PRATT & LAMBERT-INC.

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TECHNICAL ACTIVITIES

EMULSION PAINT DEVELOPMENTS

Purchased PVA emulsions are used in the manufacture of P&L emulsion paints, of which we produced 363,000 gallons (in the U. S.) during 1958. We have successfully made PVA emulsions of our own in glass laboratory equipment and at the Celanese Corp. pilot plant. This work was initiated because attractive cost savings seemed possible by making emulsions instead of buying them. Late in 1958, commercial PVA emulsions were slashed in price, thereby altering the economics of captive production. Some authorities believe that price reduction was precipitated by the paint industry's wholesale interest in making its own emulsions. If this were true, our research work paid off--but not in the way that was anticipated. Development work to date has cost $3694.

While production of our own emulsions is not so attractive as it was, it seems likely that we will one day wish to make PVA or other emulsions. The motives will be the same as for making our own alkyd resins--control over and ability to vary the properties of a key vehicle and cost savings. Most English paint manufacturers now make their own PVA emulsions. Our emulsion paint volume should continue to grow as we make additional items on this basis. We are currently trying to make an emulsion floor paint for concrete; $1157 have been spent on this project. We are also evaluating emulsion house paints, although the conservative technical opinion is that wholesale production of emulsion house paints is not imminent. Industrial finishes are, however, expected to be produced on an emulsion basis in the near future, primarily because of the fire hazard associated with solvent-thinned industrial paint. All signs seem to point toward increased reliance upon emulsion vehicles.

As new raw materials are offered for making improved emulsions, we will evaluate them. A joint factory-laboratory cost study is being undertaken to determine the volume level at which production of our own emulsions will become feasible, and the capital investment that will be required for such a move.

We spent $3560 in 1958 in research on emulsion type industrial finishes. New emulsions designed specifically for industrial use are now being offered with increasing frequency and in steadily improved quality. Until late last year, emulsions had been commercially applied only to industrial primers; emulsion enamels were in the embryonic stage. The safety of a water-thinned primer was, therefore, not much of a sales advantage, if it had to be used in conjunction with a solvent-thinned top coat. Both ADM and Rohm & Haas are now offering water-thinned vehicles (Arolon 1000 and Rhoplex AC-200, respectively) for industrial enamels. Neither product is quite right, although they represent great strides toward the desired objective. The ADM product lacks chemical and solvent resistance. The Rohm & Haas product pinholes and lacks mar resistance.

We have successfully made metal baking primers from emulsions and have found that they perform as well as solvent-thinned alkyd

primers. They can be used under almost any kind of top coat. Air dry emulsion primers have few desirable qualities; they remain water-sensitive and can be recoated with only a limited number of paint types. So far, we have only one account that is interested in a water-thinned primer. In this case, the water-thinned primer provided better adherence and impact resistance than other primers, and was used for these reasons--not for reasons of safety. The account refinishes bowling pins, the finish coat of which is white lacquer.

RESEARCH ON NEW RESIN TYPES

Urethanes and vinyltoluene copolymers are being intensively studied as paint vehicles. We have made up a whole series of experimental urethane vehicles (by reacting tolylene diisocyanate with alkyds, vegetable oils, polyethers, etc). They seem to upgrade the chemical and wear resistance of other vehicles, but have an unfavorably high cost (a urethane floor finish, for example, costs three times as much as "61" Floor Varnish, but is not three times better). We are currently evaluating urethanes in floor finishes and are making exposure tests in Florida. Other paint companies are also evaluating urethanes; duPont is currently test marketing a urethane floor finish. The cost of our research work on urethanes now totals $3800.

We have begun to manufacture vinyltoluene-alkyd copolymers in the factory, but the process has been somewhat unpredictable and required close laboratory supervision. Most of the production difficulties have now been brought under control. Vinyltoluene is related to styrene, the long chemical name of which is vinylbenzene. Styrenated alkyds are well established, but vinyltoluene-alkyd copolymers are still in their infancy. Our basic research work in this field has cost $5165.

We are attempting to use vinyltoluene-alkyd copolymers in three ways--to make a fast drying floor finish, to make a more color permanent Vitralite Enamel, and to make a low cost industrial finish. Our experimental Floor Finish VT, made from a vinyltoluene alkyd, won a less than enthusiastic sales reception. Odor and poor recoating qualities were criticized, although a competing product (Moore's One Hour Varnish) had similar disadvantages. Vitralite Enamel, made from a vinyltoluene copolymer, was more color permanent than the standard formula, but had an objectionable initial and residual odor. Since one sales feature of Vitralite Enamel is its freedom from objectionable odor, samples were not sent out for sales evaluation. It is hoped that the odor handicap can be reduced; there is little prospect of eliminating it entirely. An industrial hammered metal finish, made from a vinyltoluene copolymer, has enabled the Industrial Sales Department to acquire several new accounts because of its attractive cost. At least one of these new accounts may develop into a large volume customer.

