

PHILIP MORRIS U.S.A.
INTEROFFICE CORRESPONDENCE
Richmond, Virginia

To: Mr. J. L. Myracle

Date: June 7, 1995

From: J. E. Bickett

Subject: **PACKAGING DEVELOPMENT ANNUAL REPORT**

MDPD

4A04 Packaging Development:

Pack Expo

Philip Morris Packaging Development personnel attended IOPP seminars on flexible packaging and on quantification of packaging material performance on packaging equipment prior to Pack Expo '94 in Chicago. The latter seminar proved to be promising for development of methodologies for improving material utilization. Efforts directed toward that end are planned for 1995.

Appropriate contacts were made at the Expo on selected technologies of interest. Further information, including videos and potential presentations, was requested on ink jet printing, on-line and/or in-house. This technology could provide us with the capability to use generic cases. Additionally, information was requested on an electronic theft deterrent device that can be incorporated on product packaging, which could potentially open up new and otherwise prohibitive methods of merchandising our products.

Super Premium Packaging

The Packaging Ideation Team met in New York to brainstorm new concepts for Super Premium Packaging. Three ideas were generated and will be assessed by Richmond Product Development personnel. Following refinement of these ideas, a champion will be identified to sponsor further development.

Impulse

Packaging Development personnel received an information packet, samples, and video tape describing Checkpoint's *Impulse* source tagging system. The system consists of radio frequency tags which are embedded in labels that can be placed on goods or packaging. The device will trigger an alarm at the door if merchandise is stolen. These tags are deactivated at the point of sale by proximity deactivation. They can also be activated or deactivated in bulk. This information will be shared with the EEC region with possible application in curtailing contraband and counterfeit product.

Doc. Code: PO622

2051871054

Shipwrights

The patent application has been submitted for a novel printing process for cigarette packaging materials. The patent law firm in Washington, D.C., Folgy & Lardener, believes there is a high probability for multiple claim patentability on the Shipwrights process. Art work, color samples and SBS board stock were given to Shipwrights to demonstrate principle, make samples for comparison to existing art, and make samples for scientific affairs.

Shipwrights will also process enough samples to determine throughput rate for a process cost comparison. The process could be more costly than gravure printing but possibly competitive with offset, particularly on short runs or low volume specialty items or promotions.

Ideation Team

The Packaging Ideation Team participated in a creativity workshop organized by Product Evaluation Division personnel. The group participated in several exercises which focused on innovation concept and design, as well as color, structural, and tactile aspects of packaging and structural materials.

Packaging comps based on ideas generated in earlier sessions held by the team are currently being produced for subsequent consumer testing. Most of these ideas focused on development of a pack design for a single stock-keeping unit (SKU) to maximize brand display space in retail and convenience stores. Some package designs were also for reclosable soft packs.

World Pack

The KF/Philip Morris World-wide Packaging Core Team met in Chicago on November 14 and 15. PM companies have a packaging display termed World Pack, which contained samples of packaging styles and materials currently in use or under development across the PM family companies. Types of styles and designs include environmentally sound packaging, quality (or perceived quality) improvements, consumer benefits, productivity and trade. All samples were photographed to produce a book which will be available to each KF and PM R&D locations.

Other team meetings were held in White Plains (November 29, 30 & December 1).

Project Royce

The joint pouch development project (with KF and PM) has been approved by the NPC. To date, two pouch materials have been approved for use in the design and development of a pouch and Engineering and KF technical personnel have developed and agreed upon the necessary pouching equipment. Procurement of this equipment has begun.

Single SKU

Nine prototypes for the single SKU concept have been evaluated in three cities (Baltimore, Houston and Denver). The prototypes were evaluated in twenty one-on-one interviews in each city. Results from the testing are being evaluated.

Product Pilferage Protection The team investigating methods to prevent product pilferage has had several brainstorming sessions and is currently in the final stages of information gathering.

