

Injection Moulding Fumes Purified

PLATINUM CATALYST PROMOTES LOW TEMPERATURE COMBUSTION

By A. E. R. Budd

Johnson Matthey Chemicals Limited

Catalytic combustion is now a well established method of controlling a wide range of air pollution problems. A relatively new and improved process for the production of plastic injection mouldings resulted in the discharge to the working environment of small, but potentially offensive, volumes of malodorous or toxic fumes. This article very briefly describes the new process, then shows how existing well tried technology has been adapted to solve the pollution problem economically.

As the short- and long-term effects of atmospheric pollution are becoming more fully understood, and more widely publicised and discussed, demands are growing for the effective control of many forms of pollution. In the U.K. the 1974 Health and Safety at Work Act was one government's response to such pressures, and this in turn has resulted in personnel throughout industry being more aware of the various forms of pollution which may exist in their working environment. Such a problem can arise when some of the many raw materials used in the plastics manufacturing industry are processed and give rise to the emission of odorous, and sometimes toxic, gases which if discharged directly into the working environment could be present in unacceptably high concentrations. This particular problem was first brought to the attention of Johnson Matthey Chemicals Limited by one of the world's largest suppliers of plastics raw materials who were carrying out research and

development on plastics injection moulding techniques.

The basic principles of plastics injection moulding have been established for many years and it is well known that water vapour and the organic gases dissolved in the plastics feedstock must be removed if high quality products are to be moulded. This has long been done by a heat pre-treatment of the pelleted or powdered raw plastics materials before they are loaded into the feed hopper of the injection moulding machine.

The introduction of the vented barrel moulding machine in 1970 was probably the single most important technical innovation in plastics injection moulding for decades. It avoids the need for the pre-treatment stage, and results in lower production costs. The raw plastic feedstocks are fed directly into the moulding machine, and the water vapour and other gases—including the thermal degradation products which are given off by the plastic during the melting and kneading stages of the moulding cycle—are released from the machine; the vent being located in the section of the barrel where the feedstock material is fully plasticised and the barrel pressure is atmospheric.

Although there are very obvious practical and technical advantages with this new type of machine there is one potentially serious environmental disadvantage in that many of the organic component vapours are either toxic or at least very unpleasant. Furthermore, the gases are discharged in the vicinity of the machine operator.

One possible solution to this problem is to draw the gases away from the barrel vent and exhaust them to the outside atmosphere.

The Honeycat[®] Vent Gas Purifier comprises a stainless steel combustion chamber containing the platinum catalyst supported on a ceramic honeycomb, and an electrical pre-heater. The catalyst temperature is regulated by a thermocouple and a set-point controller while a venturi air mover, powered by compressed air, ensures that all the vent gases escaping from the injection moulding machine pass through the catalyst



However, such a system is often not acceptable because of the running costs and the practical problems associated with the installation of ducting and the necessary extraction fans.

It was considered that the most effective solution to the problem would be to destroy the vent gases at source by incineration and that the most economic way of doing this would be by low temperature catalytic oxidation, a technique already known to be particularly effective for removing the organic fumes produced by a wide variety of process industries.

On-site tests using a prototype catalytic combustion unit fitted with a ceramic honeycomb-supported platinum catalyst successfully demonstrated the destruction of the organic vapour components of the vent gases. Consultation with vented barrel injection moulding machine manufacturers then established that the most practical attachment point for the unit would be directly above the vent hole. Further-

more, it should be easily fitted to different models of moulding machines, be simple to operate and be virtually maintenance free for prolonged operation. All these features were then incorporated into the Honeycat[®] Vent Gas Purifier, which is shown in the photograph fitted above the vent port of a typical vented barrel injection moulding machine.

Since its introduction to the market four years ago, the Honeycat[®] Vent Gas Purifier has aroused considerable interest in the plastics injection moulding industry, both in the U.K. and abroad, and it is now widely regarded as an essential component by many injection moulding process operators. In addition its effectiveness has been endorsed by most of the leading injection moulding machine manufacturers who now recommend it to their customers as an approved accessory.