Silicone-alkyd vehicles, for use in Sildura, were satisfactorily processed in pilot plant equipment. Development work cost $814.

While the operation was technically successful, Sildura seems to be dead because we cannot economically manufacture the base resin in small volume.

ALKYD RESIN DEVELOPMENTS

The 1958 recession would have dealt a serious blow to our alkyd resin production volume, had it not been for the adoption of P&L resins in place of Rohm & Haas Duraplex D65A. The latter resin had been used for years in Vitralite Enamel Gloss, Effecto Enamel White, and Bone White, Verdura Trim & Shutter Finish, Lyt-all Stippling Eggshell, and Palkyd Enamel White Gloss. As a result of our decision to use P&L resin in these products early in 1958, a larger volume of alkyd resin was produced in 1958 than in 1957 or 1956. Resins of the D65A type accounted for 127,000 gallons of 1958 alkyd production. The use of our own resins will provide annual savings of $16,600. The changeover culminates several years of development work, the total cost of which was $3155.

One item, Lyt-all Stippling Eggshell, was unintentionally upgraded as a result of the above changeover. This item had been criticized repeatedly because of its high initial gloss and the slowness with which its gloss became stabilized. Lyt-all Stippling Eggshell, made from our own resin, was found to dry with much lower initial gloss than when made from purchased resin; strangely enough, the product also attained its ultimate sheen in only a week or two instead of a month.

Isophthalic alkyd vehicles, like those used by W. P. Fuller in house paint, were restudied in 1958 at a cost of $1110. This project illustrates one of the less logical facets of research work. Much of our research is defensive, simply because we dare not ignore the implication of certain commercial developments--even though we think that they deserve no attention. From the standpoint of prior technical knowledge, there was no reason to believe that isophthalic alkyd would extend the life of house paint by several years (as claimed by Fuller). However, we had never actually tried to make house paint from isophthalic alkyd, nor had we tested such a paint in Florida, or elsewhere. Tests made in 1958 provide no evidence that would encourage us to use an isophthalic alkyd vehicle in house paint. While this supports our previously-held opinions, there was an outside chance that we might have overlooked the possibilities of the resin. Fuller's enthusiasm can be based on exposure conditions that are peculiar to California wather and that are not duplicated elsewhere. Technical people in other paint concerns are baffled to explain the "why" behind Fuller's promotion of isophthalic alkyd in house paint.

TRADE SALES DEVELOPMENTS

New listed items that were put on the market in 1958 included:

Effecto Spray Enamel (14 items) - Special formulas for aerosol packaging were developed at a cost of $2505.

Vapex Masonry Paint (11 colors and Surface Conditioner) - Development work done in previous years cost $10,400. Concluding activities in 1958 cost $1147. Total development cost $11,547.

Vapex Enamel White Semi-Gloss - Development work done in previous years cost $1740. Concluding work in 1958 cost $2811. Total development cost $4551.

Vapex Flat Wall Finish Ceiling White - Development cost $99.

Painter line (3 items - "68" and "81" Alkyd Enamel White Semi-Gloss and "99" Alkyd Enamel White Gloss) - Development cost $1586, of which $315 was underwritten by Eastern Sales Division.

Low Luster House Paint 842 Black - Development cost $42.

Expedite Paint & Varnish Remover, Non-Flammable, Wash-Off Type - Work done in 1958 cost $685. Without background data accumulated over the past 20 years, this year's program would have taken longer and cost much more.

Multipurpose Tinting Colors (20 items) - This line is a by-product of work undertaken the last two to three years to insure independence of Rockcote, if and when we should wish to make our own colorants. In 1957, an offset for Rockcote's "universal" vehicle was developed. The Rockcote vehicle is contained in the "A" type colorants we buy from Rockcote. In 1958, we used the vehicle to produce offsets for the "A" colorants themselves and to develop offsets for our present Oil Color line. Since the two problems were inter-related, they were undertaken as a single project. Multipurpose Tinting Colors (which are basically Oil Colors made with a "universal" vehicle) are now ready for production. Offsets for "A" Colorants have been formulated, but further work has been suspended, pending the action we take on machine dispensing. In the meantime, package stability tests are being conducted in lead tubes and in polyester bags. Whether we can economically package our own Tube Colorants in the future will depend on the colorant volume that remains, if and when machine dispensing is established. Development work on colorants during 1958 amounted to $7820. The cost of the vehicle development, completed in 1957, was $1740.

