Chelsea Center for Recycling and Economic Development
University of Massachusetts

Technical Report # 34

Use of Post-Consumer Resin by Massachusetts Manufacturers
Survey Results

August 2000

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Survey Results

DSM Environmental Services, Inc., Ascutney, Vermont

With support from The American Plastics Council, Arlington, Virginia

Chelsea Center for Recycling and Economic Development Technical Research Program

August 2000

This report has been reviewed by the Chelsea Center for Recycling and Economic Development and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Chelsea Center, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

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The Chelsea Center for Recycling and Economic Development, a part of the University of Massachusetts' Center for Environmentally Appropriate Materials, was created by the Commonwealth of Massachusetts in 1995 to create jobs, support recycling efforts, and help the economy and the environment by increasing the use of recyclables by manufacturers. The mission of the Chelsea Center is to develop an infrastructure for a sustainable materials economy in Massachusetts, where businesses will thrive that rely on locally discarded goods as their feedstock and that minimize pressure on the environment by reducing waste, pollution, dependence on virgin materials, and dependence on disposal facilities. Further information can be obtained by writing the Chelsea Center for Recycling and Economic Development, 180 Second Street, Chelsea, MA 02150.

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EXECUTIVE SUMMARY

The Chelsea Center for Recycling and Economic Development (CCFRED) and the American Plastics Council (APC) have been working together to identify barriers to the use of post-consumer resins (PCR) by manufacturers in the Commonwealth. Their work began with a focus group meeting, hosted by the CCFRED and facilitated by DSM Environmental Services (DSM) on June 23, 1999. Manufacturers representatives were invited to participate to help identify barriers to PCR use by the plastics industry, and to develop methods to overcome these barriers. While the focus group produced some valuable information as to why manufacturers do not use PCR, CCFRED and APC felt that a broader survey of the industry was necessary to determine whether focus group participant input was representative of most manufacturers in the Commonwealth. As a result, CCFRED and APC undertook a mail survey in the fall of 1999 to better identify both the barriers to PCR use and specific measures that CCFRED and other organizations might take to increase PCR resin use in the Commonwealth.

DSM compiled the survey results in November 1999. A total of 18% of 246 targeted manufacturers completed a two-page survey on their use of, and interest in, PCR. The majority of these manufacturers were injection molders that use HDPE, PP or LDPE resins. Twenty-nine percent (29%) of them used PCR in some of their processes. The greatest barrier cited to the use of PCR was customer specifications for virgin resin and the most helpful method cited to increase use of PCR was to educate customers to see that PCR can serve as a substitute for virgin resin.

SURVEY METHOD

APC, CCFRED and DSM developed an introductory letter and two page survey questionnaire directed at manufacturers located in Massachusetts that molded, extruded or otherwise used resins in their processes. This included compounders that sold plastics to end-users. The APC identified a total of 246 manufacturers from their database as appropriate for the survey. Survey packets were mailed to the President or Plant Manager at each targeted company. In almost all cases, the APC had a contact name at the company. The survey packet contained an introductory letter, the two page survey and notes from the June, 1999 focus group meeting (Appendix A).

The survey questionnaire asked manufacturers whether they used, or would use, PCR resins in their processes, and, what were the greatest barriers to PCR resin use. Survey participants could mail or fax back the completed survey to either the APC or CCFRED and inclusion of their name on the form was optional.

Surveys were mailed in late August, 1999. DSM and APC followed up with phone calls to non-respondents in late September through October to solicit a higher participation rate. In some cases, DSM conducted the survey over the telephone with the manufacturer.

RESULTS

A total of 45 manufacturers participated in the survey, or 18% of the manufacturers who were mailed the survey. Of these respondents, 29% currently use some PCR resin. The three primary reasons cited for using PCR resin were:

- customer specifications or demand;
- marketing and environmental benefits; and,
- lower costs.

A total of 73% of surveyed manufacturers used post-industrial regrind, of which 88% used the regrind generated from in-house production. A total of 46% of those who used post-industrial regrind said that they would also use PCR regrind.

Profile of Respondents

The majority of survey participants performed injection molding. Table 1 shows the number of survey respondents using each type of molding process. (Respondents could check more than one molding process on the survey form.)

TABLE 1
Molding Processes Used by Survey Participants

Process	Number of respondents using process	% of respondents using process
INJECTION MOLDING	26	58%
EXTRUSION	9	20%
OTHER	8	18%
CUSTOM MOLDING	7	16%
PROPRIETARY MOLDING	7	16%
BLOW MOLDING	4	9%
THERMOFORMING	2	4%
FABRICATION	2	4%
COMPOUNDING	1	2%

The survey also asked participants to list the types of products they manufactured. Table 2 presents the responses and the percent of total respondents listing each type of product. However, because the survey asked participants to list the products they manufacture, rather than to check specific product categories, there may be some overlap in response categories.

