

PROJECT NUMBER : 1812  
PROJECT TITLE : New Expanded Tobacco  
PROJECT LEADER : E. B. Fischer  
PERIOD COVERED : September, 1991

## **I. BATCH GASEOUS CO<sub>2</sub> IMPREGNATION**

A. **Objective:** Define process parameters for a batch gaseous CO<sub>2</sub> impregnation process.

B. **Results:** The transition between the pilot plant impregnator and the tower was modified to use cold dry air, in place of CO<sub>2</sub>, to blanket the tobacco and maintain stability. The temperature of the air, in contact with the tobacco, was maintained at -5 to +5°F. The results of the first three tests, using uncased #10 Bright feed, were very promising. The CO<sub>2</sub> concentration in the tobacco one hour after venting had only dropped to about 1.3%. Expansion data were equally as good. The tower exit EQ CV for these three tests averaged 9.7 at an average equilibrium OV of 11.4. For reference the equilibrium OV of the unexpanded tobacco averaged 11.7%.

Cigarettes were made to evaluate the effect of cut width on NET products. The final product exiting the humid air reordering unit had 61% >6+12 mesh for the 30 cpi NET and 67% for the 25 cpi. In a Marlboro blend, the longer sieve size of the 25 cpi NET resulted in longer blend filler exiting the garniture of 45% >6+12 mesh versus 42% for the 30 cpi NET. The equilibrated firmness results indicated that there was no difference between 30 and 25 cpi. In addition, no differences were detected in smoking results.

C. **Plans:** Confirm cigarette results for 20, 25, and 30 cpi and conduct subjective evaluations. Evaluate the effect of cut width on survivability at Bermuda.

## **II. CONTINUOUS IMPREGNATION PROCESSES**

A. **Objective:** Develop a continuous impregnation process to improve the subjectives of expanded tobacco while maintaining equivalent cigarette filling power to the existing process.

B. **Results:** The installation of the short cycle impregnator pilot plant has been completed. Checkout of equipment is underway. The tobacco handling equipment was tested in the manual mode of operation. The punchlist of items generated by the test has been corrected. The hydraulic system and the ball valve impregnators were successfully tested for rotational accuracy and CO<sub>2</sub> gas pressure sealing. Pressure tests were carried out at 420 psi and 810 psi CO<sub>2</sub> gas pressure, and system leaks were detected and fixed. Checkout of the PLC for automatic operation is currently in progress.

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The startup of impregnation testing is on hold pending the review by M. W. Kellogg of localized stresses on the high pressure piping and tubing. Any mechanical changes recommended by M. W. Kellogg will be implemented in the field prior to tobacco impregnation.

- C. Plans: Make necessary modifications to obtain acceptable stress levels. Then, test the impregnation of tobacco at 850 psi CO<sub>2</sub> gas pressure and then 420 psi conditions.

### III. EXPANSION AND REORDERING PROCESSES

- A. Objective: Define alternate means of puffing, drying, setting, and reordering impregnated tobacco to improve product subjectives and physical characteristics relative to the present DIET process.
- B. Results: An experimental test grid on spiral reordering was completed at 60 minutes residence time. Results show CV can be maintained by operating with 75°F air at 62% relative humidity entering the top of the unit, and 75°F air at 55% relative humidity in the center of the unit. No advantage was found in utilizing high air velocity. Two tests have been completed at 40 minute residence time. Results are pending.
- C. Plans: Complete further testing at reduced residence times. Pilot modified sealing arrangements and test.

### IV. CHEMICAL STIFFENING

- A. Objective: Define a process to chemically stiffen expanded tobacco which will reduce thermal treatment and the associated subjective degradation while maintaining cigarette filling power equivalent to the current process.
- B. Results: In an effort to evaluate methods to improve the subjective characteristics of chemically stiffened expanded tobacco, tests were completed to determine the acid removal profiles for the additives being considered. No differences were observed in the acid removal rates of acetic and propionic acids in an equilibration chamber. The acid contents were reduced to levels approximately twice the normal amount found in tobacco in 24 hours or less. The pH of the acetic acid solution applied for stiffening had no effect on acid removal. Finally, in this test the rate of acetic acid removal in the equilibration chamber was 5 times greater than acid removal from tobacco sitting in an open container in room air. Based on these results, a subjective evaluation of these additives will be initiated to determine which additives show promise for further development.
- C. Plans: Prepare samples for subjective evaluation, including reduced acid products.

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## V. PRODUCT DEVELOPMENT AND EVALUATION

- A. **Objective:** To optimize both the physical and subjective characteristics of the NET process and to evaluate the inclusion of the various NET product options into present and future brands.
- B. **Results:** The EURONET program tests were completed to evaluate DIET and NET product interchangeability with European blends ET 025, 005, and 026. The product has been shipped back to FTR. Analysis of the expansion and chemical data is underway.

Cigarettes were made using 100% DIET and NET unexpanded and expanded filler of these three blends. They were smoked in Richmond by representatives from Europe and Richmond R&D. The subjective results of this panel can be summarized by the comments of Eric de Borst, Manager of Leaf Blending in Lausanne. According to Mr. de Borst "the overall results from a subjective quality point of view is positive for NET. On all trials, the taste response is higher and fuller; there is more tobacco taste and less peppery irritation." He did note that further review will be required to determine the impact this subjective difference may have on final products.

- C. **Plans:** Initiate testing for cigarette yield study. Process the XTI blend for comparative testing of NET and DIET in a BOLD product.

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