Gas CirculationUnit

Gas Circulation Unit for Tire Curing Press

GCU was shortlisted for "Tire Technology International Award for Innovation and Excellence 2012" out of four contenders in the category of "Tire vation of the Year".

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Gas Circulation Unit

Summary

In conventional tire-curing presses, curing is performed using liquids such as water at high pressure and high temperature. But recently, methods using steam and N2 gas have become mainstream, and problems have arisen with temperature differentials between the upper and lower areas inside the bladder during curing.
More recently as an evolution of advanced mixing techniques for uniform dispersion of special compound materials which are used in the preparation of rubber material for high performance tires such as Run-flat and Fuel-efficient tires, techniques to improve elimination of temperature differentials and achieve uniform temperature have become more necessary than ever for the curing process.

With expertise and knowledge gained during more than 30 years as a developer and manufacture of valves and other main components related to tire-curing machines, we have developed the“Gas Circulation Unit”(GCU),a ground- breaking device that consists of a special induction motor combined with a turbo-type pump(GPX) and dedicated controller (GPX-Drive),which can circulate gas inside the bladder to create an even temperature with forced convection.

While circulating gas continuously inside the bladder by installing the pump(GPX) in between the path of the flow toward the inside bladder of the tire-curing machine,GCU can eliminate temperature differentials between the upper and lower part of the bladder in a short space of time and also maintain its condition thereafter (※).

Features

- The pump(GXP) itself has the ability to deliver not only N2 gas but also deliver steam and other compound gases such as Steam+N2 gas. It is also designed with consideration given to both foreign substance prevention within the circulated gas and ease of maintenance.
- The special induction motor, which is the driving force for the rotation of the pump, has an outstanding performance with regards to tolerance of heat and pressure. Moreover, supervision of rotation status has become possible as a special noncontact sensor can monitor the number of revolutions (rpm) during GCU operation.

Effect

It is known that a “purge” process, for example, is commonly used to generate convention current inside the bladder in order to eliminate upper and lower temperature differentials by loading gas in towards the bladder and unloading gas out of the bladder repeatedly. However, in this case, other problems have arisen such as an increase of gas consumption. With purge methods, since the agitation of gas will be conducted not in a continuous manner but in intermittent steps, it requires more gas and also the elimination of temperature differentials itself may be essentially intermittent.

On the other hand, GCU can bring continuous forced convection and thus eliminate temperature differentials more continuously, consequently one can expect energy saving by a reduction in the “purge” process possibly with reduction of curing time. Also improvement in curing quality and productivity is also expected as it is possible to measure the uniform temperature inside bladder more easily, and the temperature set can be put to use as a temperature-assuring condition during curing process (※).

(※) Effectiveness may vary depending on environmental factors during use, curing condition, and directions for usage of GCU.

Main specification

Pump (GPX)		
Model Number	GPX-00S	
Body Material	SUS	
Fluid	Steam, N2 gas, Mixed N2 gas-steam	
Operation Pressure	Max. 2.8MPa	
Temperature Range	0 to +210 degrees C	
Dimension	L382 x W290 x H320 (mm)	
Weight	33 kg	
Controller (GPX-Drive)		
Model Number	GPX-Drive1Aα-1.1NC	GPX-Drive1Aα-1.5NC
Rated Voltage	200-240VAC50/60Hz	380-440VAC50/60Hz
Rated current	7.3A	4.3A
Power Draw	Max. 1.1kw	Max. 1.5kw
Control Circuit Power	DC24V 1A	←
Dimension	L220 x W204 x H148 (mm)	L220 x W204 x H158 (mm)
Weight	1.9 kg	2.5 kg

For more detailed specification, please contact us.

Fig.1 : Illustration of temperature transition between upper and lower area during tire curing