TABLE 2
Types of Products Manufactured by Survey Participants

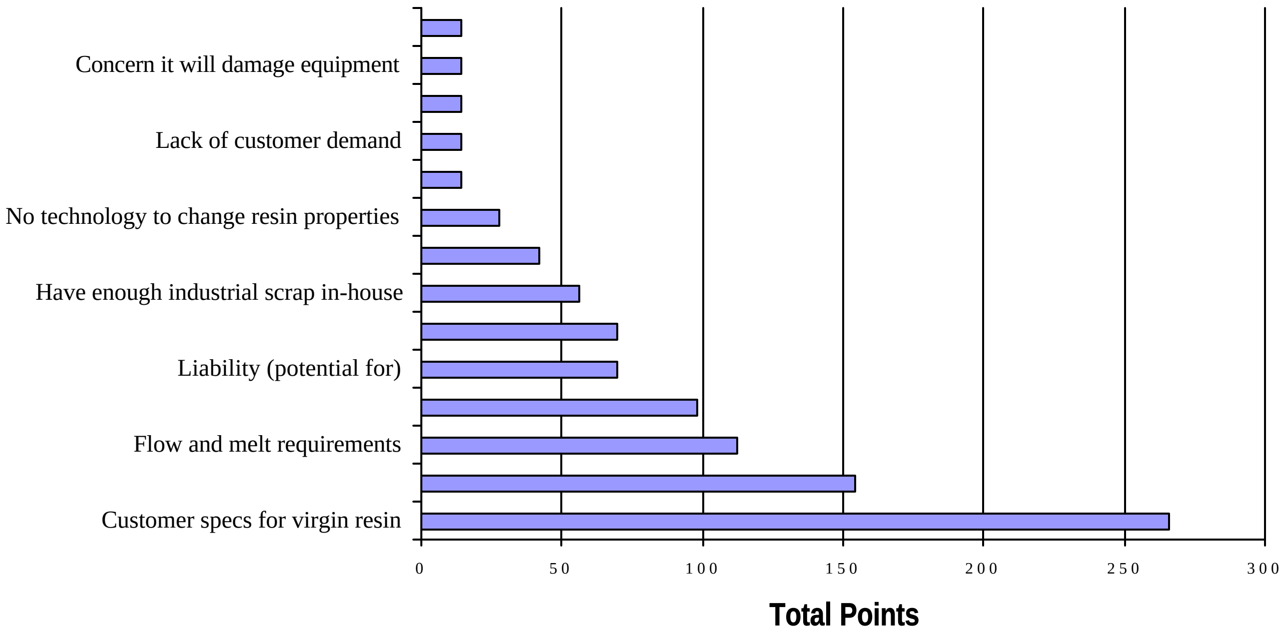
Products	Number of respondents manufacturing each product	% of respondents manufacturing each product
CONSUMER	16	36%
ELECTRICAL	10	22%
MEDICAL AND HEALTH	8	18%
OTHER PACKAGING	8	18%
INDUSTRIAL	7	16%
CUSTOM	6	13%
COMMERCIAL	5	11%
BAGS, SHEET, FILM	2	4%
TOYS	1	2%
MARINE	1	2%
CONSTRUCTION	1	2%

The survey also asked which resins were used by the manufacturers. Manufacturers were asked to check all major resin types that they used. Table 3 illustrates that the majority of respondents use polyethylenes (PE) and PP, with the next largest group using PVC.

TABLE 3
Resins Used By Survey Participants

Resins	Number of respondents using each resin	% of respondents using each resin
HDPE	21	47%
PP	21	47%
LDPE	20	44%
PVC	16	36%
ABS	15	33%
PS	15	33%
NYLON	14	31%
OTHER	14	31%
POLYESTER	13	29%
ACRYLIC	10	22%
PC	10	22%
LLDPE	9	20%
URETHANES	7	16%
SAN	6	13%
EPOXY	1	2%

