

INSTITUTION OF MECHANICAL ENGINEERS HONG KONG BRANCH  
TECHNICAL VISIT TO BLESS INTERNATIONAL GROUP ON 11/8/2018



The cosmopolitan Hong Kong may hardly be associated with manufacturing nowadays. However, food processing and production is still active in Hong Kong, and its free port and access to the global supply of food resources enables a niche product in the food industry to bud and grow. In fact, same as the developed countries, the pursuit of originality for food and beverages is in demand in Hong Kong. Notwithstanding high land and labour costs, with the use of new and advanced technology, Hong Kong can satisfy its own demand on and desire for quality fruit juices. Members of Institution of Mechanical Engineers (IMechE) were privileged to have a glimpse of the engineering involved in delivering every drip of the most original fruit juice into the hands of the demanding consumers at home and abroad.

### **High Pressure Products**

The addition of heat and additives are the conventional yet effective method to process food to extend its shelf life. The two (2) most common methods of thermal sterilisation of food are Pasteurisation and Ultra-Heat Treatment (UHT). The former method involves heating the food to below 100 degree Centigrade ( $^{\circ}\text{C}$ ) for short period for destroying harmful microorganisms and extending the keeping quality of food by reducing the number of spoilage microorganisms in the product. The latter method applies 130  $^{\circ}\text{C}$  to 150  $^{\circ}\text{C}$  of temperature to the product for 1 second to 5 seconds (J. Manners and H.Craven, 2003).

Although both methods are effective in warranting food hygiene with the inactivation or destroy of microorganisms in the food which may decay it, the original nutrients and presentation in terms of flavour, texture and colour are compromised. In spite of the loss of the original food quality can be remedied by the addition of sugar, preservatives and stabilisers, these artificial additives fall short of the consumers expectation of originality on food. Especially people in the affluent regions are more interested in eating healthy and quality than ever, the conventional thermal processing food preservation become less attractive, and the alternative methods are sought.

A solution is subjecting the food under very high hydrostatic pressure. High Pressure Processing (HPP) is a non-thermal technique of food preservation that inactivates harmful pathogens and vegetable spoilage microorganisms by using pressure rather than heat to introduce a pasteurisation effect. HPP employs intense pressure up to 600 MPa, or 6,000 times atmospheric, at refrigeration or mild process temperature, preserving most food with minimal effects on taste, texture, appearance or nutritional value. HPP can be applied to process both liquids and solid food with a high content of moisture. Although lethal to microorganisms, HPP does not break the covalent bond and has a minimum effect on food chemistry (Mutean *et al*, 2016). The original food nutritional quality and enzymatic activities can remain status quo, albeit chilled storage is required for minimising the enzymatic changes and the residual microorganism growth (Hiperbaric, 2015).

### **Hong Kong High Pressure**

Identified the opportunity, Bless International Group (Bless) was established in 2014 and launched the first HPP-process pure original fruit juice in Hong Kong in 2017. The territory had not seen HPP before Bless introduction, and it puzzled the government departments initially. In addition to the licencing requirements for food production to be fulfilled, there has been no existing law applicable to the equipment of high hydraulic pressure. Therefore, the Hiperbaric brand HPP unit is not subject to any specific governing regulation in Hong Kong.

Even so, providing suitable hardware for the first HPP facility in the territory was not simple and straightforward. Firstly, although the HPP unit with Bless is an entry production model, its empty weight of 30 tonnes imposed very high loading on the floor. Such high floor loading exceeded the floor bearing capacity of a multi-storey industrial building which is commonplace in Hong Kong, banning the HPP unit from being on any floor above ground level. Secondly, the HPP unit had to come in a single piece and be accessible from the road directly. This resulted in the accommodation must face the main road, narrowing the choice of the workshop even further.

The solution was the Bless obtained a ground floor shop by a main road inside a multi-storey industrial building. Upon arrival and installation, the machine was unloaded from the truck on the main road and moved into the shop directly, and eventually rested on a structurally reinforced concrete plinth inside the shop area. Furthermore, the workshop power supply was upgraded to deliver electricity in 250 ampere in order to operate the HPP unit.

The application of 600 MPa hydrostatic pressure implies addition of great heat in the process, which contradicts the principle of no thermal treatment of the products. Also, to meet the stringent qualities on the water of admitting to the HPP unit in terms of impurity levels and temperature, the Bless workshop is equipped with two (2) coarse water filters and three (3) water fine filters to remove all aquatic impurities. A 10 horse-power (about 7.46 kW) air-conditioning unit is deployed to chill the filtered water to maximum 2 °C or below, while glycol is added to the treated water to prevent water freezing below 0 °C. A 300 litre tank stores and supplies the treated water to the HPP unit at any time it needs for production. While the HPP unit was imported from Spain, its water auxiliaries, together with the ambient control unit

which maintains the workshop room temperature at 12 °C, were designed, supplied and installed by local contractors.

