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## EDITOR'S PICK

### Possible Use of Material Passport in the Construction Industry of Singapore

Eugene Seah, Managing Director, Surbana Jurong

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#### Eugene Seah, Managing Director, Surbana Jurong

The 'Material passport' approach in construction is being refined by various companies in many European countries. There is an urgency to land the right approach because quick access to accurate information on building materials enables active, swift recovery and reuse of units, products, or materials in buildings. The construction industry needs to encourage the reuse of building materials, particularly when we understand that raw materials are becoming scarce and deficient and that the heavy use of raw resources will destroy the environment. The concept of reusing building components

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has not been adopted yet on a large scale because of several reasons. One of the key reasons is poor building information management. Thus the goal of BAMB (Buildings as Materials Bank) is to let the people shift to a circular building sector, which mean, reusing the components and products which are in useable condition.

BAMB focuses on reusing the building materials, which is in a good and reusable condition. Reusing the construction material leads to less wastage of raw materials, adequate usage of construction material, and low cost of construction. It also saves the environment and raw materials. The correct information is appropriate for the recovery and reuse of materials, products or components in buildings. For keeping materials, products and components that can be used sometimes later in some other construction project, this information is also needed. The electronic Materials Passports developed in BAMB focuses to be a one stop for all the material information.

### What is Material Passporting

Material passport is a document that keeps the details of the materials which are used in the construction process. This document contains the data which explains the characteristics of materials to be used in construction. Material passport focuses on recovery, recycling and reuse. Identity is provided to the material with the help of Material passport.

Like our personal passport, which gives us identity and is required for travelling purposes, the material passport provides identity to the so-called used or waste materials. It allows the material to travel to different locations as per the requirement after it has served its purpose in a building. Material is taken from one site to another site or building with the purpose of reusability. The ethos of material passports is that the earth's resources should not be wasted and must be saved by reusing the materials because our planet is a closed system, and we should not disturb the balance on earth. The resources which we use as raw materials lose their identity and become rubble after one use, this is the current situation going on. In such situations, the rubble can be used in the construction sector by giving materials an identity through a Material Passport.

To help monitor the attributes of Material Passports, the electronic Materials Passports developed in BAMB, targets to be a one fixed stop for material information, where all information can be collected at once.

Materials Passports which are developed in BAMB collect the detailed data of materials, describing features of materials used in products that give them value for recovery and reuse. In Material passports, all the details of material used in the construction process are taken into account This is carried out so that later when the building is demolished, the materials which were used in the construction process, those can be checked and evaluated and can be reused if found in good and reusable condition. This reduces the wastage and ultimately gives benefits to our pocket and environment as well.

*Like our personal passport, which gives us identity and is required for travelling purposes, the material passport provides identity to used or waste materials*

Materials Passports is also known as 'nutrient certificates'. Essentially, they are made up of critical data on the materials used in products that give them value for recovery and reuse. Just like the nutrient labels on food products, the nutrient certificate also describes the materials, their usability, quality and everything else which is required at the time of reusing the materials in new construction.

### Challenges in the Construction Industry to Implement Material Passports in General

Currently, buildings are demolished with little consideration to re-use its materials. How much can be retained and what can be recycled is not documented at the onset on design and verified during demolition. This may have adverse effects to our environment. In a circular economy, materials are reused, which indirectly upholds the monetary worth and the value of the products and systems is conserved. Currently, only a few countries are following the circular economy pattern and is new to many others.

This practice is not fully developed; hence the construction industry, especially in Asia, is not much aware of the benefits of this concept. However, countries where material passporting has begun, are seeing the industry tracking well in the adoption of the concept, keeping in view the cost of construction, improved utilization of resources and the environ f  
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waste as well. Land, materials, natural resources are limited in supply. Therefore, designers have to use these resources wisely so that our next generations do not have to suffer. The Building sector plays an important role in reducing the waste on our planet because it is the largest user of resources and the largest producer of waste.