FIGURE 1
Reasons Why Manufacturers Don't Use PCR



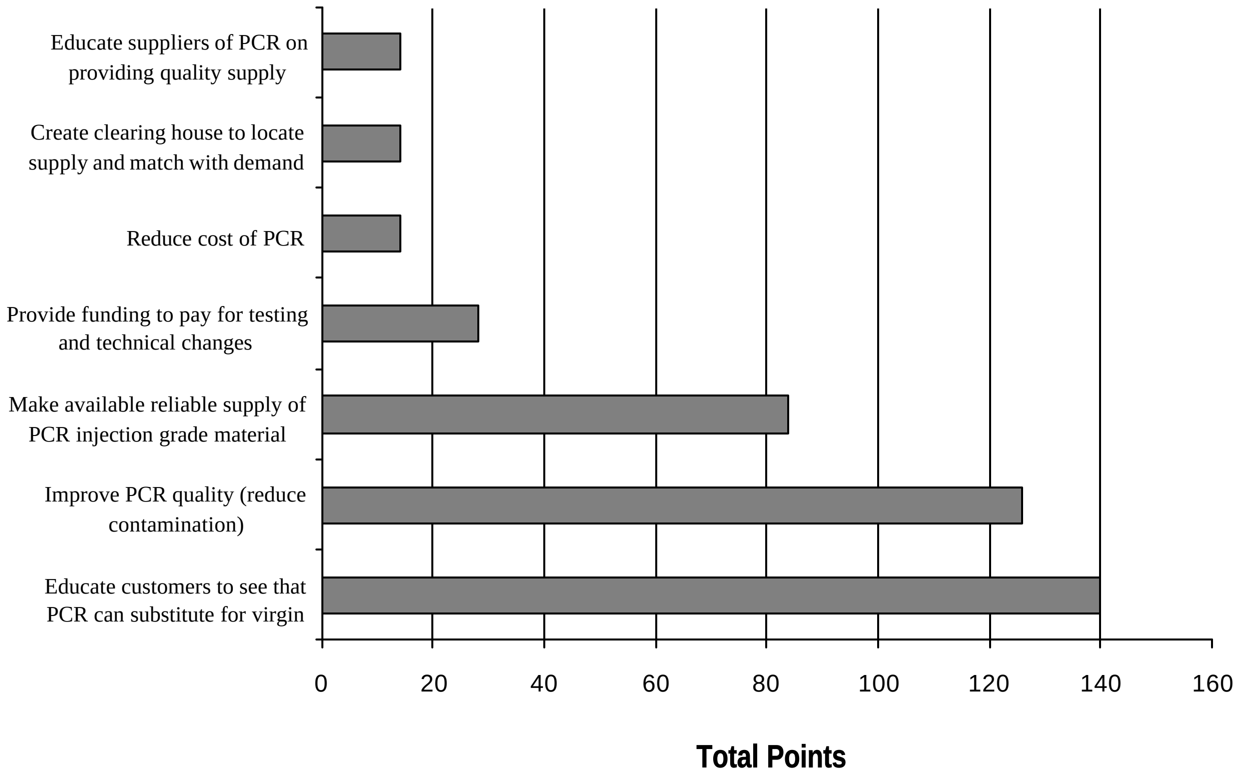
Barriers to Use of Post Consumer Resin

The survey asked manufacturers to rank the reasons why they do not use PCR at all or do not use PCR in all applications. A total of 14 possible barriers to using PCR were listed on the survey form for respondents to rank from 1, being the greatest barrier, all the way down to 14, for the smallest barrier. The reasons listed on the survey form were those cited by Massachusetts manufacturers that participated in the June, 1999 focus group meeting.

Points were then applied to the respondents' ranked reasons. DSM applied 14 points for ranking a reason as number 1, 13 points for ranking number 2, 12 points for 3, and so on. The points were then totaled for each reason/barrier to compare results among categories.

Figure 1 graphically illustrates these results and indicates that customer specifications for virgin resin was the primary reason why most manufacturers did not use PCR. Nineteen respondents (42% of all respondents) marked it as their greatest barrier to use of PCR. The second greatest barrier cited to the use of PCR resin was the quality and contamination level of the available supply. Eleven manufacturers (24%) ranked PCR quality or contamination as the greatest barrier. The third greatest barrier was the availability of post-consumer resin that meet specific melt flow requirements. A total of eight manufacturers, or 18% of respondents, ranked it as their greatest barrier. Finally, seven manufacturers ranked the lack of availability of injection grade material from post-consumer supply (i.e. supply available is predominantly blow mold, bottle grade material) as their greatest barrier.

FIGURE 2
Most Valuable Method to Increase Use of PCR by Manufacturers



Best Methods to Increase Use of PCR by Manufacturers

The survey asked which actions, or methods, would be the most helpful to increase the use of PCR by the manufacturer. Only 30 of the 45 manufacturers filled out this portion of the survey. The survey listed 8 different actions that might be taken to increase manufacturers use of PCR and asked the manufacturer to rank these methods from the most helpful to the least. The ranked methods were then numerically weighted for analysis (as done in Figure 1). Figure 2 shows the results of these responses.

