Alvin W. Boese Papers.

Version 3
August 20, 2018

3M COMPANY

MINNESOTA MINING AND MANUFACTURING COMPANY

GENERAL OFFICES • P. O. BOX 33800 • SAINT PAUL, MINNESOTA 55133, U.S.A. • TEL. (612) 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: Filter Masks

cc: A. W. Boese 53-5
G. C. Fisher 220-5E
C. Brix 230-B
G. W. Miller 230-B

October 13, 1971.

TO: B. E. FRANK 53-5

FROM: C. E. MATSON 230-1-3A

Enclosed are samples of two different competitive face masks from Europe along with copies of competitive mask analyses.

This is a result of our recent meeting where we discussed the possibility of using different fibers to make face masks of a heat molded construction rather than the present method we are using.

I hope the samples and the reports are sufficient for you to make up samples so we can determine the feasibility of making face masks with materials which will give us a good product and can be manufactured by heat molding. Also of importance is the lower flammability of the competitive materials in that while they will burn when exposed to a flame, they are self-extinguishing when the flame is removed. We would very much like to see our face masks have the same performance.

Since we are presently working on a feasibility study for making masks in Europe, I would like to ask you do whatever possible to expedite any work necessary to determine whether we can develop materials and the process to produce a suitable mask.

Thank you,

C. E. M.

C. E. Matson

/imh

Encl.

COMPETITIVE MASK ANALYSIS

NO: 2-71

DATE: 5-20-71

JUN 7 1971

NAME OF MASK: Not given.

MANUFACTURER: Minatto (Italy) (Light green)

TYPE OF PROTECTION: Non-toxic particles, nuisance dusts, etc.

MASK DESCRIPTION: (Include Picture if Possible) The mask is of a one piece molded construction with the ribs extending radially from the center of the mask. It is pale green in color and has a light green flat elastic band attached with staples very similar to those used in the #8500. The nose clip is a copper wire vinyl coated and is heat sealed to the mask. Analysis show the mask fibers to be PVC and the binder is most likely a vinyl chloride-methyl acrylate copolymer.

UNUSUAL CLAIMS: (Include Patent Information) No literature provided with the samples.

GOOD POINTS:
a) Disposable.
b) Non-flammable, i.e. self extinguishing when flame removed.
c) Light weight.
d) Maintains shape when wet.

BAD POINTS:
a) Very rigid.
b) Difficult to get a good seal on nose because of rigidity and soft nose clip.

COST: No information available.

DISTRIBUTION: No information available.

ORIGIN OF SAMPLES TESTED: Samples submitted to Mr. C. E. Matson, International Division by D. Sormani - 3M Italy/Milan.

NUMBER OF MASKS TESTED: Five (5) masks sent in: All information taken from past reports on this mask.

REFERENCES:
Problem No: 298254
Patent Notebook: 18337-32
Analytical Report: AR 5930 & 7585
Other: CTAR 3576
Competitive Analysis No. 7 (11-5-65)

COPY LIST: File, Author, Tech. Manager, Supervisor, Lab. Manager, Tech. Director

C.J.Brix

C.E.Matson

SIGNATURE: J. E. Cutlin

COMPETITIVE MASK TEST RESULTS

COMPETITIVE MASK NO: 2-71 NAME: _____

TEST	TEST PROCEDURE REFERENCE	COMPETITIVE MASK	COMPARABLE 3M MASK (# 8500)
1. Total Weight, grams	----	7.6 (average)	3.5 (average)
2. Breathing resistance before Test #4, ▲p, inches of HOH	#3001	.027	.027
3. Breathing resistance after Test #4, ▲p, inches of HOH	#3001	---	---
4. Performance Tests			
A. Nuisance dust arrestance %	#3003	98 (average)	94.7 - 98.1
B. Lead and/or Silica dust arrestance %	Lab Dust Room	---	---
C. Warming ability – average minimum temperature, °F	#4002	---	---
5. Speech Intelligibility	----	Speech coherent, because of mask's rigidity it tends to slide off the nose when speaking.	Speech coherent and mask stays on.
6. Dead air space, cc's	----	55-60	52-59

Tests performed by: From previous testing Date: 6-1-71

FE Cain

COMPETITIVE MASK ANALYSIS

JUN 30 1971

NO: 4-71

DATE: 6-28-71

NAME OF MASK: Not Given.

MANUFACTURER: Of Swiss Manufacturer. (Darker green)

TYPE OF PROTECTION: Non-toxic particles, nuisance dust, etc.

MASK DESCRIPTION: (Include Picture if Possible) The mask is a one piece construction of Dynel which is a modacrylic fiber composed of acrylonitrile and PVC. The sizing agent is an acrylic material consisting of ethyl acrylate and possibly some methacrylate. It is green in color and has almost the exact measurements of the 3M #8500, i.e. the rib design, placement, size, etc., is the same. The nose clip is 5/16" x 3-1/2" and is made of two wires (approximately 1/64" diameter) on each edge with a plastic coating of .015-.020" between them. The elastic is a white, extruded, flat material .030" x 1/8" x 17 Both the nose clip and the elastic are attached with a thin wire staple.

UNUSUAL CLAIMS: (Include Patent Information) No literature provided with samples.

GOOD POINTS:
1. Disposable.
2. Comfortable.
3. Light weight.

BAD POINTS:
1. Staples on nose clip somewhat irritating.

COST: Being sold on the Austrian market for $.03 apiece.

DISTRIBUTION: European market.

ORIGIN OF SAMPLES TESTED: Samples submitted by C. E. Matson, International.

NUMBER OF MASKS TESTED: Two masks tested. One for filtration efficiency and one for analysis. We have requested further samples.