Not included in the above expense, was an $8141 project aimed at modifying Vapex Flat Wall Finish so it would accept Multipurpose Tinting Colors and/or "A" Colorants. The problem remains unsolved. We found no way to achieve the objective without sacrificing color (in White) and washability in all colors.

The colorant problem is now entering a new phase as we undertake a crash program to develop a short line of lead-free and, if possible, alkali-resistant, colorants for machine dispensing. The program is expected to cost $5000.

In 1958, we completed our evaluation of 4-gallon pails for packaging Tube System Bases. This work cost $1407.

The Tube System has been, and continues to be, an extremely costly project in terms of technical work. From 1955 to 1957, inclusive, we spent $32,480 on Tube System laboratory work. 1958 activities cost us $17,368. 1959 activities will cost at least $5000. The total of all these figures is $54,848. If this is added to the cost of chip racks, chips, chips that had to be destroyed because of color drift, losses that were absorbed in shifting from our initial colorants to "A" colorants, it seems unlikely that the Tube System has made money for us to date. Whether we would have made less money without a Tube System--as a result of lost business--is, of course, not known, but is the rational reason for our actions.

Improvements or changes were made in the following established trade sales items during 1958:

New Lyt-all Flowing Flat White, Bases, and Petal Pink - Calcined clay, a new type inert with some hiding qualities, was introduced in place of part of the titanium dioxide. This change will provide annual savings of $27,200. While the hiding of the White could have been upgraded, instead of maintaining the hiding and decreasing the cost, restrictions imposed by our intermix system preclude such a step. The Tube System places similar restrictions on the Bases. Development work cost $1800.

House Paint 300 Outside White - Elimination of lead pigment in 1958 will provide annual savings of $21,300. Last year's development work cost $275. However, exposure tests and related work had been going on for a period of more than fifteen years. They provided the background data and the assurance for making the change.

House Paint Tints and Bases - Replacement of varnish oil with raw linseed oil will provide annual savings of $5900. Again, this development culminated years of prior testing and evaluation.

Lyt-all Stippling Flat (New) - Alkyd formula, adopted in 1958, dries more positively than previous oil base formula, hides better, and has better color permanence. Development cost $69.

Marine Yacht Whites (3 items) - Lead-free alkyd formulas, adopted in 1958, dry faster, cost less, and are safe from standpoints of toxicity and discoloration (from gas generated by sewage-contaminated harbor waters). Development cost $800.

Marine Deck Paint (2 items) - Alkyd formulas, adopted in 1958, have same qualities as "61" Floor & Porch Enamel. Development cost $488.

House Paint 305 Exterior Primer - Settling minimized. Development cost $250.

Elimination of Lead Pigments - Cellu-Tone Satin, Solidex, Vitralite Enamel Eggshell, and Effecto Enamel were reformulated to eliminate lead pigments and the stigma associated with their use on surfaces that might be chewed by children. Laboratory development work cost $1934. Manufacture of lead-free formulas in these four lines will reduce our profit by about $1475 per year.

Exterior Rustic Stains (12 items) - Reformulated to contain a more color permanent shingle oil. Development costs were negligible; they are buried in our general Test Fence Program.

A common thread that runs through many of the completed developments in 1958 is their dependence upon supporting work done one, two, three, and, in one instance, twenty years ago. Research is like compound interest. We benefit from the initial research on almost any project and then we profit from the information that is gradually accumulated on the same or related subjects. The productivity of a brand new paint laboratory without background knowledge and experience would be small in comparison with that of an established laboratory.

Lack of adequate background knowledge prevented us from taking advantage of the favorable price relationship that existed between soya and linseed oils in 1958. A maleic-treated soya oil, made by Spencer-Kellogg, could have been advantageously substituted for bodied linseed oil (made by us) in house paint. Savings at the rate of $26,000 per year would have resulted for as long as the price differential existed. The substitution was not authorized because it would have led to decreased Buffalo plant production and would have resulted in increased manufacturing costs on our residual gallonage. Since we had never attempted to offset the Spencer-Kellogg oil, we could not produce an equivalent product in our own plant. Such an oil has now been developed and will undergo exposure tests in house paint. The results will not be known for several years, but we will then be in a position to use maleic-treated soya oil, if and when the price structure favors such a move in the future, and if our maleic-treated oil proves to be as good as linseed oil.