Next steps for the team include developing shelf items for this situation and continuing to investigate new technology to prevent pilferage.

4A13 Environmentally Desirable Non Tobacco Materials

A cross-functional team was organized to discuss the potential impact of the environmental regulatory climate on non tobacco materials. The initial focus of the meeting revolved around anticipated regulations requiring reduced chlorine or chlorine-free bleaching of cellulose pulps and the inclusion of recycled fibers in paper and board stock. Materials impacted include anything made or derived from cellulose. A broader team was later formed in which the group began discussions on performing a STEPS analysis and developed a problem statement, given below. Karen Watson of Management Development attended one meeting and explained the STEPS process to the group.

*(Should we/How can we) qualify and utilize materials which are reusable, degradable, recyclable, contain recycled content, are weight reduced, or contain chlorine-free cellulose pulp, paper and board materials?

Follow-up meetings were held to complete the list of information needed for the situation analysis. The respective team leaders were given primary responsibility for identifying the categories of information required in each respective area of responsibility. The STEPS buckets were developed from the brainstormed list, and the senior review team approved the list. The various team leaders performed the necessary research and the accumulated results were compiled by Packaging Development personnel into one massive file of over one thousand pages, from which several different key findings emerged. The Director and MPL for the activity presented the preliminary findings in a meeting of the New Products Committee last August. The results of the complete analysis will be documented as an executive summary, plus individual reports on critical issues such as chlorine and recycling, accompanied by numerous appendices to the overall report to document all the data and information obtained. The massive amounts of information provided by the team have been further reviewed and analyzed by a smaller sub-group of the larger team. Recommendations for future work to place PM in a proactive position were also developed.

Additional Documentation

The results of all environmental reviews and the STEPS analysis will be documented as R&D internal reports. S. Baldwin will document all packaging related findings, except for 11 point board. Bill Rech will document that work. Cigarette Technology personnel will document findings related to cigarette components

- **Chlorine-free paper and board packaging materials, including SBS, cartons, labels, and soft pack materials.**

Packaging Development personnel attended a luncheon presentation at the ACS National Meeting last fall on the findings of an ACS blue ribbon study group concerning the environmental impact of chlorine. Copies of the report of that study group and of a letter from ACS President Ned Heindel to a US Congress sub-committee recommending against implementation of unreasonably strict effluent laws for chlorine containing compounds were obtained. These reports were provided to PM USA and Kraft Foods Scientific Affairs groups for use by the company in its negotiations with various government agencies. The Packaging Development group also conducted a complete review of the current literature in this area of continued concern to PM companies. Several hundred pages of information on chlorine use obtained from literature searches and other sources have been reviewed, and will be documented later this year in appropriate internal reports.

- **Source reduction**

The Environmental Team obtained and reviewed all the Project Harry files on prior studies on the use of 11 point board. These studies were determined to be incomplete and further studies have been recommended.

Reduced Weight Board

A consumer test plan has been developed to evaluate the differences between mid-range stiffness of 12 point caliper board versus the low end of the statistical populations of 12 and 11 point board. The low end of the range for 12 point board coincides with midpoint of the range of the 11 point board. The test board was selected to provide a very narrow range for each test sample at the following values: 12 point, 11 point, and 10 point, which reflect the target and lower extremes of the range for 12 and 11 point board, respectively. The blanks were produced the weekend of December 17. Westvaco completed selection of the board stock and provided their own analytical results. Analytical testing of the board to obtain a more sensitive measurement of Taber stiffness will be performed to obtain better numbers (more significant figures) for this attribute.

The consumer research plan calls for evaluation of unbranded 100 mm packs by POL participants with few questions concerning packs on the ballot. Sample production and POL testing are complete and we are awaiting results of testing. Any changes to the FTB must be shown by the testing to be transparent to the consumer.