REFERENCES:
Problem No: 298524
Patent Notebook: None
Analytical Report: CTAR 3617
Other:

SIGNATURE: J. E. Cain

COPY LIST:

File	Author
~~Tech. Manager~~	Supervisor
Lab. Manager	Tech. Director
C.J.Brix	~~C.E.Matson~~
J.P.Conery	W.H.O'Brien

COMPETITIVE MASK TEST RESULTS

COMPETITIVE MASK NO: 4-71 NAME: _____

TEST	TEST PROCEDURE REFERENCE	COMPETITIVE MASK	COMPARABLE 3M MASK (#)
1. Total Weight, grams	----	4.0-4.5 (approx.)	3.5 (average)
2. Breathing resistance before Test #4, ▲p, inches of HOH	#3001	.016	.027
3. Breathing resistance after Test #4, ▲p, inches of HOH	#3001	-	-
4. Performance Tests			
A. Nuisance dust arrestance %	#3003	89.4	94.7 - 98.1
B. Lead and/or Silica dust arrestance,%	Lab Dust Room	-	-
C. Warming ability - average minimum temperature, °F	#4002	-	-
5. Speech Intelligibility	----	Coherent	Coherent
6. Dead air space, cc's	----	52-59	52-59

Tests performed by: L. D. Neuenfeldt Date: 6-21-71

A. W. Baese

INTERNATIONAL GROUP

LAB PROJECT

AUTHORIZATION SUMMARY SHEET

Laboratory Involved New Bus. Ventures Dept. No. 0508

Date: Nov. 16, 1971 (discard previous summary dated -)

Total Forecast 19 71 Int'l. Sponsorship for this lab $ -

Previously authorized program(s) $ -

Additional funds to be authorized with attached program(s) $ 1,000

Total $ 1,000

Balance: Uncommitted $

or

Authorized beyond forecast $ 1,000

Prepared by C. E. Matson

INTERNATIONAL GROUP
LAB PROJECT AUTHORIZATION

Originator C. E. MATSON Date Nov. 16, 1971. Project No. 908811

Laboratory Involved New Business Ventures Dept. No. 0508

PROJECT TITLE Service to International - Face Masks.

Technical Objectives

Determine feasibility of manufacturing an acceptable face mask using fibers which can be heat molded and will also not support combustion.

Value Objectives

1. Lower mmanufacturing costs over present methods. (Exact amount unknown until feasibility study completed).
2. Maintain present mask business which is threatened by flame retardant competitive p#oducts, especially in Europe. It is estimated we could lose 10-15% of a $3,000,000 market in Europe in 1972 unless we develop a flamerretardant construction.

Intl. Div. V.P. Mfg.
Domestic Tech. Director

Costs

1. This project is a sustaining activity which will be renewed yearly. Amount to be authorized this year $ ______

– OR –

2. It is estimated that this program will be completed April 1, 1972. Total program cost is estimated at $ 3,000. Amount to be authorized this year. $ 1,000

This project was in this year's Forecast: Yes ____ No X

Approval Signatures: (through $2500, Mfg. Mgr.; over $2500, Tech. Dir.)

W H O'Brien	11-17-71	[signature]	11/22/71
Intl. Tech. Manager	Date	Domestic Tech. Director	Date
[signature]	11/18/71	[signature]	11-19-71
Intl. Mfg. Manager	Date	Intl. Div. Tech. Director	Date

Copies: Originator
Intl. Div. Tech. Director
Intl. Div. Accounting

NOTES:

cc: J. E. Hill - 220-5W

BCC: J. P. Liddell

Form 7804-C

LABORATORY PROJECT/PROBLEM AUTHORIZATION

PROJECT DESCRIPTION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
S	R	V		T	O			I	N	T	L	-	F	A	C	E		M	A	S	K	S							

DEPARTMENT NUMBER

31	32	33	34
0	5	0	8

PROJECT NUMBER

35	36	37	38	39	40	41	42
		9	0	8	8	1	1

COMMODITY ISTRIBUTION

43	44	45	46
8	5	9	1

%

51	52	53
1	0	0

CLASS

47

ORIGINATING SECTION

48	49

EFFECTIVE DATE 11/1/71 AUTHORIZED BY WJ DATE 11/16/71

irc: A. W. Boese

DISTRIBUTION:

ORIGINAL - LABORATORY COST ACCOUNTING - 224-4
CANARY - ORIGINATING
GOLDENROD - LABORATORY COST ACCOUNTING - 224-4

AW Brese - 53-3

Mask Meeting — 1 Dec. 1971

Al, Bert, Vern, Pat, & Burt
Russ Clayton

Price + inflamability

PVC — Cordella, Trilyon

Rando + garnett

Nose clip
Rubber

Acrylics for fill

Problems to resolve

① Mold release
② Fiber selection
③ Equipment selection

Mold release methods

Male + female molds
Thin shell molds – quick cool
Hi pressure – lower temperature

Maybe mold-release – cure in oven.

Dry binder (thermoplastic powder) – maybe thermosetting (to set up very stiff).

Make web first – cut to size – then mold.

Solution blowing – into shaped cavity.

Program (now)

① Make webs of Rhovyl PVC on card – mold at various temperatures (blend of MP + ~~strength~~ (T) variety).
Possibly blend in cellulose acetate (cheaper – higher melting)

50–50 blend ✓ ✓ — T type Rhovyl ✓ + undrawn polyester ✓ + MP type Rhovyl

Dec. 1971

Neb. 908811 - 50 hrs -

Burt. 908811 - 20 hrs -

3M COMPANY

MINNESOTA MINING AND MANUFACTURING COMPANY

GENERAL OFFICES • P. O. BOX 33800 • SAINT PAUL, MINNESOTA 55133, U.S.A. • TEL. (612) 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: Non-flammable Face Mask

cc: G. N. Evans 42-1E
J. Heide 42-1E
G. C. Fisher 220-5E
A. Boese 53-5 ~~42-1E~~
G. C. Fisher 220-5E
R. J. Barghini 230-33

January 13, 1972.

TO: A. E. JOHNSON 42-1E

FROM: C. E. MATSON 230-3

This is to supply you with information requested concerning a need in International for a non-flammable face mask. I have attached pertinent letters relative to this subject, but would like to point out that there has been considerable other activity concerning the need for a non-flammable construction.

In looking at possible ways to produce such a mask, one method was to use fibers which would be heat molded, principally PVC materials. It was also thought that if a heat molding process could be used, it might conceivably result in a lower cost manufacturing process. So while the principal reason for looking at this possible new construction is to obtain a non-flammable product, there is also a possibility of one with lower cost. As you will note in the attached file, the immediate concern is a possible loss of from 10-15% of a $3 million market in Europe in 1972 unless we can develop a flame retardant construction.

Regards,

C. E. M.

C. E. Matson

/imh

Encl.

INTERNATIONAL GROUP
LAB PROJECT AUTHORIZATION

Originator C. E. MATSON Date Nov. 16, 1971 Project No. 908811

Laboratory Involved New Business Ventures Dept. No. 0508

PROJECT TITLE Service to International - Face Masks.