House Paint was criticized in 1958 on the grounds of flashing. Most complaints occurred in the west during early summer. They were attributed to the weather conditions (cool and wet) that existed on a country-wide basis at the time. Nonetheless, we have spent $905 on research aimed at making a more foolproof paint under these drying conditions. A formula modification resulting from this work is now undergoing preliminary production tests.

One project, completed in 1958 at a cost of $2221, did not pay off and offers little promise of doing so. It was a study of paint soiling. We tried to learn what makes dirt cling to paint, if any ingredient will repel dirt, and if any ingredient will ease the removal of deposited dirt. No leads with commercial potentialities resulted from the study.

Multicolor lacquer aroused the interest of our sales personnel during 1957 and early 1958, but no reports or comments have been received at the laboratory level in recent months. The Industrial Sales Department issued a sales bulletin (No. 22) describing Tex-Hue (a multicolor lacquer made for us by American Lacquer Solvents Company), but to the best of my knowledge, no orders have ever been received. $1403 were spent on laboratory evaluation and study of competing materials. No technical effort has been directed toward formulating multicolor lacquer.

Fire retardant paint also attracted a lot of attention in 1958, largely as a result of the Chicago school fire. $406 were spent on Stick and Wick Tests of our trade sales items and of competing paints. No technical work has ever been done on the formulation of a fire retardant paint of the intumescent type.

INDUSTRIAL SALES DEVELOPMENTS

Production of industrial finishes at Buffalo declined 21% in 1958, as compared with 1957, but the demand for laboratory services on industrial finishes declined only 2.5% (on a man-hour basis).

The table, which follows on the next page, lists our largest industrial accounts and indicates the laboratory charges that were made against these accounts in 1958. Also listed are certain other accounts, for which substantial amounts of laboratory work were done. In 1958, we spent an average of 1.2 cents out of each sales dollar for direct laboratory work to maintain or develop our 25 largest industrial accounts. Assuming that proportionate research and manufacturing services were added, we would then have spent 3.4 cents out of each sales dollar for laboratory work. Figures published from time to time in trade papers indicate that our competitors spend from 4.0 to 7.0 cents out of their industrial sales dollars for laboratory work; the average of available figures is 5.5 cents. These figures suggest that we may have been a bit frugal in cultivating existing industrial customers, even though we did spend considerable money for this purpose in 1958.

Account	Sales - 1958 (in 1000s)	Laboratory Charges - 1958
American Can Co.	$390	$1146
Carborundum Co. (including Munising Paper)	182	1469
IBM (including Crosley, Marathon, Suffolk, General Bronze)	104	2899
Brooklyn Metal Decorating Co.	94	330
Dunlop Tire & Rubber Co.	55	213
Ebco	47	653
Talon	47	1925
American Sanitary Partition Co.	46	840
Western Electric Co. (including Anetsberger, Bell)	37	234
Twin Coach Co.	36	530
Eastman Kodak Co.	35	1721
Hard Mfg. Co.	35	1273
Metpar Steel Products Co.	32	252
Reznor Corp.	27	660
Union Fork & Hoe	23	118
Pratt & Whitney	23	331
Trico Products Corp.	22	165
Continental Can Co. (Hazel-Atlas Div.)	21	-
Markel Electric Products Co.	21	545
Gilbert-Bennett	20	325
Titan	19	938
American Standard	18	33
Fein's Tin Can Co.	18	-
F. N. Burt Co.	14	179
Haartz-Mason	12	110
Ozalid	11	525
National Cash Register Co.	less than 10	535
Standard Can Co.	less than 10	535
Royal-McBee	less than 10	467
Fedders-Quigan	10	459
Risdon Mfg. Co.	less than 10	434
General Felt Co.	less than 10	422
Grumman Aircraft	less than 10	394
Taylor Instrument	less than 10	393
General Precision Laboratories	less than 10	372
Remington Rand	less than 10	372
Raybestos-Manhattan	less than 10	355
Aldan Rubber	less than 10	320

Wrinkle finish production declined 34% to 57,300 gallons in 1958. Two accounts--IBM and Eastman Kodak--were responsible for most of the decrease. At IBM, the loss of business reflected that company's replacement of our wrinkle finish with Armitage vinyl texture finish. In spite of this loss, IBM continues to be our largest wrinkle finish customer; its 1958 purchases amounted to 30,000 gallons.