Waste can be reduced if we focus more on recycling. Along with recycling, it is important to have knowledge about the materials which can be reused. Keeping in mind the capability of our Earth and the increasing world population, resource scarcity is expected in the near future. This scarcity of resources will lead to a price increase for materials required for building. In a circular economy, materials are kept in use for as long as possible. The suggestion is to maintain the value of materials, products or components. Materials are valuable if they are accessible, functional and attractive. This requires that materials or building products be removed from a building after their lifetime with minimal effort, contamination and without loss of quality.

The benefits for good material passport in buildings include but are not limited to:

- Improvement in indoor air quality
- Increase in value stability
- Reduction of the disposal costs by the avoidance of impurities
- Increased employee satisfaction (e.g. lower absenteeism, health promotion)
- Quality assurance in construction
- Optimization of resource extraction (sustainable consumption and climate protection)
- Compliance with increasingly stronger regulatory requirements
- Contribution to the achievement of national and international goals and standards (e.g. UN Sustainable Development Goals, Circular Economy Goals)
- Cost-optimised maintenance

Therefore, it can be concluded that:

1. With a material passport, we can look into the deconstruction or demolition of the properties. We can also look for the highest possible usability of the materials which are used after the premises have been vacated or demolished.
2. There is an opportunity to recover more reusable parts by selling the small separate parts instead of the building as a whole.
3. Material Passport increases the value of materials or keeps the same value of products and components even over a period of time.
4. Choosing healthy, sustainable, and circular building materials is easier for the developers, renovators and managers.
5. Material passport is also considered as a one-fix-shop to explain Circular Economy value across the building cycle. Its main target is using and reusing the same components and materials. With this, there will be less wastage. Materials Passports platform helps in bridging the gap in the marketplace.

*Therefore*, the concept of Material Passport is excellent for the environment, but there would be a capital cost that may delay initial adoptions. But weighing the environmental impact, the initial cost is minuscule compared to the benefits of extending and improving the lifetime of the building materials, all finite materials that the earth has to offer. Material passports are meaningful and thoughtful tools to bridge that gap. This idea can improve clarity and access to information on the component materials and products used during building construction and renovation. Material passports help in such practices like reusing the materials also supports and give a better shape to the business models that come under the construction sector.

The Construction industry of Singapore is in a good position to adopt Material Passport as the foundations of DfMA, BIM, and other initiatives have paved the way for adoption. However, there would still be much study needed on the processes of BIM libraries, updating of the Material and Building Passport and the design process using BIM for Material Passporting. Nonetheless, because of the current initiatives by the Singapore Government that is in place for the Construction Industry, it is in a good position for adoption and contributing to the saving of the Environment.

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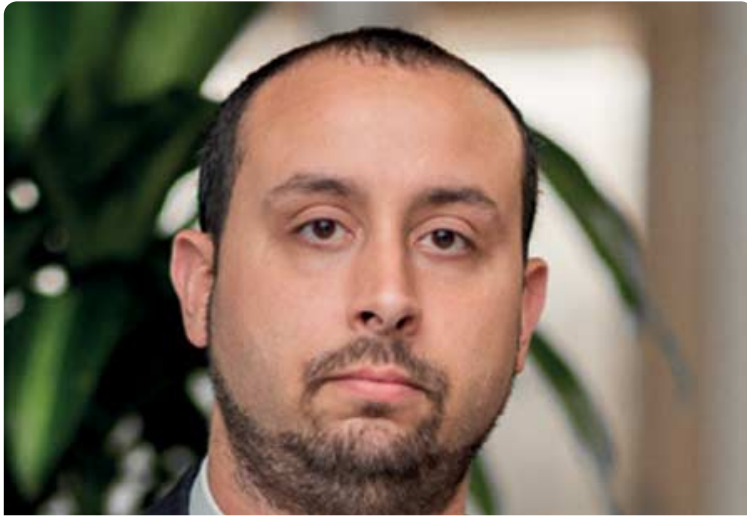
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