Technical Objectives

Determine feasibility of manufacturing an acceptable face mask using fibers which can be heat molded and will also not support combustion.

Value Objectives

1. Lower manufacturing costs over present methods. (Exact amount unknown until feasibility study completed).
2. Maintain present mask business which is threatened by flame retardant competitive products, especially in Europe. It is estimated we could lose 10-15% of a $3,000,000 market in Europe in 1972 unless we develop a flame retardant construction.

Copies Originator, Intl Div Tech Director, Intl Div Accounting, Intl Div Mfg, Domestic Tech Director

Costs

1 This project is a sustaining activity which will be renewed yearly Amount to be authorized this year $ _____

OR

2 It is estimated that this program will be completed April 1, 1972
Total program cost is estimated at $ 3,000 Amount to be authorized this year $ 1,000

This project was in this year's Forecast Yes ____ No X

Approval Signatures (through $2500, Mfg. Mgr., over $2500, Tech Dir.)

Intl. Tech. Manager	11-12-71 Date	Domestic Tech. Director	11/22/71 Date
Intl. Mfg. Manager	11/12/71 Date	Intl Div Tech. Director	11 9 71 Date

NOTES.

cc: J. E. Hill - 220-5W

MINNESOTA MINING AND MANUFACTURING COMPANY
GENERAL OFFICES • P. O. BOX 33800 • SAINT PAUL, MINNESOTA 55133, U.S.A. • TEL. (612) 733-1110

International Division

INTEROFFICE CORRESPONDENCE

cc: J. G. Liddell
W. H. O'Brien - 230-1S

SUBJECT: Non-Flammable No. 8500
Mask Construction

November 16, 1971

TO: C. E. MATSON - 230-1S

FROM: D. E. HALVORSEN - 220-5E

Dear Chuck:

This will follow up on my letter to you of November 10 concerning our desire for you to go ahead through the New Business Ventures people to hopefully develop the subject mask. Although my letter did confirm that we felt an expenditure of $3,000 was a worthwhile venture, I failed to indicate the sales potential involved and just what we might stand to lose if we don't come up with a mask of this type.

Right now in Europe alone we anticipate in 1972 a potential of approximately 16 million to 20 million masks, or roughly $3,000,000. We would anticipate a loss of approximately 10 - 15% of this business potential if we don't come up with a mask of this type within the next 3 - 6 months.

Hopefully, with these figures in mind, you have even a truer sense of our necessary requirements for a product of this type. Thank you.

Best regards,

Don

DEH/geb

fwd to G. Fisher
return
Hatch - Subs. Ouels

OCT 11 1971

Interoffice Correspondence 3M

Subject: #8500 Mask
Non-Flammable
Construction

cc:
R. J. Barghini
J. E. Corbin
H. R. Courtney
D. E. Halvorsen 220-5E
J. G. Liddell 220-5E
G. W. Miller

October 8, 1971

TO: C. E. MATSON - INTERNATIONAL DIVISION - 230-3

FROM: C. J. BRIX - GIFT WRAP PRODUCT CONTROL - 230-B

The terms non-flammable, or flame retardancy are nebulous in that it is our experience in testing competitive constructions (International) all face masks will burn dependent on conditions. For example; the straight PVC mask (Lombardo - Italy) will burn when exposed to direct flame, but is self-extinguishing when the flame is removed. The straight polyester fiberous mask will ignite, but a longer exposure time to flame is required and the fiber will support combustion. Yet these constructions are considered non-flammable or flame retardant. The use of resin coatings refer to the fiber constructions as being flame resistant.

If flame retardancy is acceptable, modifying the existing fiber formula can be considered.

1. Straight polyester formula: 50:50 binder staple combination. An approximate \$.06/lb. increase in cost or a \$.0004 increase per mask.

2. American Viscose has an experimental flame resistant rayon at \$.85/lb. This approach would require development work; also triple the cost as the standard rayon substitute.

3. Other fiber substitutions that are flame retardant are:

   a) Modified acrylics (Tennessee Eastman - \$1.00/lb).
   b) Acetates (Celanese - \$.45 - \$.50/lb).

   Also the following binders can be checked as possible replacements: vinylidine chloride and acrylic/vinylidine chloride copolymers. All require development work.

4. Another approach is the thermoplastic fibers; polypropylenes, polyvinyl chlorides and flameproof acetates. The use of these fibers could eliminate the need for resins and drying ovens; therefore, presenting an entirely new manufacturing concept for the molded mask program. In addition, these fibers would produce a product that is as non-flammable as the European competitive products; however this approach would require research and development work.

5. The least desirable approach would be the introduction of flame resistant resins; i.e. inorganic salts like ammonium sulfonate or organic phosphorous compounds. The medical products group (Gale Matson) have done some work in this area.

CJB/JW

3M COMPANY

MINNESOTA MINING AND MANUFACTURING COMPANY

GENERAL OFFICES • P.O. BOX 3800 • ST. PAUL, MINNESOTA 55101 U.S.A. • TELEPHONE: 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: Comparative Filter Masks - Non-flammable

cc: R. J. Barghini 230-B-33
H. R. Courtney 230-B-33
J. G. Liddell 220-5E

June 24, 1971.

TO: C. J. BRIX 230-B-33

FROM: C. E. MATSON 230-1-3A

Last year tests were run on a competitive mask from Europe which was non-flammable. This particular mask was called Comasec and was discussed in J. E. Cain's letter to me of June 30, 1970.

We also had a request from the U.K. concerning an incident where supposedly one of our #8500 face masks had caught on fire and this is covered in your letter to me of January 7, 1970.

Recently you have provided information on two competitive masks from Italy. These were the Minetto and the Lombardo filter masks. Good points listed for both of these were that they were non-flammable, i.e. self extinguishing when the flame was removed.

It appears as though more and more of our competitors are building a product which does not support combustion. I would like to ask if there has been any work to make our face masks non-flammable since the last exhange of correspondence concerning this subject. It may well be that we could be forced into making a non-flammable product if competition starts to sell their non-flammable property against our products.

I would appreciate your comments concerning this.

Regards,

C. E. M.

C. E. Matson
/imh

P.S. J. G. Liddell - Graham, in view of the information on these last two competitive face masks, I would appreciate your feeling on this subject.