The top ranked method was to educate customers to see that PCR can be substituted for virgin resin in manufacturing with 33% of responding manufacturers choosing this as the number one method. The second ranked method was to reduce contamination and improve the quality of the available supply. A total of 30% of the respondents selected this as the most helpful method to increase their PCR use. The third ranked method was to increase the available supply of injection grade material with 20% of respondents citing this as the most helpful action to increase their use of PCR.

CONCLUSIONS

The PCR use survey conducted had a relatively high response rate for a mail survey, with 18% participation. This higher rate was achieved through follow up telephone calls. However, use of a mail survey instead of a random telephone survey can bias responses. For example, those who had no interest in PCR resin may be less likely to respond.

Assuming that the 18% responding were representative of the plastic manufacturing population in Massachusetts, the most important thing that can be done to increase use of PCR resin is to educate the molders' customers that PCR can be substituted for virgin resins. Customer specifications often dictate that virgin resin is used and in some cases, this is specified in ASTM or other standards. Specifications must be expanded, where feasible, to enable post-consumer resin to be substituted if it can meet the melt flow requirements for molding and durability and other demands of the product. Education might best be accomplished by the CCFRED by:

- working more closely with the State Environmentally Preferable Products Procurement Program and other State officials[1] to alter specifications;
- hosting demonstration projects with manufacturers;
- publicizing successful initiatives; and,
- "getting the word out" to customers of the benefits of PCR.

A related step identified through the survey is to continue to improve the quality of the PCR resin supply. This is more difficult for CCFRED to accomplish because private processors often control available supply. However, because of customer perception regarding PCR's inability to match the quality of virgin resin, improving PCR quality should improve PCR demand and eventually PCR prices. The third ranked action, making available a reliable supply of injection molded material, will require actions focused on both the residential and commercial sectors. This is because the largest, most homogeneous supply of injection molded material is most likely available from commercial activities. This will require an assessment of potential generators and work with independent handlers and reclaimers to collect, clean and grind this material.

Injection grade material from residential sources is also available, although it is a mix of HDPE, PP, PET, and PS. Therefore, it would be necessary to develop collection programs, simultaneous with encouraging MRFs to accept and sort this material, and reclaimers to sort, wash, and grind the collected material. This is unlikely to occur unless Massachusetts can demonstrate a sustainable demand at a price sufficient to lower collection, handling, and reclaiming costs.

Finally, the three top reasons why manufacturers use PCR should also be considered by the CCFRED in analyzing market development strategies. These were: customer specifications for PCR; marketing and environmental benefits; and cost relative to virgin. Other than continuing to achieve collection and processing efficiencies with PCR resin, costs relative to virgin cannot be controlled. However, demanding customer specifications is a reoccurring theme, which could be consistent with the marketing and environmental advantages of using PCR. This area provides the greatest opportunity for CCFRED to work on PCR market development.

[1] The Commonwealth of Massachusetts has already committed significant staff and resources to research environmental purchasing.

APPENDICES

Appendix A

August 10, 1999

Dear Manufacturer:

The Chelsea Center works with Massachusetts manufacturers to increase the use of a variety of recyclable materials. At a recent meeting of Massachusetts molders and converters, barriers to growth in the use of post-consumer recycled plastics were discussed. Meeting participants identified the leading barriers to increased use of recycled plastics as: cost relative to virgin, quality and type of recycled plastic supply, and customer product specifications.

The purpose of the meeting was to identify measures that the Commonwealth (through the Chelsea Center for Recycling and Economic Development and other organizations) should take to reduce the barriers and increase the demand for recycled plastics. Some of the steps identified at the meeting are detailed in the attached summary of the meeting.

However, we still need your help! We need a base of input from the plastics industry in Massachusetts to determine what measures would best help the plastics industry to increase their use of recycled plastics. The enclosed survey details the input we need from you. If you are concerned about confidentiality you can exclude your contact information from your response.

Please take a few minutes to complete the survey. The results will help us to identify what needs to be done to help the State=s plastic industry (i.e. molders, fabricators, compounders) use recycled plastics and advance plastics recycling in the state.

If you have any questions about this survey effort, please feel free to call either of us at the APC at (158) 432-7835 or at the Chelsea Center at (617) 884-4324. To simplify your effort, you can fax back the completed survey to:

American Plastics Council at (518) 426-2276 or
Chelsea Center for Recycling and Economic Development at (617) 887-0399

Feel free to visit CCFRED and APC websites for more information about either organization (*www.chelseacenter.org* or *www.plasticsresource.com*).

We thank you for your participation!