- **Recycled fiber (corrugated cases, cartons, blanks and label stock)**

James River Paper 100% Recycled Board for Cartons

2051871067

A representative from James River Paper provided information about the 100% recycled fiber board produced at James River's Kalamazoo, Michigan mill. A video of the triple Fourdrinier machine was provided. The machine has three separate head boxes, so that layers of the triple ply board are not merely laminated together, but are formed together.

In order to address possible toxicological issues associated with the use of recycled fibers, James River was willing to have one of its representatives speak directly with one of our toxicologists. Appropriate contacts were provided by James River. The purpose of this preliminary evaluation was to assess the acceptability of these novel materials as a part of determining overall fitness for use.

Packaging Development personnel met with representatives from Shorewood Packaging to develop plans for evaluation of 12 point board containing 100% post-consumer recycled fiber content. Printing trials utilizing both gravure and offset printing were conducted. Marlboro graphics were produced by gravure printing, and some sample promotional items were printed using offset printing. James River's Pacesetter Board was evaluated in these trials, with Westvaco's standard SBS board serving as the control. The samples were visually examined for surface defects and print quality. Examination of physical properties was delayed due to higher priority for the foil project.

Kraft Foods has a research project underway developing an application for this board as a carton for low fat cream cheese. The progress of that project will be monitored.

China

One interesting business implication derived from the environmental situation analysis is that the Chinese are greatly interested in packaging technologies. Several reports on findings on China will be issued this spring. Information was received from members of an Environmental Technology Delegation to the Peoples Republic of China pertaining to environmental conditions and several other factors of importance in China which are relevant to conducting business there. This information will be summarized and provided to International as input for a situation analysis currently being performed. In order to gain access to China's potentially huge consumer market, many companies are finding that technology is the key which helps them enter. In the oil industry, for example, China wants Western companies to develop the oil fields, build refineries and infrastructure, but does not want to permit the companies to compete with Chinese companies in selling gasoline to Chinese consumers. One company which has gained access to a specified percentage of that internal market did so by trading well head technology which the Chinese wanted for access to China's internal market. China lacked that technology and consequently has been unable to perform secondary recovery. Technology can therefore provide a company with a strategic competitive advantage for that market. A key technology related to our businesses that has been identified by the Chinese as one they lack and need is packaging technology. Several other references to this need in China have been obtained independently of the Environmental Technology Delegation Report.

Additional information from the Environmental Technology Delegation to the People's Republic of China included several items relevant to our business. China has 100 plants that produce activated charcoal, much of which is based on nut shells rather than coal. The typical nutshell material has a honeycomb structure when examined microscopically. China also has promising carbon fiber technology as well, having developed fibers derived from unspecified polymers that are more effective at scrubbing stack gases than alternative activated charcoal samples with greater surface area. The difference appeared to be related to surface composition or functionality of the char.

China's paper industry does not extensively utilize wood pulp, but rather relies on grasses such as rice or wheat straw, as well as some sugar cane. Straw and grasses such as these (or flax) have significantly less lignin than wood. Consequently, the cooking and bleaching sequences required to remove the lignin are much less severe than those required for wood. For example, as with cotton linters, the cleanest cellulose fiber source, simple caustic cooking can effect delignification of the straw without the more costly and malodorous alkali-sulfide kraft cooking used as the first step of most delignification processes. A potential benefit of the use of fiber sources low in lignin content is that the need for pitch control agents in the processes is minimized or eliminated. China is also developing chlorine-free bleaching technologies, which will be well suited for use on the grasses which comprise most of their fiber source. The implementation of these technologies is still some time away, but this is an active area of research in Japan, China, and in other Asian areas.

Although China's paper mills are generally quite old, they have actively been seeking western paper makers and equipment manufacturers to acquire access to newer technologies. A number of new mills have been built with purchased equipment from other countries or as part of joint ventures with outside partners. One final note of importance relating to China's paper making capabilities is that they are quite experienced at making very light weight papers. Much of the paper produced for commercial use is very low basis weight, but is often of inferior strength. New technologies will ultimately improve the physical attributes of their lighter papers, but strength and uniformity are currently issues.