Interoffice Correspondence 3M COMPANY

Subject: Competitive Masks

cc:
R. J. Barghini
C. J. Brix
G. W. Miller

June 30, 1970

TO: C. E. MATSON - INTERNATIONAL DIVISION - 230-3

FROM: J. E. CAIN - GIFT WRAP LAB - RESPIRATOR DEVELOPMENT - 230-B

The masks which you sent to us are very similar to some which we investigated in the fall of 1965. That mask was of a French manufacture under the trade name of Comasec. Copies of the competitive mask analysis and analytical test reports are attached. Re-evaluation of the mask showed its efficiency, etc., to be the same as in the 1965 report. A new analytical analysis is being run at the present time in the Tape Analytical Lab.

However, our main concern is the product flammability. The only criteria under which we presently test our respirators is the Flammable Fabrics Act using the AATCC (American Association of Textile Chemists and Colorists) test procedure 33. At present we are only approximating this test, due to the lack of a complete equipment set up. The procedure only differentiates between materials which exhibit normal flammability, and are generally accepted by the trade as having no unusual burning characteristics; and materials with rapid and intense burning, and are considered dangerously flammable and unsuitable for clothing. The test defines normal flammability for textiles, to be a burn time of greater than four seconds over a given area.

The #8500 and #1800 (Aseptex) masks were tested by C. W. Matson, Medical Products, and I on April 3, 1970. At that time, we found the #8500 took 16 seconds and the #1800 took 17 seconds to burn over a given area. This burn resulted from a one second ignition from a constant propane flame and then the removal of the flame and a continuous combustion of the mask material for the remainder of the burn period. On June 24, John Garner, Medical Products, and I tested the French mask and found that it would not ignite. The sample would burn when a flame was held to it, but was self extingquishing upon removal of the flame.

The only real conclusion which can be drawn is that, although the #8500 and #1800's are flammable, they are not dangerously so and shouldn't constitute a grave hazard.

J. E. Cain

JEC/jmw

Put in file for 6-26 HES

MINNESOTA MINING PRODUCTS AG

MAY 20 1970

cc. L. Fleury

May 14, 1970//H

TO: Mr. C.E. MATSON - ST PAUL INTERNATIONAL

FROM: C. STAUB - 3M SWITZERLAND

By separate air mail we are sending you today 4 competitive industrial filter masks for lab evaluation. For the moment we only know for sure that these are of French manufacture. Did you hear of a product called something like "Pirey" France? Our medical people have also seen a product of similar shape called "Tepron", by Tenagil, 33 rue de Monceau, Paris 8e. We are still trying to get relyable information.

These competitive masks are heavily sold in our market with an argument that could be very dangerous to our product. They show the customer that 3M masks are inflammable and therefore a safety risk while theirs are not.

Can you please advise what practical arguments we can bring up against this statement.

This matter is very urgent since substantial business is at stakes and we should highly appreciate your prompt comment.

Thank you in advance for your help.

Best regards,

C. Staub

MINNESOTA MINING AND MANUFACTURING COMPANY
GENERAL OFFICES • P. O. BOX 33800 • SAINT PAUL, MINNESOTA 55133, U.S.A. • TEL. (612) 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: New Manufacturing Method for Filter Masks

cc:		
	E. Antonini	220-7W
	R. Barghini	230-B-33
	G. Evans	42-1E
	G. C. Fisher	220-5E
	B. Frank	53-5
	A. E. Johnson	42-1E
	W. R. Ludka	220-5E
	C. W. Pipal	220-5E
	G. Stutzman	220-7W
	H. Walden	53-5
	A. Boese	53-5

January 19, 1972

TO: W. H. O'BRIEN 230-1-3

FROM: C. E. MATSON 230-1-3A

This is to inform you of the status of our International Project 908811 in Department 0508 (New Business Ventures) relative to the development of a flame resistant face mask to be made by a heat molding process.

Initial work done was not too optimistic as the webs made with non-flammable materials were heat sensitive to the point where the molded mask could not be removed from the mold because of low strength at the molding temperature.

To solve this problem, the New Business Ventures people proposed that some type of a shell in the shape of the mold be used to support the molded mask material until it had cooled down and became strong enough to be removed without distorting the shape of the mask. The New Business Ventures people have discussed this with Mr. A. Johnson of our International Engineering group, and discussions have revealed two possibilities. One is to use a metal plating method to obtain a shell to help support the mask, and the other is to use a powdered metal system to make a shell. These possibilities have been discussed with Mr. A. Johnson and we have agreed to go ahead and make up a mold or molds which appear promising in an attempt to see if this method is feasible.

A very interesting feature of this method is that it would lend itself to a new manufacturing method which could give us a less expensive mask using equipment presently available. While this idea is still theory, the Engineering people who have proposed this believe that if the method is successful, it can be used on equipment such as our SCOTCHBRITE makers.

The basic web or matt material would be made on the Rando webber and before the material had to go into the oven areas which could be contaminated, the web would be pulled at a right angle to the web line by a paper sheet after the web is cut into matts. This line at right angles would then operate on the heat molding process with the shells.

Another possibility would be to use the 40" line at Fairmont. Apparently there is a possibility that this equipment could be used to make the basic web and then the heat molding equipment be added to this. This would be an excellent possibility for initiating a new mask line overseas or in the U.S.

I wish to point out that most of these ideas are still nebulous, but hopefully we have an idea going here that could lead to an improved mask at a lower manufacturing cost, and which would be adaptable to present equipment overseas.

Regards,

C. E. M.

C. E. Matson

/ldp

Interoffice Correspondence 3M COMPANY

Have a Good Day

Subject:

cc:
R. F. Clayton
J. E. Corbin
W. H. O'Brien
K. J. Richardson

February 7, 1972

TO: A. W. BOESE - CORPORATE INOVATIVE LABORATORY - 53-5

FROM: R. J. BARGHINI - OCCUPATIONAL PROTECTION PRODUCTS - 230-B

Confirming our telephone conversation of February 3, 1972 the initial research of developing a system to produce a flame resistant molded face mask, as requested by the International Group, will now be sponsored by Occupational Protection Products Laboratory.

Effective February 1, 1972, please use Project Number 257919, rather than the number you have established to recharge International.

In our conversation you indicated a sample of a molded non-flammable face mask should be available by the end of February, 1972 and roughly 2/3 of the allocated $3,000 has been used. When the remainder of the funds have been spent, we request a status report and samples. If we can be of any assistance to you, please do not hesitate to contact us.

Thank you.

RJB

RJB/jw

S W R Thank you See margin note

RECEIVED FEB 4 1972

Interoffice Correspondence 3M

Subject: Non-Flammable Face Masks J. A. T.

