WORKSHOP

GLASS SURFACE TEMPERATURE VS. INTERLAYER TEMPERATURES IN GLASS LAMINATION PROCESS

SUMMARY

In the lamination process, an interlayer film is disposed between glass sheets, whereupon a sandwich structure sheet comprising glasses and interlayers is formed. The interlayer film is heated in a lamination furnace to the target temperature, whereupon the temperature measured on the outer surface of the sandwich structure sheet immediately after the furnace is 60-90° C., depending on the thickness and composition of the sandwich structure. The temperature of the interlayer film is then considered to be at the target temperature which, for example for PVB film, is 60-65° C. After heating the sandwich structure sheet passes between a pair of rollers pressing it and forcing air out of its material interfaces. Thus, the aim is to heat the interlayer to a certain temperature before it enters to the nip rollers, but the realised temperature is not known.
The workshop focuses particularly to the problem above. During it theorical and practical know-how of the heating process in lamination oven is given, and based on that is shown how glasses and interlayers in sandwiches with different compositions heats up in a lamination oven. A complex sandwich containing many interlayers and equipped with thermocouples is heated with full-scale lamination oven, and the data is studied together with participants.

There are significant temperature differences in the inlet temperatures of the glass sheets on entry into the laminating room, which are due, among other things, to the timing of the glass washing. Washed glass sheets waiting longer in the factory hall for lamination typically cool down closer to the temperature of the factory hall. This is one of the reasons why there is considerable variation in the temperatures of the glass sheets to be laminated conveyed in the lamination furnace. During the workshop it is theoretically and experimentally studied, how much the nip roller pressing temperature of the sandwich can vary with the variation in glass incoming temperature above.

Also, the effect of a low-e coating on the top surface of a sandwich to its temperature at nip roller is together researched.

There exists lot of different interlayers in the market when the subtypes of main types (PVB, SentryGlas, EVA) are included. In the workshop it is discussed should the film-type has influence to the heating recipe, for instance.

The nip roller removes air from the moving sandwich structure sheet by compressing it, whereupon the air in the material interfaces inside the sandwich structure becomes highly over-pressurised and tries to discharge from the sandwich structure sheet. The air tries to discharge in a direction opposite to the movement of the sandwich structure sheet in which the compression by the nip roller and movement directs it. Thus, the air to be removed accumulates on the internal interfaces of the sandwich structure sheet, increasingly at its rear end. The ability of the rear edge of the sandwich structure sheet to discharge air from the interfaces is in fact particularly important. The lamination oven used in the workshop has an ability to heat the rear ends of the sandwiches less than rest of them. The effect of the ability to heating result and air removal is demonstrated in the workshop.

COURSE TIMETABLE 14TH OF JUNE 2023

9:00 : Start
15:00 : End

DURATION : 6 Hours

ABOUT THE AUTHOR(S)

KALLE KAIJANEN, GLASTON, PRODUCT MANAGER – FLAT LAMINATION

Bachelor of Engineering (B.Eng.), Automation and maintenance (2007) in Satakunta University of Applied Sciences (Finland).

Kalle started at Glaston Finland in 2007 as Service Engineer doing field service and installations at customers' factories for 7 years. From the field moved to product management and sales support of Glaston upgrade products continuing to upgrade sales. Today he is responsible of Glaston's flat lamination products.

ABOUT THE AUTHOR(S)

TIMO ALHO, GLASTON, PRODUCT OWNER - AUTOMOTIVE AND FLAT LAMINATION

From 2001 to 2012, I worked at Pilkington, where I held various roles in production, mostly as bending furnace operator. In 2009 I completed a Vocational education in Glass and ceramics field. In 2018 I joined Glaston as a Process expert. Currently I am working in R&D as a Product owner for Heat treatments of Automotive and Flat lamination.

MIKKO RANTALA, GLASTON, THERMAL ENGINEERING & PATENT MANAGER

Mikko has gained 25 years of experience in developing of glass heat treatment machines and 14 years of experience handling of patent matters. He has completed Ph.D. on heat transfer in glass heat treatment machines. He works as Thermal Engineering & Patent Manager. One of his main topics today is to develop machine-intelligence in glass heat treatment machines with theoretical equations.

ALEJANDRO DE LA MUELA CHASCO, KURARAY, SENIOR MANAGER HIGH PERFORMANCE PRODUCTS

Graduate in Chemistry (2002) University of Alicante. Master in polymeric materials and their transformation processes (technological institute of plastic, Valencia 2002). Alejandro started his career working in Kuraray's R&D Center at Troisdorf (Germany). After other professional experiences like plant manager, he returned to Kuraray for work as a Technical Service Manager around the globe supporting customers in South America and Europe. Now he continues supporting Trosifol customers specialized as High Performance Products Senior Manager at EMEA.