Recycling of fiber has long been practiced in China. However, there are shortages of high quality fiber for recycling. For corrugated cases, for example, the fiber has often been recycled four or five times, so the resulting board is too weak to provide adequate product protection. This situation is typical of much of China's paperboard packaging. Some clothing products produced in the special economic zones of China's Southeastern coast have been impossible to export due to the inadequacy of the packaging and shipping containers. Because of China's shortage of wood, pallets and crates are in short supply. Although China plans a reforestation program to improve the supply of wood for paper and packaging, one must question the wisdom of such plan when China is again moving into the position of needing to import foodstuffs and grain. Alternative approaches such as development of structurally reinforced composite materials for packaging may be a preferable option for shipping cases. The economics and feasibility of such approaches should be investigated.

2051871059

IPPS

6A21 Packaging Development

International Packaging Specifications

A project was outlined after consulting with the manager of Licensees and Affiliates. It was then placed in the PM R&D activity based plan. This plan outlined a scheme to develop base material specifications for contract manufacturers in the international arena. (No resources were available to implement the plan). Toward that end, copies of base material specifications were obtained from FTR and PM Australia for printed board (carton and box), soft pack labels, foil, and polypropylene film. Utilizing this information, an initial estimate of requirements can be established. Before specifications can be finalized, however, experimental samples should be produced in the designated countries, made to these specifications, including materials covering the extremes, not simply targets of the specification. These materials must then be brought to the U.S. for subjective, physical, and chemical evaluation. Machining trials should be conducted at the specific contract manufacturing facilities. A list of priority countries and manufacturers has been established by the Vice President of International Operations. Marlboro, of course, is the priority product. China, Viet Nam, India and Malaysia were identified as the priority countries.

Hoechst Visit

Meetings were held at Hoechst with the Director of Worldwide R&D and Tobacco Film Managers to discuss a program to reduce the migration of organic materials out of film and into product. A program was developed to conduct a cooperative study to:

- 1) Attempt to set a taste standard for film by utilizing the Robinson test (water taste test) and do comparative smokings.
- 2) Identify the organics that are migrating out of the film.
- 3) Investigate developing catalyst systems for resins and their potential for reducing migration.

FTR Visit

Information concerning the impact of open and unsealed film on product shelf life was given to FTR R&D and Q.A. personnel via a presentation and one on one discussions. Comparison of USA and FTR test results clearly indicated that product shelf life was at risk when product is exposed to low relative humidity and heat. These conditions are at their worst in vending machines in Germany. FTR Q.A. is formalizing a recommendation for improving film sealing. The concept of utilizing a new lower sealing temperature film was introduced to FTR with a recommended film and vendor contacts.

Dust Free film

Significant progress was made in the development of a dust free film for Japan. After it was determined that a commercial product was not available, a program was developed with Mobil to invent an acrylic coated film. The patent pending film has passed component approval and T&O approval. Modifications are being made so the film meets other physical requirements (i.e.pack blocking), and will be available in the second half of 1995 for introduction.

Metallized Carton Overwrap for Saudi Arabia

A metallized, printed film commercially available carton overwrap was developed as a cost savings to replace the currently used printed foil.

SOCP**7A35 Packaging Development****Foil Specification Improvement Project****Background and Introduction**

In order to conduct a cross-functional project to improve the performance of Alcan foil in our factories, a planning team was established to develop plans to address several concerns associated with that material. The planning team established plans and time-lines for a full evaluation of the issues. The members of that group included representatives from R&D, Purchasing, Quality and Specification Engineering, and Engineering. A representative from each factory was also invited to participate in the overall effort. Problem definition and frame of reference were defined at the initial meeting. In order to research the situation, a review of prior engineering studies was conducted, along with a review of floor complaints and incoming materials data for foil. Other current projects pertaining to foil were also assessed. A comparative study of different PM companies' foil specifications was conducted as well. After completion of the initial research on what had already been done, an extensive meeting with representatives from each factory was held last to complete an exhaustive assessment of issues. Ron Street of Q&SE led a brainstorming session to identify key issues. After establishing priorities for the issues, an experimental design was subsequently developed by R&D and two consulting statisticians. Initiatives with vendors were established through Purchasing.

