Wood is a renewable resource and has a much lower carbon footprint than other materials like steel, aluminum and polymers. Controlled plantation of softwoods can lead to quick harvesting and better control of wood qualities. However, these plantation woods are intrinsically more prone to decay. Accoya® is the brand name of chemically modified solid wood produced with proprietary acetylation process developed by Accsys Technologies PLC (Figure 1). Acetylated wood exhibits superior qualities in terms of dimensional stability and durability than other natural or treated woods.

To support the continuous development of the company, a new plant design with Internal Rate of Returns (IRR) 2.5% higher than that of current system was suggested in this project.

**Methodology**

Development opportunities are identified through investigation of technologies in related fields/industries. Ontology Design, an explicit specification of conceptualization, is applied to analyzing the scattered and unstructured ideas collected in a systematic way to formulate applicable design concepts. Design concepts are ranked in terms of potential costs, benefits (e.g. higher capacity, better product quality) and risk. Technical Feasibility and Business Feasibility of the most promising concepts are studied in more detail.

**Results**

Specifications of necessary equipment for the new design were deduced through in-lab tests and the equipment was co-developed with equipment suppliers. Potential uncertainties contributing to variations in IRR were identified and corresponding effects were estimated through a Sensitivity Study. It was found that even in the worst case scenario, the new design resulted in IRR improvement more than expected.