

## Britain's 'OSHA' has second thoughts about VCM

An article in a recent issue of the British Medical Journal suggests that vinyl chloride monomer may not be as serious a hazard as was formerly supposed.

In that publication (Oct. 7, 1977), Dr. Peter Baxter and three other doctors who are affiliated with the Health & Safety Executive (a British government agency similar to our OSHA), reviewed the preliminary report by the agency on the incidence of angiosarcoma (liver cancer) in Great Britain.

Specifically the report looked for any correlation between incidence of the disease among workers and in the general public around factories where PVC resin is manufactured or processed.

Reviewing health records for the 10-yr period of 1963-73, the study states that of the 47 cases of liver cancer reported, in only 14 instances was the diagnosis confirmed. Further, of those 14 cases, only one could be "confidently associated" with exposure to VCM. In that instance, the worker had probably been exposed to VCM concentrations exceeding 200 ppm in air for more than 20 years. The VCM exposure standard in Britain is 10 ppm averaged for an 8-hr. day.

Turning to the statistics for the general population, living near PVC-using plants, the study found one confirmed case of angiosarcoma, a man who lived within half a mile of such a plant for 6 years before his death. However, no correlation could be found between the incidence of the disease in the general population and the location of PVC operations.

The report also failed to find any cases of the disease that could be attributed to ingestion of VCM from foods contained in PVC packaging materials.

Based on that 10-year period, the article's authors concluded that the incidence of this type of cancer in Great Britain appears to be considerably less than 10 cases annually in a population of 50 million and that only one case of the disease diagnosed during that entire 10-yr period could be definitely associated with VCM exposure. The authors, however, did not dismiss the possibility that angiosarcoma could be caused by low-level exposure to VCM and endorsed a continuing monitoring of the situation.

Commenting on the study, a spokesman for the Employment Medical Advisory Service, the parent

organization of the Health & Safety Executive, stated: "The findings give us grounds for hope that the chemical will turn out to be less of a cancer risk than when the American findings were announced."

## U.K. plastics production posted gains in '77

Though final figures for the year are not yet available, plastics production figures for the first 6 months of 1977 indicated that the year may end up about 8% higher than 1976.

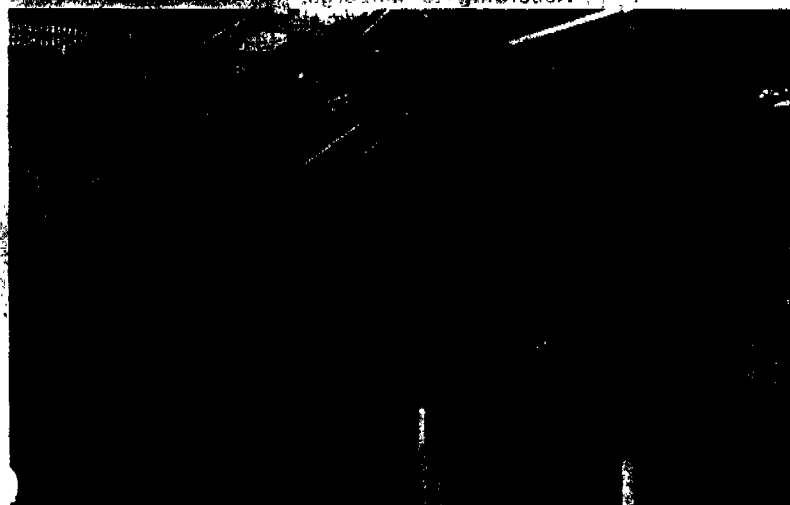
Based on the first half of the year 1977, plastics production totaled 4,448,000 metric tons (about 3.5 million lb). This represents an annual increase of about 2.7 million tons compared to 2.56 million tons in 1976. Considering the large state of the

|                        | (1000 metric tons) |
|------------------------|--------------------|
| Alkyds                 | 72.4               |
| Polyesters             | 34.1               |
| Amines                 | 92.0               |
| Phenolics              | 29.8               |
| Epoxides               | 11.2               |
| Polyurethanes          | 38.4               |
| Other thermosets       | 166.9              |
| <b>Total</b>           | <b>444.8</b>       |
| Acrylics               | 33.3               |
| Polyethylene           | 264.5              |
| Polyethylene           | 133.3              |
| PVC                    | 208.1              |
| Other vinyls           | 5.7                |
| Polystyrene (crystal)  | 34.2               |
| Polystyrene (impact)   | 53.9               |
| Polystyrene (expanded) | 29.4               |
| Other styrenes         | 5.3                |
| ABS                    | 16.6               |
| Polyamides             | 16.4               |
| Other thermoplastics   | 14.7               |
| <b>Total</b>           | <b>851.6</b>       |
| <b>Total</b>           | <b>1296.4</b>      |

British economy, this performance is viewed as reasonably satisfactory.

