

Technical Memorandum



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Subject POTENTIAL BENEFITS OF CONTROLLING THE POSITION
OF BLEND COMPONENTS ACROSS THE CIGARETTE ROD

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TECHNICAL MEMORANDUM NO. TM.88-01-009POTENTIAL BENEFITS OF CONTROLLING THE POSITION
OF BLEND COMPONENTS ACROSS THE CIGARETTE RODAuthors: R.L. Prowse, W.J. StoneABSTRACT

Current work at R&D on the separate feeding of blend components direct to a cigarette making machine has shown that some control over the positioning of blend components diametrically across the rod cross-section might be achievable. Some earlier work at Southampton has indicated that cigarette smoke mainstream and sidestream are formed from different regions of a burning cigarette. This Memorandum brings these two possibilities together and speculates on the very significant product advantages which might be achievable. The product would be economically more feasible than, and perform in a different way to, the more familiar double-wrapped annular cigarette.

DISCUSSION

Virtually all of the previous work at Southampton in this field (1)-(4) has centred around (!) the evaluation of annular cigarettes produced by first making a wrapped slim cigarette (ancestor of CAPRI) and using this as the core in the production of cigarettes of normal dimensions. All evaluations of these cigarettes were conducted with the cigarette paper of the core still in place.

However, the type of cigarette which might result from WJS's work on the separate feeding of blend components direct to the making machine is quite different. The findings to date indicate that it is possible to achieve a concentration of selected blend components (relative to the whole blend), either towards the centre of the rod or around the periphery of the rod, in a single making operation without wrapping the core. In this version gas flows and particle/gas diffusion are relatively unimpeded compared with the earlier 'double wrapped' version. Consequently, it is to be expected that the WJS version will behave much more like a conventional cigarette.

If this is so, then RRB's findings (5) will be relevant. This report concludes that mainstream nicotine is principally derived from the pyrolysis/combustion of tobacco at the periphery of the cigarette. The corollary is that sidestream nicotine is derived mainly from tobacco at the cigarette core. At first sight this may seem the "wrong way around", but observation of a cigarette during puffing demonstrates that the tobacco towards the cigarette periphery is

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burning faster and hence probably contributing disproportionately more to mainstream than the tobacco at the core. While the effects on nicotine delivery of positional manipulation of sub-blends with different tobacco nicotine levels has been recognised (5), we would like to draw attention to the following possible benefits.

Assuming that mainstream smoke is derived more from the peripheral tobacco than from the core tobacco in a cigarette, then, compared with the normal cigarette:

- (i) Concentrating DIET towards the core would
 - (a) enable higher DIET levels to be used before the subjective smoke detection limit is breached;
 - (b) give higher mainstream nicotine deliveries (in the absence of nicotine migration between blend components);
 - (c) reduce sidestream deliveries;

while still gaining the fill value advantages of enhanced DIET inclusion levels (though RGH/NB are the experts here, of course).

- (ii) Concentrating stem (WTS) towards the cigarette centre would similarly raise the subjective detection threshold level of stem and improve fill value - particularly useful in companies with excess stem (e.g. Chile Tabacos).
- (iii) Concentrating low quality grades, particularly those poorly grown/cured (Malaysia) or drought damaged (Argentina), towards the cigarette centre would enhance subjective character for any given level of inclusion.
- (iv) Concentrating those blend components which are precursors of undesirable smoke compounds (e.g. nitrosamines, etc.) towards the cigarette core or periphery will decrease levels of these smoke compounds in mainstream or sidestream respectively.

It is not the purpose of this memo to be exhaustive on the advantages of the consequences of positional manipulation of blend components within cigarettes but to indicate by way of the above examples what we consider to be the great potential of this ability. There will certainly be other advantages, not least in the ETS/sidestream arena.

Indeed, it is possible that other companies are already there - B&W are puzzled by the high nicotine transfer efficiencies achieved by Philip Morris; this might be explained by P/M positioning high nicotine components (or its nicotine-scavenging reconstituted tobacco) around the periphery of their Marlboro.

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However, it is inconceivable that total segregation of blend components within a cigarette will be achieved, or that mainstream smoke is totally derived from tobacco at the cigarette periphery. Nevertheless, it would seem logical to assess the degree of segregation that can be achieved at a relatively early stage.

In order to monitor the degree of segregation achieved, future effort will involve feeding a smoking machine with separate streams of DIET and an unexpanded lamina blend dyed with both hydrophilic and hydrophobic dyes (6). This opens up the possibility of monitoring segregation objectively by visible or other spectroscopy. The Gardner Colour Difference Meter could have a role to play here.

Finally, although success in controlling cigarette rod diametric blend distribution will not be cost free, additional cost can be partially offset by the concomitant removal of cut tobacco blending systems in the Primary Department.

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