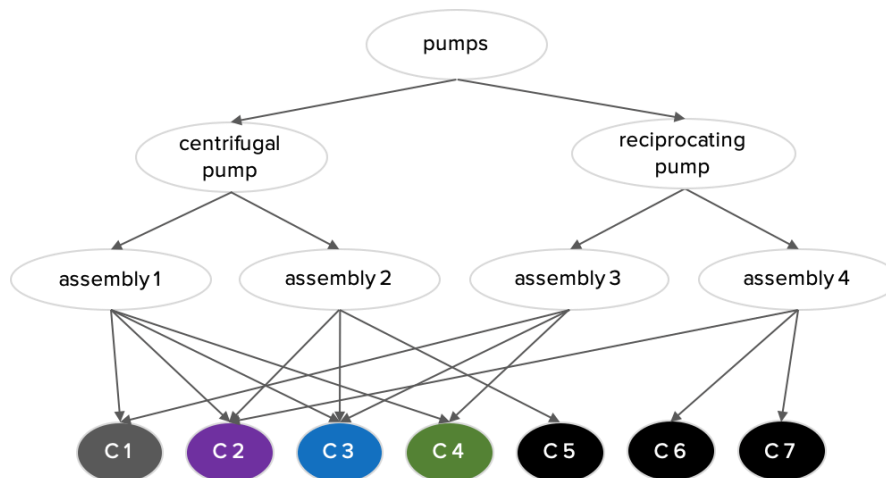
### Equipment Class BOMs

Conventional BOMs are Single Equipment BOMs such as shown for a centrifugal pump and reciprocating pump in Figure 1. The tree structure of these BOMs is what’s called a graph (alternatively network or lattice) in mathematics. The circles/ovals are called nodes and the arrows are called edges. The nodes with common colors indicate similar components across the two pumps.



*Figure 1: Two pump BOMs with common parts highlighted*

An Equipment Class BOM consolidates multiple Single Equipment BOMs of a certain equipment class into a single BOM tree such as illustrated in Figure 2 for the two pumps.



*Figure 2: Pump class BOM*

We see that this layout of data is more compact, and explicitly shows the cross references between the two pumps. The degree of compactness is pronounced in complex facilities which may have as many as 150 pumps. Such a graph would look something like what's shown in Figure 3.



*Figure 3: Illustration of a large graph*

This representation may cause an aneurysm in a human but is a highly efficient schema for a machine to navigate through the use of graph data science techniques such as path finding, centrality and community.

## **Value Proposition**

### Wrench time reduction

Wrench time is a measure of the percent of time maintenance personnel actually spend working on equipment. In many facilities it's only about 30%. The other 70% is spent waiting for jobs, preparing for assigned jobs, returning to the store for new items, and so forth. In a large facility, improving wrench time by 10% could save millions of dollars in direct and indirect costs. A primary contributor for low wrench time is poorly specified work orders for corrective maintenance jobs. A crew that embarks on a job with the wrong

parts, tools and skills will have to return to the store, or worse defer the job to wait on ordering parts not in stock, wait for personnel with the required skills, and so on.

Figure 4 is a segment of a pump class BOM showing two centrifugal (4730-P...) and one reciprocating pump (1611-P...). All have a common drive shaft. The drive shaft in the reciprocating pump failed previously (Failure Report 1) and was fixed (Work Order 1). The centrifugal pump at bottom right has just failed (Failure Report 2). We can use natural language processing to automatically cross reference the failure reports, and if there is high enough similarity between them then Work Order 1 would be a good prediction for the new work order. In a complex facility, there would likely be a library of existing Failure Report–Work Order pairs to search to find the closest set of candidate work orders.

