

Extruded Products - Derivatives

Project Initiator: Mr. J.A. Luke

Objective

Explore the potential for using DEER technology to evolve a range of new materials including smoking materials, for specific areas of product enhancement.

Status

Earlier research demonstrated the flexibility of the DEER technology through the experimental production of a number of completely novel materials. It is intended now to explore fully whether such materials have real or lasting potential for use in products. Emphasis has been placed on evolving materials from the DEER base where possible to encourage early use when successful.

Five materials are under consideration, two DEER derivatives, two non-tobacco materials and a filter material. Most progress has been made on the first and last of these and is described later. The non-tobacco materials are intended to be used in products for control of deliveries. They mark a more radical approach to the solution of current problems and may lead ultimately to tailoring of the chemistry of cigarettes for specific purposes.

Direct-expansion extruders incorporate high shear force mixing zones, which permit very thorough mixing of ingredients and introduce large amounts of energy through inter-particle friction. The latter is sufficient to cause molecular re-arrangements in some types of ingredients. These processes provide an understanding of the use of the extruders.

I Project ELITE (Project Manager: S.R. Hensley)

Castings and flavours are being introduced to DEER products through either the solids feed hopper or the liquid feed pumps. It is thought that by so doing, more uniform application and more gradual release can be achieved. Even controlled release seems feasible. One clear difference is the intimate mixing of the castings and flavours, unlike normal surface additions, which may favour certain volatile materials. Current studies involve:

- i) menthol addition
- ii) introduction of U.S. blended character into F.C. blends
- iii) amelioration of off-notes attributed to e.g. stems

Initial products provide some grounds for optimism.

II Project NITROX (Project Manager: S.R. Hensley)

The value of the extruder for effecting Maillard (Amino-Sugars) reactions is under exploration using the addition of invert sugar, ammonia and an ammonium salt such as NH<sub>4</sub>Cl. The amino-sugar reaction is thought to release valuable flavour precursors, which would enhance product performance. The current chemistry expectation is that deduced from Marlboro by Crown & Williamson. Marlboro contains band-

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cast sheet in which high levels of 2-5 and 3-6 deoxyfructosazine (DOF) are present, by-products of Maillard reactions. 2-6 DOF is thought to be the precursor to the so-called favoured P.M. compound 5-methyl pyrazine methanol.

Initial work has shown that such reactions appear to take place inside the extruder, with the formation of ICF's. The materials produced have also provided evidence of nicotine scavenging properties, one of the much publicised features of P.M. hand-cast sheet. L.S.C. has established a method for ICF's and the levels detected so far appear to be comparable to levels in the P.M. sheet.

### III Project DEEP (Project Manager - G.L. Luke)

Some success has been achieved in extruding mixtures of starch and polypropylene using only water as an expanding agent. The material has been produced in skrotted form (as per DEEP) and as a foamed rod, both of which have potential as cheap filters.

The main factors behind the development are that the technology is virtually identical to DEEP technology, hence encouraging dual use, and that both ingredients are widely available and cheap. The development, if successful, should have much wider application than earlier cheaper filter options because of the relative small-scale, ease of operation and low cost of the process.

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