Key Learnings

The following major findings and results were obtained:

*The foil specification improvement team completed a comparative review of world-wide PM companies inner foil specifications for cigarette packaging materials.

*Additionally, preliminary data comparing the surface properties of foil laminating papers showed significant differences between the papers in liquid absorptive properties. Alcan uses three 19 pound tissue papers from three different vendors to produce silver foil.

*Samples of foil and paper which had run poorly in the mentholating process were also received from Louisville, via Quality and Specifications Engineering for evaluation for physical properties. The sample which had caused "bleeding" and subsequent crystallization of menthol contained the James River paper. The differences in absorptive properties observed between the three types of paper were subsequently determined to account for the intermittently recurring problem. Once the root cause was identified, corrective action (standardizing laminating paper properties) was taken. The action taken was to stage materials for use, making sure that foil made with James River laminating tissue not be used for the mentholating process.

* A review of previous Industrial Engineering studies showed that no definitive studies have been conducted for at least three years.

* The key recommendations from the team were: (1) standardize the component materials for foil; (2) develop a set of specifications for the foil laminating papers which standardize paper sizing level and type; (3) have current I.E. studies performed on the high speed equipment; (4) continue to characterize all silver foil materials received; (5) complete laboratory measurements comparing propensity to curl at different conditions for the three papers and corresponding foil samples; (6) complete laboratory measurements comparing bond strength properties and propensity to delaminate at different conditions (temperature and R.H.) for foil samples produced from the three 19 pound tissue papers.

Following the initiation of this project, a problem arose with mentholated foil intended for use in Japan. The work done in this project led to key findings related to that project as well. Those results and findings are given below.

Japanese mentholated foil issues

The following items were identified as contributors to the browning and crystallization problems with mentholated foil, both for Japan and domestic:

I. Foil Laminating Paper

- **Absorption rate of paper substrate:**

Absorptive properties (rate and capacity) were identified as the cause of LMCP's mentholating problems last fall. Avoiding use of James River's paper has been the interim solution, since it had the slowest absorption rate. The low absorption rate resulted in liquid runoff and wetting of the foil as well as crystallization problems.

- **Actions: Standardize the materials, most critically the paper. Move the James River absorption rate in line with the other two papers.**

Mill trials were conducted in December with lower sizing levels on the James River Paper. Evaluation is in progress. Recommendation for a standard paper specification is scheduled for June of 1995.

II. Slip Coat Treatment

- In December, data were reported which showed that chemical interactions were taking place between the fatty acid slip treatment and other chemical components in the foil. Sodium adducts of the fatty acids were found to be present on the foil. Additionally, it was shown that instead of stearic acid, oleic acid and other fatty acids were present on the foil surface. This indicates either impurity in the material as purchased, or decomposition during Alcan's preparation of the slip treatment.
- The fatty acid coatings are extremely soluble in ethanol, so that the metal surface can be exposed for potential corrosion. Both ethanol and fatty acids are reported in the literature as corrosive to aluminum.

Results and Discussion

For the interested reader, a more detailed discussion of some of the details of the work is provided below.