### **High Pressure Juice**

Plastic packaging materials are the best suited for HPP due to their reversible response to compression, flexibility and resiliency (Muntean *et al*, 2016). The Bless fruit juices are bottled in polyethylene terephthalate (PET)-made bottles. The threads on the PET bottles for capping are carefully profiled to maximise the sealing effectiveness; otherwise the bottle neck may fail under the extraordinarily high external pressure and the bottle may burst. Also, the air void between the cap and the juice surface at the bottle neck has to be minimised or it may compromise the containing capability of the bottle upon pressurisation; thus filling must be under stringent control. After capping, the filled PET bottles are put into the plastic-made caissons for batch pressurisation in the HPP unit.

The 600 MPa hydrostatic pressure is uniformly transmitted to the filled PET bottles in the HPP unit pressurising chamber from atmospheric in four (4) minutes and maintained for three (3) minutes. Working over 10 hours per day, the HPP unit is able to process 3,000 litres of fruit juices daily. The 300 litres of the pressuring medium in the HPP unit, which conditions are real-time monitored by the Hiperbaric supervisory control and data acquisition system in Spain through an independent communication network, is replaced daily. Regular check is scheduled every 5,000, 10,000, 12,000, 20,000 and 25,000 pressurised cycles.

### **High Pressure Quality**

Should the fruits be subject to cold pressing in order that the juice extract may retain the original nutrients, colour and texture, the shelf life of the bottled juice can be five (5) days at best. With the HPP treatment, however, the shelf life can be extended to 80 days and up to 120 days. The combination of cold pressing and HPP is an ideal solution for the commercial circulation of the most original fruit juice, and in combination of its free port, Hong Kong is able to produce the top quality fruit juices in any season of a year.

Hong Kong does not produce fruits for its own consumption whereas sources them globally all year round. Unlike the countries of strong agricultural production impose stringent quarantine requirements and even import restrictions on the fruits from abroad in order to protect their own agricultural industry, Hong Kong opens wide its gate to all fruits without duty. This permits Hong Kong and Bless to be abundantly supplied with the most seasonal fruits in their top quality. For instance, within the same year Bless has produced orange juice from fresh oranges, which sweetness at 12.1 degrees brix is the most ideal for juice production, from Australia, Egypt and South Africa according to their season.

ISO 22000 on food safety management has helped Bless to implement high standard quality control on the ingredients sourcing and production. Each batch of fresh fruits procured must be accompanied by reports of their bacteria, pesticide and hygiene levels, and stringent sampling is in place to ensure only the quality produces are

admitted to the process. All fruits are subject to ozone washing before being cold pressed.

### Remarks



*The activity convener, Mr. Benny Sit, presented a certificate of appreciation to Mr. Alfred Tong, CEO of Bless International Group Limited, in recognition of his offer of the activity*

Although the multi-storey industrial buildings in Hong Kong were intended to house production and process factories of various trades, most of them nowadays function as ordinary offices. Bless is an exception that, notwithstanding the high land and labour costs, it

insists produces premium original fruit juice inside the units of these buildings in the territory, with the use of

cold pressing and HPP technology. Not only are the Bless beverages available in the premium hotels and retail outlets as well as theme park in Hong Kong, they are served in the premium classes in the flights of Cathay Pacific Airlines and Qatar Airways. The supply list is expanding and export to Dubai has started.

HPP can satisfy the consumers' appetite of the originality of nature, and the mechanical engineering behind HPP is the foundation of the excellence.

IMechE Hong Kong Branch thanks Mr. Alfred Tong, CEO of Bless International Group Limited, Mr. Anson Lau, Factory Manager of Bless International Group Limited and their colleagues for their kind offer for and assistances to the visit.

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### References

Hiperbaric; Juice and Smoothies. Hiperbaric website, 2015

J. Manners, H. Craven; Processing of Liquid Milk. Encyclopedia of Food Sciences and Nutrition (Second Edition), 2003.

Marceau-Valentin Muntean, Ovidiu Marian, Victor Barbieru, Georgiana M. Cat UNESCO, Ovidiu Ranta, Iran Drocas, Sorin Terhes; High Pressure Processing in Food Insutry – Characteristics and Applications. 5<sup>th</sup> International Conference "Agriculture for Life, Life for Agriculture", 2016.

Encl.  
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IMechE Hong Kong Branch  
Activity Sub-Committee – Technical Visit Group

## TECHNICAL VISIT to BLESS COLD- PRESSED JUICE COMPANY

Institution of  
**MECHANICAL  
ENGINEERS**

Improving the world through engineering

**Bless is the cold-pressed juice company in HK, with fresh fruit juice daily made locally. High pressure processing technique is used to cold pasteurize juice while preserving its taste and nutrients for 60 days without any preservatives or sugar with ISO 22000:2005 certification.**

Date: 11<sup>th</sup> Aug, 2018

Time: 09:30am – 12:00pm

Gather venue: Lobby, Block A, Sun Fung Centre, 88 Kwok Shui Road, Kwai Chung

Free of charge for IMechE Members

Number of participants is limited to 25.

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