February 3, 1972

TO: J. A. THWAITS - EXECUTIVE - 220-4W

FROM: J. E. CORBIN - COMMERCIAL TAPE & GW LAB - 230-2S

Our respirator laboratory is very close to the program initiated by International for a non-flammable face mask.

The initial work toward achieving a solution to this problem must be done on the basic web material. Al Boese's laboratory, the Corporate Innovative Laboratory in New Business Ventures, was established a little over a year ago to serve all divisions in the area of specialty non-woven webs. When Al has developed a web material which meets the flammability requirements and is basically sound as a mask material, we will become involved in producing the finished product. In order to keep the lines of responsibility crystal clear, we will sponsor this work in Boese's laboratory and recharge International. Boese will supply us with progress reports.

Good

We have considered the importance of fire resistance on masks for the U. S. market. Our sales people report that this is not a problem in the U. S., nor are we losing any business because our mask is not fire resistant. Since incorporating a fire resistant characteristic into the mask will increase the manufacturing cost and/or affect its physical properties, we can see no reason to make a move in this direction. We will of course reassess this situation if and when Boese can supply a suitable web.

I should point out that all the people in Boese's department were formerly in our laboratory, so that our relationship is extremely close.

If you have any further questions, please let me know.

J.E.C.

JEC/is

c: A. H. Redpath - R. J. Barghini - W. H. O'Brien - A. W. Boese - K. J. Richardson

This should be checked to ensure we are not missing future market opportunities

Interoffice Correspondence 3M

Subject: Non-Flammable Face Masks

February 3, 1972

TO: J. A. THWAITS - EXECUTIVE - 220-4W

FROM: J. E. CORBIN - COMMERCIAL TAPE & GW LAB - 230-2S

Our respirator laboratory is very close to the program initiated by International for a non-flammable face mask.

The initial work toward achieving a solution to this problem must be done on the basic web material. Al Boese's laboratory, the Corporate Innovative Laboratory in New Business Ventures, was established a little over a year ago to serve all divisions in the area of specialty non-woven webs. When Al has developed a web material which meets the flammability requirements and is basically sound as a mask material, we will become involved in producing the finished product. In order to keep the lines of responsibility crystal clear, we will sponsor this work in Boese's laboratory and recharge International. Boese will supply us with progress reports.

We have considered the importance of fire resistance on masks for the U. S. market. Our sales people report that this is not a problem in the U. S., nor are we losing any business because our mask is not fire resistant. Since incorporating a fire resistant characteristic into the mask will increase the manufacturing cost and/or affect its physical properties, we can see no reason to make a move in this direction. We will of course reassess this situation if and when Boese can supply a suitable web.

I should point out that all the people in Boese's department were formerly in our laboratory, so that our relationship is extremely close.

If you have any further questions, please let me know.

J.E.C.

JEC/is

c: A. H. Redpath - R. J. Barghini - W. H. O'Brien - A. W. Boese - K. J. Richardson

Interoffice Correspondence 3M COMPANY

Subject:

DC: R. J. Barghini - 230-33
A. W. Boese - 53-5
G. C. Fisher - 220-5E
B. E. Frank - 53-5

February 22, 1972

TO: C. E. MATSON - 230-1-3A

FROM: H. B. WALDEN - 53-5

The samples of fibers which you referred to in your letter of January 26 were received and visual examination indicated that none of them were of the undrawn type and therefore, could not be used as a binder fiber.

The sample marked dtex. 1.7/38 M.M. appeared to be very similar to the RM 6265 - 1.5 x 1-1/2 polyester which has been used in production of the 8500 mask. The sample of polyester staple from Bayer although it had no denier or staple length indicated, also appeared similar to RM 6265.

The sample of viscose fiber market FIOCCO LUCIDO Den. 1.5 MM38 is apparently a standard viscose fiber and should be an acceptable substitute for RM 6230. The sample submitted appears to be somewhat more stringy and tangled than normal and for that reason, (if it is representative) may require more opening than normal.

The samples marked dtex 2.4/38MM and dtex 3.3/38MM are probably too large filament size to be a good substitute for RM 6265.

We made up two webs each of the following formulas and molded masks from them.

A. 40% - RM 5470
40% - Viscose - sample - 1.5 x 38MM
20% - Polyester - sample - 1.7 /38MM

B. 40% - RM 5470
40% - Viscose - sample - 1.5 x 38MM
20% - Polyester - sample (Bayer)

As far as we could see, these blends carded and molded about the same as our regular RM fiber and we see no reason why they could not be used as substitutes for RM 6265 and RM 6230.

If you have any questions or would like more work done with these fibers, let us know. We are holding the samples of fibers until we hear from you.

Herb Walden

HBW/ryk

Interoffice Correspondence 3M

Subject: Non-flammable Face Mask
Dept. 0508
Project 908811

dc: R. J. Barghini - 230-BS
P. H. Carey - 53-5
B. E. Frank - 53-5
A. E. Johnson - 42-1

April 10, 1972

TO: A. W. BOESE - 53-5

FROM: H. B. WALDEN - 53-5

Object: To develop a mask construction which will be sufficiently flame retardant to satisfy sales requirements for the International Division.

Report: Work on this project was started during December, 1971 - in the direction of using a flame retardant fiber construction rather than impregnating with flame retarding chemicals.

Rhouyl, which is a thermoplastic, non-flammable P.V.C. fiber, was selected as a binder fiber and some 30 to 40 blends of this fiber in varying proportions with several other fibers indicated that a blend consisting of 70 to 80% Rhouyl and the balance either polypropylene or polyester fiber should meet flammability requirements.

In molding a mask shape with thermoplastic fibers, the major problem is removal of the shape from the mold. The fiber structure remains soft and pliable while hot and cannot be removed without serious distortion.

To overcome this problem, it was suggested that a thin metal shell which would fit closely over the mold be used to support the fiber structure while molding. It could then be removed and cooled. When cool, the fiber shape can be stripped from the metal shell and retains its shape.

Initially, a sheet of aluminum foil was shaped as well as possible over a mask mold to try out the idea. It appeared to work out quite well and at this time, the process was discussed with Mr. A. E. Johnson, International Engineerging, to determine if it might be possible to design molding equipment using this approach. Mr. Johnson was of the opinion that the idea could be worked out and at his suggestion, we had an electro-plated shell made to fit over one of the old style Mask Molds. This mold does not have the ribs as currently used, but we wanted to make the mold as simple as possible to start with.

