Add: 16, Yuanqi, Jurong, Zhenjiang,
Jiangsu, China

Tel: +86-25-86182218
Web: www.useon.com
Mail: sales@useon.com

How to configure your XPS production line

Normally XPS production line is a tailor-made one for individual request. So before your investment, you need to learn something about how to configure your XPS production line to get the most out of your investment.

XPS stands for eXtruded PolyStyrene. The first thing you got to know is the output. How much capacity are you looking for? For example, 500kg/hr or 1.5 ton per hour, there is big difference when capacity varies. Also, the output has some connections with your product category. Say, if the majority of your product is in 20mm thick, or less, I will NOT recommend you the line more than 300kg/hr. Vice versa, if you are going to produce XPS boards thicker than 100mm, I will recommend you the line more than 1000kg/hr, for the greater thickness requires bigger pressure gradient.

Well, let's get back to the machine. Normally, today's XPS line has tandem extrusion system, primary extruder plus secondary extruder in two stages. Either single screw plus single screw extruder, or twin screw plus single screw extruder. One stage twin screw extrusion system was out of date about 10 years ago.



Fig 1: 7 components loss-in-weight feeding system

Generally speaking, XPS production line is consisted of feeding system, extrusion system, die, and downstream. First of all, the feeding system. Mainly, there are three kinds of feeding system, loss-in-weight, gravimetric and auger feeding. They also have big difference in price. Fig 1 is 7 components loss-in-weight feeding system with vacuum loading system. In loss-in-weight feeding system, each material will be dosed and conveyed continuously. Every unit has its own load cell. Either pellets or powder can work with loss-in-weight feeding system very well. The feeding range of each material could be quite big. Fig 2 is 7 components gravimetric feeding system. In gravimetric feeding system, each material will be dosed in batch, then mix it before feeding. It has only one load cell for all. Both loss-in-weight and gravimetric can work with twin screw extruder, however, single screw extruder can work with gravimetric only, because the mixing and distribution efficiency of single screw extruder is insufficient comparing with twin screw extruder. The gravimetric feeding system has the propensity of layering when your raw materials have powder such as talc or pigment; such layering will slightly affect the mixing and distribution of materials, so if you use gravimetric feeding system, you better use all



Fig 5: 7 components gravimetric Feeding system

materials in pellets. Gravimetric feeding system is relatively cheaper than loss-in-weight.

Fig 3 is an auger feeding system. Auger feeding is much cheaper than the other two, but the accuracy, mixing and work environment is comparatively poor as well. Comparing with other two feeding system, auger feeding requires at least one more labor at feeding section, because workers have to weigh each material manually and put them into a pre-mixer. Then the pre-mixed materials will be transported to primary extruder by an auger loader.



Fig 3: auger feeding system

Regarding the primary extruder, personally, I strongly recommend you twin screw extruder as primary one. It carries a number of advantages. It is better at mixing, flexible screw profile, lower maintenance cost and less additive consumption (you can save 20% of flame retardant). As you know, the blowing agent for XPS has evolved from CFC to HCFC, then HFC, now it's CO2. There might be something new in the soon future. And every generation of blowing agent requires new screw profile. How can you keep up with the ongoing development? Twin screw is the answer. Unlike single screw, our parallel twin screw is modular design. You can change the screw profile according to the different process requirements, even for other application.

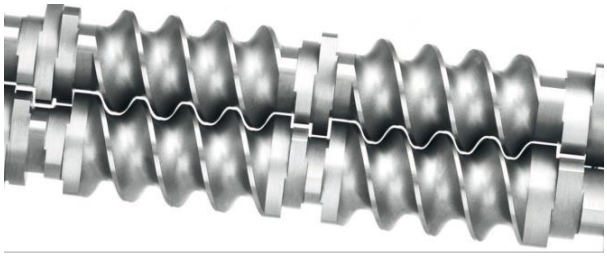


Fig 4: modular design screw elements for twin screw extruder

Now let's look at secondary extruder. The main purpose of secondary extruder is cooling, so the cooling capacity and the accuracy of temperature control are very critical, that will be the main factors to affect the physical property of the board. We are using tailor-made oil temperature controller to control the temperature of secondary extruder. All temperature control is digital setting, so it's foolproof. The cooling channel design not only has something to do with cooling efficiency, but also the safety of the barrel. One more secret I have to tell you that the screw inside cooling is very important as well. Fig 5 shows a rotary joint for screw inside cooling.



Fig 5: screw inside cooling

Now, we come to static mixer and die. Static mixer is designed to reconcile the radial temperature difference from the barrel wall to the root of the screw flight. The design can affect the surface quality of final product. The design of die has big influence on the surface quality and density of the board which will determine your production cost. The size of the die could be tailor-made for the particular size of final product.

The regular downstream includes calibrator, haul-off, edge hogger, main cut-off, edge trimming, stacker and packaging. But there are some peripheral devices like printer, surface groover, and embossing machine etc. The most popular size of XPS board is 1200X600mm (LXW), but some application needs 1200mm wide or some particular size. This must be taken into your consideration.

Regarding the portfolio of blowing agents, I am going to introduce in another “how to”. If you are interested in more details about XPS production line, please contact us today.

By Cliff Zhang

cliff.zhang@useon.com

Phone: 0086 137 7073 1096