Data

Data were received from the Institute of Paper Science and Technology comparing foil laminating papers produced by Menominee and James River. The two papers were determined to have very different surface characteristics. The surface free energy of the James River paper was nearly twice that of the Menominee paper with water as the wetting liquid. The James River paper has been treated with a reactive sizing which actually bonds to the cellulose and imparts hydrophobic character to the fiber and resulting sheet. The Menominee paper is unsized. Contact angle data for these samples were also consistent with the surface free energy data. Earlier testing in our own laboratories indicated differences in absorptive properties of the papers, but the more instructive results from IPS & T laboratories indicates the origin of the differences. Knowing that cause pointed the direction to a solution for the problem.

Completed data comparing the surface properties of foil laminating papers were obtained from the Institute of Paper Science and Technology Paper Testing Laboratories. As indicated in the preliminary data, the three papers showed significant differences in liquid absorptive and wettability properties. Alcan uses three 19 pound tissue papers from three different vendors to produce silver foil. Despite the fact that the IPMC paper is also sized, the complete report on the surface properties showed the James River paper to be the clear outlier among the papers with regard to these properties. The Menominee paper contains no size; the James River paper is sized with a Hercules emulsion sizing, Hercon 75; the IPMC paper contains a resin based size produced by Plasmine Technologies. In terms of surface properties and wettability, the IPMC and Menominee papers are quite similar.

Laboratory studies also identified critical differences between inner foil samples produced from papers from Alcan's three different paper vendors. The differences between vendors were identified as the major cause of variation between foil samples. The critical differences between the papers were also identified by the testing. The key findings were: (1) that the major factor contributing to variation in the materials is the difference between manufacturers; (2) the key

properties in which the foil materials differ are: caliper, coefficient of friction (C.O.F.), smoothness and roughness, bond strength of laminate, and thermal shock resistance. (3) Some evidence of differences in propensity to curl under different environmental conditions has been observed, but all data have not yet been received. (4) Absorbent properties, hydrophobic character and stiffness have also identified as key differences between the different foils which are all related to differences between the papers. Consequently, as proposed last October, the most useful step to be taken is to standardize the papers.

Data on bond strength of the foil laminates made from the three different papers were received from U.S. Testing Laboratories in New Jersey. Those data revealed that the ease of delamination was greatest with foil produced with the James River paper. Since Alcan uses an aqueous based adhesive, the weaker bond strength is consistent with the absorptive properties and surface free energy characteristics of the three papers.

Methods and Methodologies

Statistical Design of Experiments

Plans were developed with Alcan and a consulting statistician for an experimental approach through which we will map the physical properties of all paper and foil combinations currently used by Alcan. We will then utilize this information to develop knowledge of that region of the parameter space which should be further optimized (through experimental design techniques) in order to attain improved performance in both Alcan and PM processes. The results of the study will provide information with which Alcan can work with their own vendors to attain greater standardization of materials for our processes as well as their own. Toward that end, Alcan has begun providing rolls of production material so that a total of twenty-seven samples can be obtained over the next two to three months. Alcan currently has three suppliers of the 19 pound laminating tissue paper and three suppliers of the aluminum foil. We will obtain samples of all 9 combinations of foil and paper from three different lot dates to obtain analytical data with which to map the physical properties of the foil materials.

This information, combined with information obtained from the review of PM company wide specs for foil, will provide a shortened cycle time for developing new specifications for properties and material combinations never defined before by PM USA. Approximately 18 months have been cut off the typical time frame for generating completely new information with no prior knowledge base.

High Speed Motion Analysis System

The Kodak EM 1012 E/2 Motion Analyzer and associated devices comprise another set of tools for our materials tool box. The item has been purchased for use with all materials for all Richmond and Louisville Manufacturing support groups. The benefit of this technology is the capability it provides to resolve machine-material interaction issues. A triggering mechanism on the camera permits downloading from memory (to a VHS tape for subsequent study) frames showing the motion of the material, foil, for example, for 8 packs preceding a failure event.

2051871064

Representatives from Packaging Development, QA, Q&SE, Engineering and R&D were selected to form a cross-functional steering team to prioritize projects for the camera.