A number of mask shapes have been molded for testing using this technique and although it is apparent that some modifications are necessary, the basic process idea appears to work out quite well.

H B Walden

HBW/ryk

3M COMPANY

MINNESOTA MINING AND MANUFACTURING COMPANY

GENERAL OFFICES • P. O. BOX 33800 • SAINT PAUL, MINNESOTA 55133, U.S.A. • TEL. (612) 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: Non-flammable Face Mask

cc:	A. W. Boese	53-5
	P. H. Carey	53-5
	J. E. Corbin	230-23
	B. E. Frank	53-5
	A. E. Johnson	42-1
	G. Peel	220-5E
	H. B. Walden	53-5
	G. K. Wille	220-5E
	D. E. Halvorsen	220-5E

April 21, 1972.

TO: R. J. BARGHINI 230-33

FROM: C. E. MATSON 230-3A

Thank you for the copy of the report by Mr. Walden on non-flammable face masks as well as the samples.

Everyone that has seen the samples has been impressed that a good looking mask having flame resistant properties has been produced, and, at least at this initial stage, appears to have promise of becoming a commercial product.

As you suggested in your note to me, we definitely believe that the next step should be to determine a projected cost if this type of mask were to be made on a production basis. I would like to ask that you proceed and request that this cost work be done so that a decision can be made whether to proceed further in the commercial development of a non-flammable face mask.

I would like to take this opportunity to thank those involved in this development work for their initiative and ingenuity in providing these excellent initial samples.

Regards,

C. E. Matson

C. E. Matson

/imh

Interoffice Correspondence 3M COMPANY

Have a good Day

Subject: Industrial Face Mask - Raw Materials

dc: R. J. Barghini - 230-B33
A. W. Boese - 53-5
G. C. Fisher - 220-5E
B. E. Frank - 53-5

TO: C. E. MATSON - 230-3A

FROM: H. B. WALDEN - 53-5

The samples of polyester fibers from Holland and German manufacturers were visually examined and as far as we could tell, all three samples appeared to be similar to our RM 16977 or RM 6265.

Each of the three samples was blended in a 50% proportion with RM 5470 (undrawn polyester binder fiber) and masks molded from the blend.

The two polyester fibers, no. 66573 and 63936 seemed to be very similar to RM 16977 - as far as cording qualities. The sample from Brandes seems to have a tighter crimp and did not open as readily as the others.

A slight difference in color of the molded mask was observed. No. 66573 and the sample from Brandes have a slightly yellowish tint while the 63936 is very comparable in whiteness to RM 16977.

It would seem that any one of these fibers could be candidates as a replacement for RM 16977 or RM 6265 on the basis of these somewhat limited observations.

Samples of the masks molded from these fibers along with some using RM 16977 as a control are being sent to you for your evaluation.

H. B. Walden

HBW/ryk

Interoffice Correspondence 3M COMPANY

Subject: Non-Flammable Molded Mask

May 5, 1972

MEETING MINUTES

A meeting was held in Mr. Barghini's office in Building 230 on May 4, 1972, to discuss what information the International Division would require to conduct a cost estimate of producing a non-flammable mask.

Those attending were Mr. A. W. Boese, Mr. R. J. Barghini, Mr. R. F. Clayton, Mr. C. E. Matson and Mr. H. B. Walden.

1. Mr. Walden will investigate flammability tests on competitive masks and on fiber blends which have been used in making prototype masks. The results should establish the proportion of non-flammable fibers necessary to satisfy the requirements.

2. Mr. Boese will furnish Mr. Matson with the type and specifications of the fibers which are suitable so that current foreign prices can be used in cost estimates.

3. Messrs. Boese and Walden will contact Mr. A. E. Johnson, International Engineering, and obtain some preliminary cost estimates for production equipment.

4. Mr. Walden will have a metal shell made up using the current ribbed shape and make up a number of masks using this shell.

5. Messrs. Barghini and Clayton will conduct tests of the masks molded to be certain they meet requirements of pressure drop, efficiency, etc.

H. B. Walden
Author

dc: A. W. Boese - 53-5
R. J. Barghini - 230-B
R. F. Clayton - 230-B
B. E. Frank - 53-5
A. E. Johnson - 42-1E
C. E. Matson - 230-1S
J. R. Sjolander - 220-11E

3M COMPANY
MINNESOTA MINING AND MANUFACTURING COMPANY
GENERAL OFFICES • P. O. BOX 33800 • SAINT PAUL, MINNESOTA 55133, U.S.A. • TEL. (612) 733-1110

International Division

INTEROFFICE CORRESPONDENCE

dc: J. Anderson - 42-4E
R. J. Barghini - 230-B
A. W. Boese - 53-5
D. J. David - 3M Fairmont
G. N. Evans
B. E. Frank - 53-5
H. J. Heide
C. E. Matson - 230-1S
J. R. Sjolander - 220-11E
H. B. Walden - 53-5

SUBJECT: Non-Flammable Molded Mask

May 23, 1972

REFERENCE: Meeting minutes of May 5, 1972 to discuss what information the International division would require to conduct a cost estimate of producing a non-flammable face mask. (Item 3 of minutes by H. Walden attached.)

The cost of equipment depends upon how the heat bonded mask is produced. For International plants, we may have several equipment configurations depending upon volume and the mix of other non-woven products.

I feel that it is necessary to fully prove out a heat bonding process before any meaningful maker cost estimates are made. Along this line, we should be talking at this time of an experimental project to modify the Fairmont 40" face mask line to produce heat bonded masks. A process proved out on the 40" line would be used to produce masks for sales to definitely establish the market, costs, etc. on this new mask construction before any additional face mask makers are commissioned.

A project to modify the 40" line should receive wide support and top priority. I feel that a meeting should be called to discuss this project; to determine who will undertake the work, and to fit it into the overall planning for additional face mask capacity.

International's primary interest is in obtaining a flame-proof mask which appears to be most economical with a heat bonding process. However, the concept of a heat bonded mask should be of equal benefit and interest to the total 3M Company.

There are several flammability tests and it may be that the ordinary heat bonded mask which is less flammable than the present mask will satisfy International needs, without having to go to the thermoplastic PVC fibers and the additional processing problem of cooling the mask before removal from the heated platten.