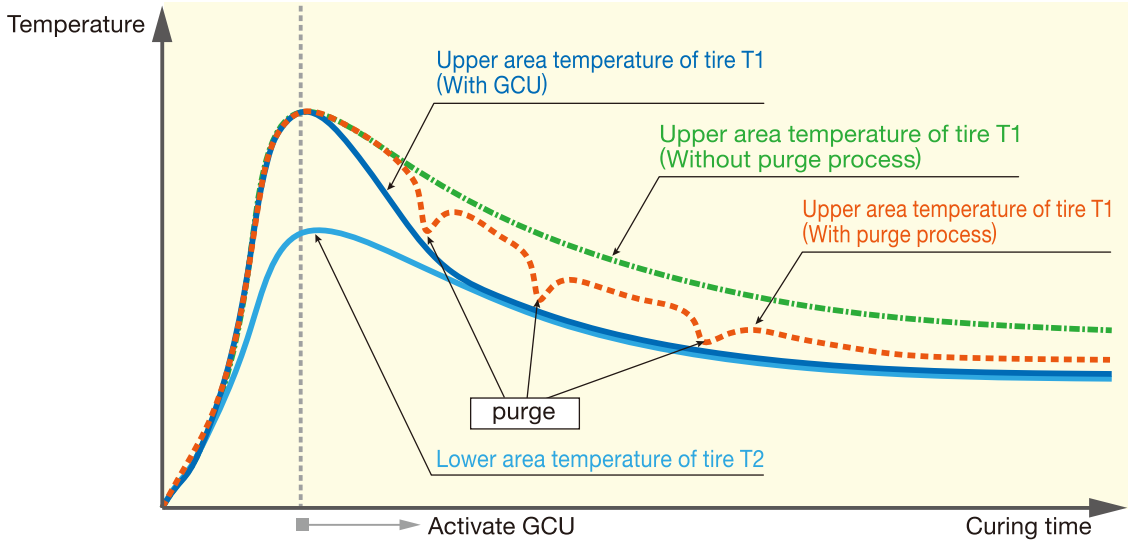
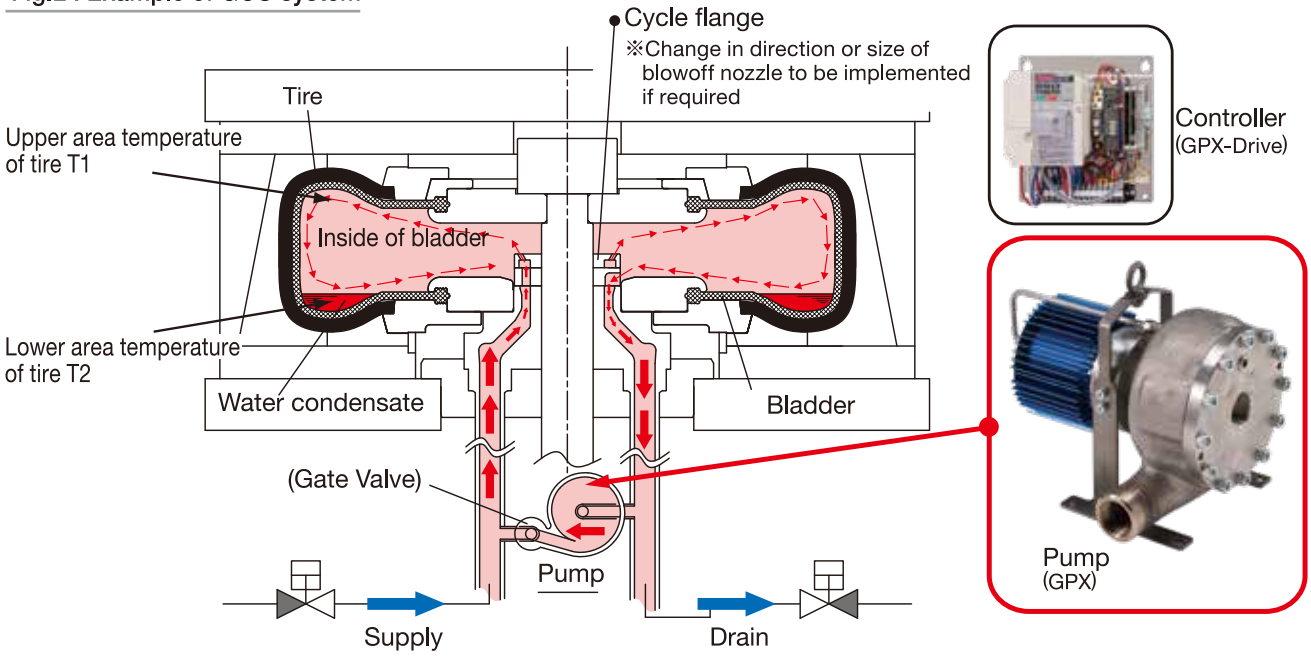


Fig.2 : Example of GCU system



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