The following studies were performed with the motion analysis system last December:

*Bay 2 currently specifies the use of foil produced only with the Menominee 19 pound laminating tissue. Studies on this acceptable material were performed to establish a control and to profile "normal" performance. Electrical and mechanical experts from the factory were consulted to discuss the most appropriate packer fault detector locations to which to connect the camera's triggering mechanism. Number 3A machine was selected as the packer for the studies, and three critical fault zones were identified for study: (1) before the bottom stop detector; (2) before the alufoil detector; and (3) the foil cutting zone. These studies were performed December 12. Packaging Development personnel went to the Manufacturing Center to work with Bay 2 personnel to get the wiring connected to the GD NV fault detection system.

* The foil cutting area was also studied using a fiber optics lens which provides viewing access to difficult places to observe. The previous camera did not have sufficiently sensitive light detectors to permit use of the fiber optics extendible lens.

Foil baseline studies in Bay 2 of the Manufacturing Center were initiated on December 12, 1994. GD packer #3 in line A running Alcan foil with Menominee 19 pound tissue was the system monitored to provide the baseline information. Foil and machine interactions three critical fault zones were evaluated by Packaging Development and Boitnott Audio Visual personnel, using a Kodak EM/1012 motion analysis system. The triggering mechanism on the camera unit was attached to the GD NV fault detection system. The communication between the camera and the packer fault detection system permits the camera unit to download images of the foil motion proceeding a failure event to a VHS tape for further observations. The fault zones studied were: (1) the foil cutting zone; (2) before the alufoil detector; (3) before the bottom stop detector.

It is believed that the 19 pound tissue paper from James River causes utilization problems in Bay 2 and possibly in other areas. Currently, Bay 2 specifies the use of foil produced only with Menominee 19 pound laminating tissue for use with their packers. The Menominee paper purportedly causes fewer machinability problems within Bay 2. Only one foil related fault was observed during that shift.

Data collected that day using the Menominee 19 pound laminating tissue were stored on VHS tape and were evaluated by the high speed camera team on December 16. A Field Service Engineer from Eastman Kodak helped assess the data collection techniques.

Materials Characterization

During a cross-functional meeting conducted by Packaging Development personnel to discuss the needs for physical characterization of packaging materials, several key points were discussed. First and foremost, the need to develop our own specifications for materials was identified by group consensus. The group also decided to keep a narrow focus while developing specifications

because of the total number of permutations and combinations which could result if all materials, properties, products, and machinery were to be considered. Since the foil specification improvement project was an established project, the group decided to address that material first.

Methods and methodologies were also discussed by this group and it was agreed that statistical design techniques would be utilized for identifying the most important parameters and ranges. Also, standard analytical procedures such as TAPPI or ASTM methods will be used as much as possible, along with other well established procedures. The outside laboratories selected to perform these analyses were the Institute of Paper Science & Technology laboratories in Atlanta and U.S. Testing Laboratories in Fairfield, NJ.

Factory Support

*The success of the use of materials characterization techniques in resolving the foil mentholating problem and foil delamination floor complaints has led to several requests from the factories for assistance using these tools. We are succeeding in getting useful technologies to the factories and are helping them solve their problems. Requests came from Bay 2, Louisville (via Q&SE), Bay 5, Cabarrus, and the Materials Storage area for assistance in resolving problems such poor performance of the James River Paper in Bay 2, menthol crystallization and bleeding, problems with Lark tipping, problems with Merit cut labels, and thermal shock for foil during very cold weather. With our help in providing appropriate materials characterization studies and the use of the motion analysis system, assignable root causes were identified in each case so that corrective action was implemented by the factories or MTS.

*At the request of Bay 5 management, the camera was used to monitor tipping problems associated with Lark. Despite the fact that few good pictures were taken since the tipping operation was running too poorly to obtain satisfactory images, the observations which were made permitted Bay 5 personnel to make machine adjustments which corrected the problem. The machine-material question was quickly resolved, avoiding alternative lengthy, more costly and less effective studies.