More money has been spent in trying to reproduce the Armitage vinyl texture finish to IBM satisfaction than on any other one industrial project, past or present. In the past six years, $25,000 have gone into this project, but the tempo of spending declined in 1958. Last year's work cost $2899. No sample of vinyl texture finish ever supplied by us has won IBM approval, but a subcontractor, Abbott-Marks, successfully used 500 gallons of our finish, before the company's contract expired. The finish was accepted by IBM inspectors. Abbott-Marks bought from us because of their inability to obtain satisfactory Armitage material. More than technical qualifications alone, therefore, seem to be involved in the over-all problem.

The vinyl texture finish developed for IBM has been approved by General Precision Laboratories for use on aircraft ground control units (similar to radar installations). If this company does the business it expects to, some of our research expense on the vinyl texture finish will be salvaged.

Another P&L military development in the vinyl field was a black paint for use on rocket fuel containers now being manufactured by Pratt & Whitney. The containers are buried underground and presumably supply fuel to the rockets just prior to launching. Vinyl paint offered maximum resistance to soil corrosion and to the fuel.

Stip-Tone, the new textured multicolor finish developed by Mr. Hoffman and Mrs. Matesick in 1957, has met with mixed customer interest. Only 1000 gallons have so far been sold, but the finish has been the means by which several new accounts have been attracted to Pratt & Lambert-Inc. These accounts include Wilmot-Castle Co., a manufacturer of surgical lamps, Smith-Corona Co., and Connorsville Casket Co. Our Stip-Tone patent application has received a stock rejection by the Patent Office. An appeal will be filed shortly by our patent attorney. Development work on Stip-Tone now totals $1998.

Our industry is concerned whenever other materials replace paint, but we have a case history that provides an interesting sidelight on one such replacement. Some years ago, Talon adopted color-anodized aluminum for its fastener chains to eliminate their painting. The continuous process that converts anodized metal into the finished chain includes a cutting operation (to form the "teeth") which leaves raw metal edges and an objectionable bright streak down the middle of the fastener. To overcome this, Talon now applies a thin coat of dye lacquer. Several hundred gallons of our lacquer

will be used each month in this manner. Talon was one of a very few industrial accounts that bought more P&L finishes in 1958 than in 1957.

In 1958, our U. S. metal decorating business declined 23%, to 143,000 gallons; our Canadian business declined 4%, to 26,000 gallons. American Can Co. took two thirds of our 1958 U. S. volume in this field; it purchased 31% fewer gallons in 1958 than in 1957. Part of this drop-off was caused by design changes in cans fabricated for Schaeffer Brewery. Our second largest metal decorating customer, Brooklyn Metal Decorating Co., increased its purchases slightly in 1958, as did also Continental Can Co. (Hazel-Atlas Div). Brooklyn Metal Decorating Company's increase was due to the purchase of 2800 gallons of a new interior coating for PVA emulsion paint cans. Over the past four years, research work on metal decorating finishes (exclusive of work on specific sales problems) has cost $3984.

We are once more involved in a lawsuit as a result of coatings sold to Brooklyn Metal Decorating Co. The suit concerns Sanitary Gold Lacquer, M5464, used inside cans that were ultimately filled with a whipped topping by Baker's Whip Top Products Co.

Carborundum Co. purchased the same volume (36,000 gallons) in 1958 as it did in 1957. Of this volume, 6750 gallons was an emulsion paint that went to Munising Paper Co. for use on paper made especially for the Carborundum Co. Fourteen experimental adhesives were developed for Carborundum Co. in 1958 at a cost of $1469. For the first time, we were able to offer a paper belt adhesive with better sanding efficiency than glue.

Research was concluded on the development of an air drying clear finish for aluminum at a cost of $691. While this work was undertaken as an industrial project, the end-product is now being sold as an unlisted trade sales finish for prefabricated aluminum storm sash and doors.

Epoxy resins have found their primary outlet in industrial finishes. We have spent $2752 exploring uses for epoxy finishes, but our commercial production of such finishes has been and continues to be minute.