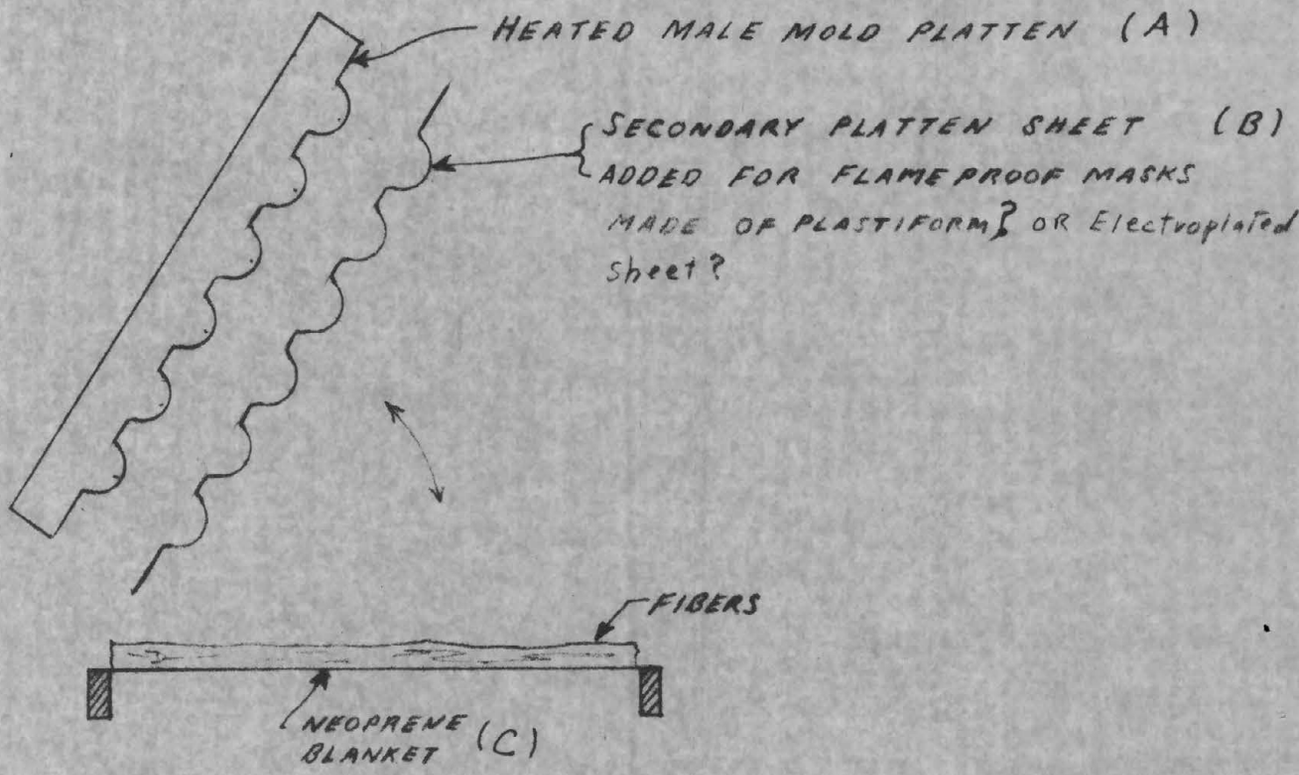
Attached is a schematic sheet which indicates that heat bonded masks would not require any additions to the Fairmont 40" or 60" lines. Flame-proof masks would require a secondary platten sheet as one possibility. I would like to defer estimating project costs pending a more complete project directions.

A E Johnson

AEJ:jmf

Attachment

270.2 Int'l.



REGULAR FACE MASKS ARE MADE USING PARTS A & C WHEN THE PRESS OPENS MASK BATTS ARE REMOVED MANUALLY FROM A AND THEN ARE TRANSFERRED TO A CONVEYOR FOR SOLUTION ADD ON AND OVEN DRYING, AND THEN CONVERTED

HEAT BONDED FACE MASKS CAN BE MADE USING PARTS A & C (ALL POLYESTER WEB CRYSTALLIZES WITH HEAT) WHEN THE PRESS OPENS MASK BATTS CAN BE REMOVED, READY FOR CONVERTING.

FLAME PROOF FACE MASKS MUST BE HEAT BONDED AND BE COOLED BEFORE THE BATTS CAN BE REMOVED FROM THE PRESS. PART B IS ADDED AND REMAINS WITH THE BATT UNTIL COOLED.

ON THE FAIRMONT 60" LINE PARTS A & C ARE IN THE RECIPROCATING PRESS, PART B TAKES THE FORM OF CONVEYOR WIRES, WHICH COULD BE PLATES PART B ARRANGED INTO A CONVEYOR.

AEJ 5-19-72

(1) ~~Loc~~ DN EVANS (2) 270.2 INT.
M.J. HEIDE
C.E. MATSON

Interoffice Correspondence 3M COMPANY

Have a Good Day

Subject: Non-Flammable Molded Mask

May 5, 1972

MEETING MINUTES

A meeting was held in Mr. Barghini's office in Building 230 on May 4, 1972, to discuss what information the International Division would require to conduct a cost estimate of producing a non-flammable mask.

Those attending were Mr. A. W. Boese, Mr. R. J. Barghini, Mr. R. F. Clayton, Mr. C. E. Matson and Mr. H. B. Walden.

1. Mr. Walden will investigate flammability tests on competitive masks and on fiber blends which have been used in making prototype masks. The results should establish the proportion of non-flammable fibers necessary to satisfy the requirements.

2. Mr. Boese will furnish Mr. Matson with the type and specifications of the fibers which are suitable so that current foreign prices can be used in cost estimates.

3. Messrs. Boese and Walden will contact Mr. A. E. Johnson, International Engineering, and obtain some preliminary cost estimates for production equipment.

4. Mr. Walden will have a metal shell made up using the current ribbed shape and make up a number of masks using this shell.

5. Messrs. Barghini and Clayton will conduct tests of the masks molded to be certain they meet requirements of pressure drop, efficiency, etc.

H. B. Walden
Author

dc: A. W. Boese - 53-5
R. J. Barghini - 230-B
R. F. Clayton - 230-B
B. E. Frank - 53-5
A. E. Johnson - 42-1E
C. E. Matson - 230-1S
J. R. Sjolander - 220-11E

3M COMPANY

MINNESOTA MINING AND MANUFACTURING COMPANY

GENERAL OFFICES • P.O. BOX 3800 • ST. PAUL, MINNESOTA 55101, U.S.A. • TELEPHONE: 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: Heat Molded Flame Resistant Mask

cc:	W. H. O'Brien	230-1S
	G. K. Wille	220-5E
	R. F. Clayton	230-B-33
	B. E. Frank	53-5
	J. R. Sjolander	220-11E
	J. E. Corbin	230-2-23

June 28, 1972.