Looking at specific resins, there was no major growth area. Both polypropylene and polyethylene ran ahead of '76, though PVC production remained level.

With the exception of polypropylene, there was no major shift in the level of exports or imports. PP, however, was up about 34% on an annualized basis over the 71,000 metric tons shipped in 1976. Imports of PP were up almost as much, about 26%. The accompanying table shows the U.K. production by resin for the first half of 1977.



This 1400 mm (47 in.) polyethylene pipe was recently extruded on a 160 mm (6 1/2 in.) extruder in a trial run at the builder's plant before shipment to a pipe producer in Europe. Designed and built by Luigi Bandera S.p.A., Busto Arsizio, Italy, the extruder has a rated output of about 1550 lb/hr and can produce pipe of up to 55 in. dia.

## Better polymer education can cut product design costs

"Increased formal emphasis in the schools on polymer science, and probably even more on polymer engineering, should lead to more cost-effective design. It seems reasonable to expect that more polymer engineers in the academic pipeline would shorten product development time in companies subsequently employing them," says Prof. Williams.

This is the view of Prof. Max L. Williams of the University of Pittsburgh, who observes that polymer engineering education in the U.S. is lacking when compared, first, to polymer science, and second, to metallurgical science and engineering. He feels that "the development of a more academic base for polymeric development" has been affected by two factors.

"First, and assuming a customary formal progression from science through engineering application, it appears that chemistry departments in the universities have paid little attention to the polymer aspects of classical chemistry. As the second factor, one might proceed to conjecture that the absence of a polymer chemistry science component in the undergraduate curriculum suppressed the emergence of a formal engineering counterpart."

As for the future, he adds, "In order to achieve maximum synergism with respect to end-use products, I recommend that an important place be reserved in the curriculum for mechanics analysis and design implications."

## Engineering data, application focus spurred early growth of nylon

Henry M. Cadot, former product manager for DuPont's Zytel nylon resins, says that their application-oriented approach, concentration on proper design and the compilation of useful engineering data contributed to Zytel's success. Mr. Cadot recently retired after 40 years with DuPont.

In the 1950's, there was a handful of Zytel resins; there are now over one hundred grades in use. "We would run across needs we weren't fulfilling with our current grades," recalls Cadot. "It was evident that we had a very versatile product which could be modified in a number of ways. Our engineers, talking with engineers in end-use companies, would come

across potential applications. We would take a look at how much total volume there might be, and if it looked good, we'd go ahead and make it. That's how the line grew."

Early applications included wire coating for the electrical market, bearings in textile machinery and interior light-lens domes in automobiles. At the time, "there was practically no information on the properties of nylon. We compiled it and put it into a shape that engineers could use. That has been a great marketing tool."

Marketing any plastic in the 1950's was not easy, says Cadot. "We had to convince the consuming public as well as the manufacturers of major ticket items that we had something that would perform in a mechanical application. People were used to shower curtains that bled plasticizer and toys that broke."

Cadot notes that the situation today is different. With more engineering plastics on the market, all with extensive product lines, the competition is great. After guiding the development of more than one hundred Zytel compositions, Mr. Cadot says, "we're still holding our own."

## Changing social values are reshaping economy

Egil Milbergs of Stanford Research Institute says that social, political, consumer and economic forces are moving U.S. business from a predictable economic growth and competition to a more uncertain, socially directed and qualitative economy. This transition is happening not because of any inherent limits to resources, says Milbergs, "but because of a revolution in perception, ethics and values."

According to Milbergs, there are certain trends at work behind this revolution, such as a decline in public confidence in business and a general distrust of technology. Growing out of this credibility gap are the consumer movement and increasing government regulation.

Other trends include the decline of urban areas, resource shortages, and changes in the demographics and values of the work force.

Milbergs puts it, "Business is being asked, and in some cases forced, to strike a new balance between economic and social expectations." He explains this phenomenon in terms of two perspectives which he calls the growth ethic and the social ethic. The growth ethic says that if growth and profits can be maintained they will provide the resources to accomplish our social objectives. The social ethic asks why U.S. affluence, technology and management skill cannot cure social ills.

"The growth ethic, as traditionally defined, no longer satisfies large numbers of Americans," says Milbergs. "We have moved very swiftly along a seemingly unstructured path into a socially directed economy."