COMPLAINTS

Fewer complaints were registered in 1958 than in 1957, but the ratio of justified to total complaints remained unchanged. The statistics follow:

Year	Total No. Complaints	Per cent Justified
1958	392	36
1957	417	36
1953	515	35
1948	228	38
1938	239	28

The origin of complaints (by sales organization) in 1958 and the amount and type of settlement follow:

Division	Per cent Total Complaints 1958	1957	1958 Settlements Cash	Merchandise (1)	Total
Canadian	3	8	$ 34	$ 365	$ 399
Central	20	15	310	620	930
Eastern	15	23	273	691	964
Industrial	21	26	881	59	940
Western	41	28	3357	1015	4372
	100%	100%	$4855	$2750	$7605 (2)

(1) Based on estimated average value of $3.93 per gal. (figure supplied by Mr. Wilkinson)

(2) 1957 settlements cost $9110

It cost $7600 in laboratory time to investigate 1958 complaints. The total cost of 1958 complaints in terms of cash, merchandise, and laboratory time was $15,200. This figure excludes time spent by salesmen in investigating complaints, preparing Inspection Reports, and in negotiating settlements.

Justified complaints fell into the following major categories in 1958:

Cause of Complaint	No. Justified	Per cent Justified
Viscosity change, gelation, skinning, lumping, seeding	49	35
Color change in package or after use	23	17
Streaking, flashing, spotting	15	11
Faulty color match	9	6
Drying	8	6
Settling	5	4
Gloss	5	4
Faulty texture of wrinkle finish	4	3
All other	22	14
	140	100%

As in previous years, package changes of one kind or another account for about half of all justified complaints. Viscosity change causes the most trouble. Half of the justified complaints on package color change involved Oil Stain. Flashing complaints were confined almost entirely to House Paint. Settling complaints were half as numerous as in 1957. Mislabeling complaints dropped markedly; only two were registered in 1958. Six justified complaints were caused by faulty tube colorants manufactured by Rockcote.

Fewer than 10% of the justified complaints could have been prevented by closer quality control, or greater manufacturing care. While all complaints on package stability are theoretically preventable, they result from the use of fast drying and inherently sensitive vehicles, without which we could not make modern paint.

Industrial items caused 29% of all justified complaints. Trade sales "paint" items caused only 16% of the justified complaints. Trade sales items other than "paint" caused the remaining 55% of the justified complaints.

PERSONNEL

Separations	1958	1957	1953
Dissatisfied with pay or opportunities	5	6	4
Resigned to enter military service	1	1	1
Resigned for other reasons (health, pregnancy, further schooling, etc.)	7	4	6
Discharged	3	3	3
Died or retired	1	-	2
Transferred to other departments	2	1	-
Total	19	15	16
Avg. number of employees	66	66	61
Separation Rate	27%	23%	26%

Separations increased somewhat over the previous year. As in other years, most separations involved people with less than a year's experience. The death of I. Kalicki ended seven years employment as a finisher in the Enamel Control Laboratory. He was a conscientious and dependable workman.

LABORATORY EXPENSE

Laboratory operations cost 2.6% more in 1958 than they did in 1957. The increase was due entirely to wages and salaries; expenses remained the same as in 1957. Detailed comparisons between these two years, as well as earlier years, follow:

	1958	1957	1953	1948
Research	$137,300	$128,300	$ 69,000	$ 60,800
Sales Problems (Lab. Req.)	74,600	78,500	87,000	60,800
Manufacturing Services	178,000	173,300	144,000	87,800
	$389,900	$380,100	$300,000	$209,400

The figures illustrate how the growing complexity of our products has affected operations at the technical level. During the past ten

years, total laboratory costs have increased 86%, but the amounts spent on research have increased 123%, on laboratory requisitions 23%, and on manufacturing services 102%. A thousand dollar research project was a rarity ten years ago; today, major problems commonly cost $3000 to $5000. Every problem is a research problem today; there are practically no simple problems any more. There are fewer demands for specials (Laboratory Requisition work). Nearly every new product now has to be patiently nursed through the factory.

This trend is most evident in the trade sales field. For each hour that was spent in 1958 in developing one new architectural product, 4 hours were spent on research and 1.5 hours were spent on manufacturing services. The corresponding figures for each new industrial product were one hour for development, another hour for research, and 0.7 hour for manufacturing services.

SUMMARY

	1958	1957
New Products Developed	1,296	1,211
Sales Problems Reported by Laboratory	1,243	1,272
Research Problems Completed	53	59
New Raw Materials Investigated	580	488
Raw Material Shipments Tested	2,538	2,599
Batches Tested - Buffalo	16,463	16,188
Fort Erie	3,221	2,870
Service Calls	105	130
Technical Department Bulletins Issued	39	48
Paint Manufacturing Bulletins Issued	132	54
Label Bulletins Issued	128	75

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