MEETING MINUTES

A meeting was held on June 21, 1972 to discuss the present status and determine future plans involving the development of a heat molded flame resistant mask.

The following were in attendance: R. J. Barghini, A. W. Boese, G. C. Fisher, H. J. Heide, A. E. Johnson, H. B. Walden and the writer.

Mr. Walden has had flammability tests run by Central Research and it appears that about a 60% vinyl fiber is required to obtain a flame resistant mask. He also reported that a 25%/75% polypropylene/vinyl combination gave good flame resistance performance.

We were also informed that Monsanto has announced some modacrylic materials that are supposedly self-extinguishing. These fibers can take 375°F. without shrinkage and can be blended with undrawn polyester fiber on our present mask making equipment. We will obtain samples and evaluate this new material.

New shell type molds with the ridge pattern have been obtained and Mr. Walden will arrange to have sample masks made up with the ridge pattern for Mr. Barghini who will have performance tests run on these samples. Two formulations will be used to make up the matte from which the masks would be molded.

One matte will use 40% 1.7 Denier polyester and 60% 1.5 Denier vinyl fiber. The other matte will use 40% 3 Denier polypropylene and 60% 1.5 Denier vinyl.

../,

These masks will be made and tested as soon as possible to determine whether we have an acceptable construction.

If these masks test satisfactorily, it is then planned to arrange for additional molds so that this process can be checked out at Fairmont, probably on the 40" line.

Mr. Walden was also going to try the production of an all polyester mask at Fairmont to determine what type of product would result with this formulation. There is special interest in this construction as the shell for the #8710 is 100% polyester.

The present cost of the vinyl fiber in Europe is being investigated by the writer, but as yet we have had no reply from our Purchasing people in Europe.

Mr. Boese also was to supply information and samples of undrawn polyester so this information could be sent to Europe to see if there is a source for this material there. This sample and information have already been received and will be sent to Europe immediately.

It is planned to call another meeting within the next two to three weeks to determine the future course, but this will await the results of the performance tests to be run on the masks to be made by Mr. Walden.

C. E. M.

C. E. Matson

/imh

Interoffice Correspondence 3M COMPANY

Have a good day

Subject: A More Fire Resistan
Type 8500 Mask for
International Division

cc:
~~A.~~ W. Boese
A. E. Johnson
C. E. Matson
H. B. Walden

August 8, 1972

TO: R. J. BARGHINI

FROM: R. F. CLAYTON

We received 12 masks from Herb Walden of the Fiber Web group in New Business Ventures. These masks were molded from 60% PVC (Rhovyl) fibers and 40% 3 den polyester fibers; molding was done on a hot mold (electro formed shell). The shell was then cooled and the mask removed (would not strip from hot mold). The masks were tested with respect to tests for the 8500 mask; results are as follows:

Size: Larger than 8500 - This mask ends up almost as large as the mold.

	ΔP (32 lpm	Dust Efficiency	Stiffness	
PVC Mask	.033" H_2O	95.1%	5.6	
			Stiff	Soft
8500	.02-.06	92.0-98.0%	0.0	4.0

A collapse test was made in the dust chamber with a dust load of about 700 mg. per cubic meter of Mg CO_3 .

	Wearing time (minutes)
PVC	15.0 - 17.0
8500	7.0 - 5.0

Finishing: There was no problem in running the masks on the finishing equipment.

Staple Pull Out: 5.0 - 7.0 pounds. This is as good or better than the 8500 mask.

General Appearance: A much better appearing mask. A nice smooth inner surface.

Fire Resistance: Very difficult to ignite with a match; is self-extinguishing at a 45° angle. The 8500 mask burns readily.

12 F Clayton

RFC/jw

3M COMPANY

MINNESOTA MINING AND MANUFACTURING COMPANY

GENERAL OFFICES • P.O. BOX 3800 • ST. PAUL, MINNESOTA 55101, U.S.A. • TELEPHONE: 733-1110

International Division

INTEROFFICE CORRESPONDENCE

SUBJECT: Flame Resistant Filter Mask

cc:		
	H. L. Anderson	218-3
	E. M. Antonini	220-7W
	R. J. Barghini	230-B-33
	A. W. Boese	53-5
	R. F. Clayton	230-B-33
	J. E. Corbin	230-2-23
	F. S. Copeland	218-3
	D. E. Halvorsen	220-5E
	P. E. Hansen	218-3
	G. C. Fisher	220-5E
	A. E. Johnson	42-1
	W. H. O'Brien	230-1S
	A. D. Pearson	220-7E
	G. Peel	220-5E
	H. B. Walden	53-5
	G. K. Wille	220-5E
	H. B. Wistrand	220-7W

August 15, 1972

M E M O R A N D U M

I would like to call the attached report of Mr. Clayton concerning test results obtained on the last lot of heat molded masks to the attention of those not copied in the attached report.

Please note that, based on the tests run, the prototype mask is equivalent or superior in all performance characteristics to the present #8500 except for stiffness. However, in use tests show the prototype mask lasts twice as long.

This would indicate a more comfortable product having a longer use life. I believe this molded approach should be accelerated as much as possible and will call a meeting with those concerned at the earliest opportunity so that decisions could be made concerning future plans.

One very important factor has not yet been determined. This is the availability of a vinyl yarn identical to that used in these evaluations. We have been attempting to get present prices and availability for this material, but do not have this completely resolved. However, we have just received a sample from Germany which we believe will be equivalent to or an acceptable substitute for the vinyl yarn used in the prototype. This material will be tested as soon as possible.

C. E. M.

C. E. Matson

/imh

8/23/62

Check Maker 36762

Japanese

Tevilon
PVC - Rhovyl type Type MP Rhovyl.

Teikoku Rayon Co. Ltd.

5 Mfgrs of PVC fiber in Japan

1960 15 million lbs.

8/31/72

Vinyon

Japan trademark

Embiron
Envilon

Tevilon PVC fiber of Rhovyl type

431

Teikoku Rayon Co. Limited

5 manufacturers in Japan

We need a