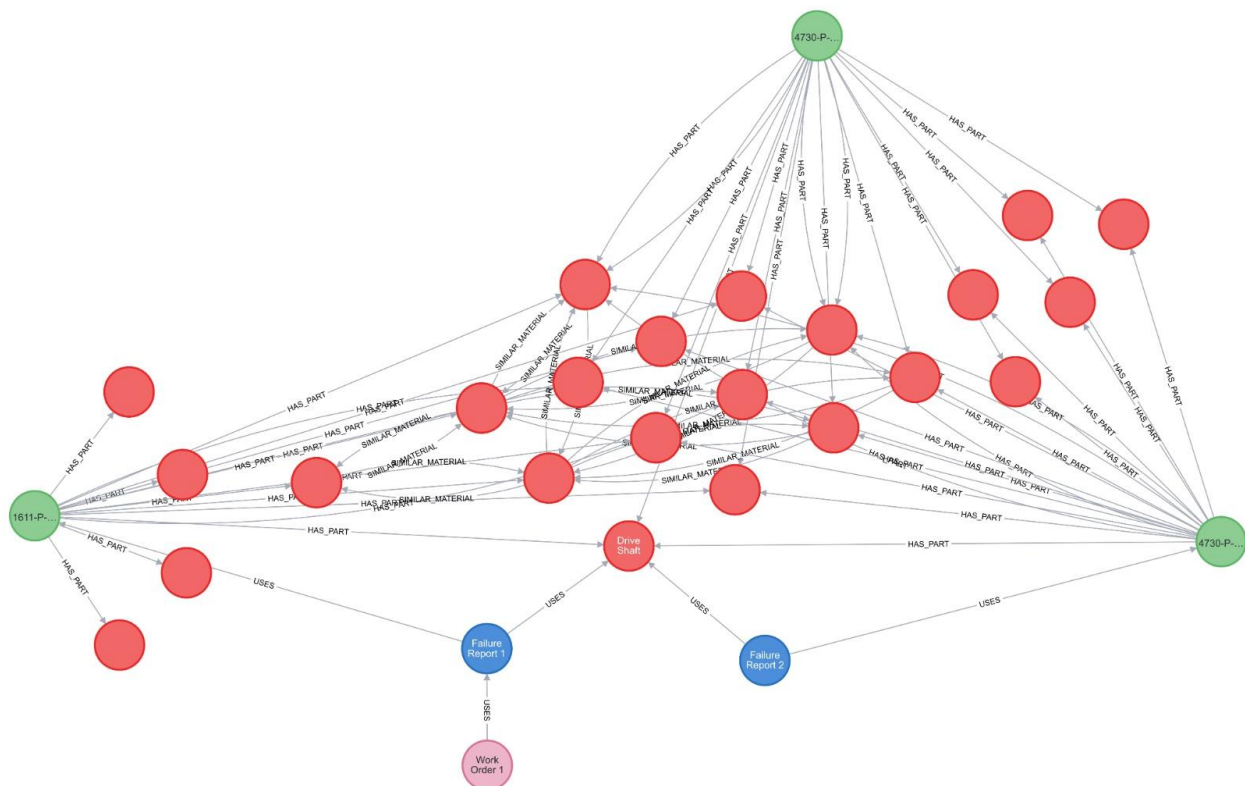
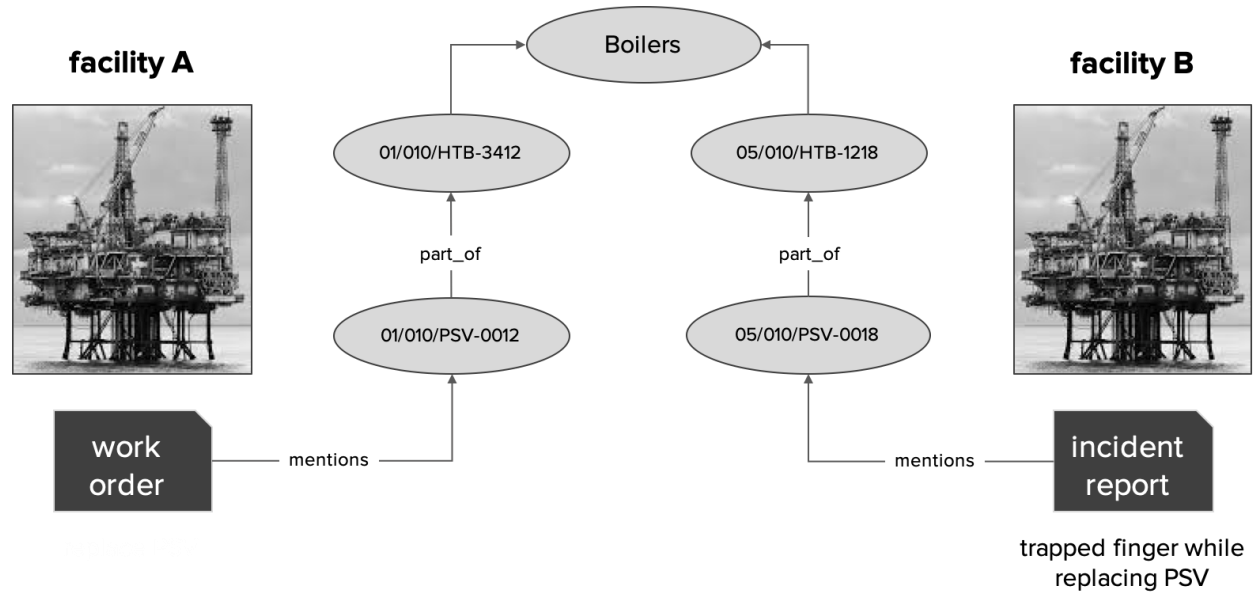


Figure 4: Segment of a pump class BOM

### Safety incident reduction

Many industrial facilities have massive equipment in place which significantly increases the risk for personnel working on them. Elimination of even a single safety incident has a value well beyond its direct financial impact.

Figure 5 illustrates a situation where a maintenance technician has been assigned a work order to replace a pressure safety valve (PSV) at Facility A, and wants to know if there have been any safety incidents in the past when changing a PSV. In the case shown, there hasn't been any incident at Facility A, however, there has been one at Facility B. The relevant PSVs are both part of a boiler class BOM making the incident report easily accessible to the technician.



Any incidents replacing PSV?

Figure 5: Illustration of safety incident cross referencing

## Conclusion

Equipment Class BOMs enable a highly efficient schema for machines to cross correlate information and provide on demand to maintenance staff. They have tremendous potential to improve operational efficiency.