

**PRODUCT TESTING AND PRODUCT DEVELOPMENT
BEST PRACTICES**

Contributions by:

British-American Tobacco Company, Cigaretten-Fabriken

British-American Tobacco Company, Limited

Brown & Williamson Tobacco Corporation

Companhia Souza Cruz Industria E Comercio

Imperial Tobacco Products, Limited

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This cycle continues until a product is judged by a panel of target consumers to meet the action standards.

These prototypes are then selected for large scale consumer product test (CPT).

From this point, casing and flavor development follows the same pattern as described in overall product development. It is good practice to do an aging study on the prototype to determine the smoke sensory quality stability of the product over a period of time. The length of such testing will depend on the recall policy of the particular company.

Normally CPT takes at least three months and when the product within this period does not change adversely in smoke sensory quality the risk of commercialization is minimal. Nevertheless, the aging study should continue through the predetermined period.

CIGARETTE DESIGN

INTRODUCTION

Cigarette design has an influence not only on smoke sensory quality, but also on the physical and visual characteristics of the product. The objectives of the cigarette design components are to:

- Control deliveries to defined or acceptable levels (e.g., tar, nicotine, etc.).
- Optimize the smoking mechanics while achieving the target deliveries (e.g., per puff deliveries and puffing pressure drop).
- Provide the defined or generally acceptable physical properties (e.g., firmness, end stability, coal retention, etc.).
- Provide the defined or generally acceptable visual aesthetic properties (e.g., tipping color, perforation visibility, paper opacity, etc.)

In addition, the above objectives must be met while adhering to the prescribed dimensional criteria for the product, such as, cigarette length, filter length, tipping length, circumference, etc.

The cigarette design specialist has a number of "tools" at his disposal that he must apply to maximize the probability of meeting the objectives set forth in the Charter. These tools are:

- Computerized Cigarette Design Model (simulation model combined with data banks on smoke analysis, blend parameters) - This tool allows the cigarette design specialist to manipulate the design components and predict the analytical effects of the changes in the components.
- Analytical Data - On competitive products and in particular of the target product (routine and nonroutine).

- Standard Cigarette Materials - "Standard" cigarette papers, filter tows, tippings, etc.
- Nonstandard Materials - Such as filter tows with unconventional pressure drop/efficiency relationships, papers with new burn additives, etc. (There should be a good reason for their use to avoid unnecessary material proliferation.)
- Blend Components - Such as expanded tobacco, puffed stem or reconstituted tobaccos can often be used to control the deliveries and simultaneously modulate the physical properties.
- Processes to achieve required design parameters (e.g., rod pressure drop, density/firmness ratio, etc.).
- Smoke Sensory Quality Assessment of the Target Product - From either "expert" assessments, panel results or CPT results gives the design specialist information regarding the key attributes and their contribution to the overall preference of the target product.
- Sensory Input - The design specialist, based on his past experiences, should be able to impose certain empirical limits on design parameters such as filtration/ventilation ratios, envelope ventilation etc., to simulate the smoking mechanics of the target product.

Cigarette Design Process Flow

Cigarette design like blend and casing/flavor strongly influences the taste perception of the product. It should, therefore, always be considered in combination with blend and casing/flavor development. The design process flow (Figure 4) usually is as follows:

- Feasibility check of design criteria in the Product Charter.
- Development of preliminary design options.
- Production and assessment of sample cigarettes versus criteria.
- Production and evaluation of final prototypes.
- Commercialization.

Feasibility Check of Design Criteria in the Product Charter

Cigarette design specialists, in conjunction with Marketing, Manufacturing, Engineering, Purchasing and other areas of Product Development, should have input into translating the design components of the Product Charter before any development work is initiated. The Product Charter must specify those criteria, which are necessary to match the marketing concept. At a minimum, the Product Charter should specify the following design information:

- Visual appearance of the cigarette (e.g., dimensions, tipping color, etc.).
- Deliveries (e.g., tar, nicotine, etc.).
- Physical quality requirements (e.g., firmness, end stability, coal retention, etc.).

Cigarette properties and smoke deliveries in the Charter can explicitly be specified with either discrete values, within a discrete range, relative to a target product (e.g., equal to or better than), or specified as being within generally acceptable levels. If a cigarette property is not specifically defined in the Charter, it may be assumed that the generally acceptable levels will suffice.

Design elements not considered to be of key importance should not be arbitrarily defined in the Charter since this may impose unnecessary constraints on the design.

Other criteria, usually not specified but assessed for acceptability by the cigarette design specialist, include, puff number (and thus per puff deliveries), open and sealed cigarette pressure drops, tobacco section pressure drops, ventilation/filtration balance, puff-by-puff profiles, etc.

Development of Preliminary Design Options

Having interpreted the Product Charter in terms of various design components, the actual product development is best done as follows:

- Mutual development of a broad concept which includes the following steps:
 - Mutual sensory evaluation by Product Development Team of target product(s).
 - Review current status with regard to sensory, analytical and other information (of most successful products) to identify a product that might provide a springboard for further development. Analyze strengths and weaknesses of such product(s) from target smokers' perspective.