Merit Cut Labels

Analytical results obtained from ARD on Merit cut label samples evaluated by low magnification light microscopy higher magnification light microscopy work showed that the Merit labels which failed to run satisfactorily did indeed have puncture marks which permit light to pass through the labels. Other Merit labels, which performed better than the problem labels but poorer than the B&H labels, also showed puncture of the print layer in the crest region. Additionally, all the Merit labels showed cracking in the crest region to varying degrees. The problem batch was clearly the worst. The original stereo light microscopy work performed by Packaging

2051871066

Development also showed a much deeper impression in the crest area on the back side of the Merit labels than with the B&H labels. Penetration of the substrate paper fibers was observed with the higher magnification light microscopy in the worst cases.

These data suggested that the depth of embossing needed to be more carefully controlled. The problem batch of labels was the first produced by Alberson, so that the edges of the embossing dies may have been sharper. The depth of the embossed impression, coupled with the rough edges of the fractures in the crest may have been contributing to some interlocking between labels, thereby causing difficulties with the feeding of the labels. That hypothesis was later confirmed experimentally when Cabarrus captured the events on film using a high speed motion analysis system like the one purchased by Packaging Development. The camera confirmed that the labels were indeed interlocking and were feeding two at a time. Cabarrus and PTS were then able to work with vendors to improve the embossing process.

Packaging Panel

In support of PTS and other packaging areas, the Packaging Panel held 284 smoking panels in which 378 samples were evaluated by paired comparisons testing.

9A05 Continuous Improvement

SAS ASSIST Training Class:

Packaging Development personnel organized a two day seminar on data analysis using Statistical Analysis Systems (SAS) software on December 13 and 14 in the R&D Computer Applications area. The class instructor was a statistician from SAS Institute in Cary, NC. In addition to the Packaging Development group, representatives from the Analytical Research Division, Product Research and Cigarette Testing Division attended the seminar. The objective of the course was to provide the statistical background necessary to perform statistical analysis using SAS Assist software. SAS Assist is a new menu driven SAS software package available through the R&D host computer.

TOPIC QUERIES

Working with the Information Technology Division, Packaging Development also initiated weekly literature searches on six key packaging materials and environmental areas. These searches are regularly conducted through the TOPIC database search system. This year, we hope to extend this capability to the New York Packaging Group.

11A20 Packaging Development

Maintaining the Technology Base

Several different patent searches were conducted by the patent department covering different packaging categories. Packaging Development personnel also researched the proprietary use of polysiloxanes as materials performance enhancers for use on packaging materials, including foil.

Strategic Outsourcing of Technology

The theme of the IRI (Industrial Research Institute) annual meeting was "making innovation happen," with a focus on the judicious outsourcing of technologies. Topics such as determining

whether to make or buy technologies, whether and when to outsource needed skills and services, and when and how to conduct product development with partners were addressed by several speakers. Tapes of the most pertinent talks were obtained by Packaging Development personnel attending the meeting. Packaging Development has implemented the use of these techniques by selectively outsourcing as much work of a non-strategic nature as possible.

cc:	C. Altizer	R. Fenner	R. Pugh
	B. Antkowiak	F. Forsmark	W. Rech
	G. Atwell	H. Grubbs	S. Roberts
	S. Baldwin	R. Heretick	T. Sanders
	H. Burnley	K. Houghton	R. Slagle
	J. Carboni	C. Irving	J. Smith
	J. Calloway	R. Kelly	R. Street
	C. Campbell	C. Lilly	M. Tickle
	R. Carchman	R. Lively	M. Walchak
	A. Collins	R. Latshaw	L. Watts
	R. Cox	B. Mait	J. Whidby
	R. Dunaway	A. McDaniels	D. Wolenberg
	C. Ellis	B. Miles	
	B. Ferguson	P. Nolan	

2051871068