Sincerely,

Jodie Siegel
Chelsea Center for Recycling
and Economic Development

Stephen Rosario
American Plastics Council

CONFIDENTIAL SURVEY

Use of Post-Consumer Resins by Plastics Industry in the Commonwealth

Please complete all questions. Thank you for your participation!

PLEASE CHECK PROCESS USED AT YOUR FACILITY (CHECK ALL THAT APPLY):

BLOW MOLDING	THERMOFORMING	CUSTOM MOLDING
COMPOUNDING	FABRICATION	PROPRIETARY MOLDING
INJECTION MOLDING	EXTRUSION	OTHER: ___________________

PLEASE LIST TYPE(S) OF PRODUCTS THAT YOU MAKE:

____ ____

____ ____

PLEASE CHECK MAJOR RESIN TYPES USED (CHECK ALL THAT APPLY):

ABS	HDPE	NYLON	PP	SAN
ACRYLIC	LDPE	PC	PS	URETHANES
EPOXY	LLDPE	POLYESTER	PVC	

OTHERS, PLEASE LIST: ______________________

1) Does your company currently use post-consumer resins (PCR) in molding? (Please circle) **YES** **NO**
   (*Post-consumer resins are those materials that have been collected for recycling from the residential, commercial and institutional sector and do not include industrial regrind*.)
   If so, what are the reasons why you use PCR?

2) Does your company currently use industrial regrind? **YES** **NO**
   Is it from in-house production? **YES** **NO**
   If yes, would your company consider using post-consumer regrind? **YES** **NO**

3) What are the reasons that your company does not use PCR at all or does not use PCR in all applications? (Rank by placing 1 in box that is greatest barrier and 14 in box which is smallest barrier.)
   - Lack of availability of injection grade material available from post-consumer supply (i.e. supply available is predominantly blow mold, bottle grade material
   - Cost (relative to virgin)
   - Availability of post-consumer resin that meets specific flow and melt requirements
   - Quality and contamination level of available supply
   - Customer specifications for virgin resin
   - Liability (potential for)
   - Perception of poor quality on customer?s part
   - Demand for injection grade vs. bottle grade material
   - Have enough industrial scrap in-house/don?t need any PCR
   - Lack of technology to change resin properties
   - Product quality (can only use 10% or so post-industrial)
   - Lack of customer demand
   - Concern it will damage equipment
   - Other, please list

4) Which of the following would be most helpful to increasing the use of PCR by your business, or getting your business to use PCR? (Rank by placing 1 in the box that is the most helpful measure and 8 in the box that is the least.)

- Reduce cost of PCR
- Change public perception so people are willing to pay more for PCR products
- Improve resin quality (reduce contamination)
- Make available reliable supply of injection grade material (or other type of material than post-consumer bottle grade)
- Create clearing house or exchange service to locate supply and match with demand.
- Educate customers to see that PCR can substitute virgin (in appropriate application)
- Educate molders that they can use PCR or educate buyers of material (industry) where, how to substitute
- Educate suppliers of PCR on providing quality supply
- Provide technical assistance in conversion
- Provide funding to pay for testing and technical changes

5) Do you have problems finding appropriate injection grade material? **YES NO NOT APPLICABLE**

6) Would you be interested in participating in workshops or discussions regarding the use of PCR? **YES NO**

7) Other comments:

OPTIONAL INFORMATION:

NAME: ______________________________

TITLE: ______________________________

COMPANY NAME: ______________________________

PARENT COMPANY: ______________________________

STREET ADDRESS: ______________________________

CITY: ______________ STATE: ________ ZIP: ________

PHONE: ______________ FAX: ______________

OF EMPLOYEES: ______________________________

PLEASE FAX COMPLETED FORM BY SEPTEMBER 30th TO:

American Plastics Council at (518) 426-2276,or
Chelsea Center for Recycling and Economic Development at (617) 887-0399.

FOR MORE INFORMATION, CONTACT:

Stephen Rosario APC Government Affairs Albany, NY (518) 432-7835
Jodie Siegel Chelsea Center for Recycling and Economic Development, Chelsea, MA (617) 884-4324

APPENDIX B

LIST OF THOSE INTERESTED IN DISCUSSIONS / MEETINGS

Name	***Title***	***Company***	***Address***	***City***	***State***	***Zip***	***Phone***
Bob Vaillencourt	General Manager	Plastic Technology	774 Norfolk Street	Mansfield	MA	02048	(508)339-0005
Tim Stuart	VP - Operations	Tyca Corporation	470 Main Street	Clinton	MA	01510	(978)356-5522
Joe Stregowski	Manager, Custom Rotomolding Group	Hardigg Industries	147 North Main Street	S. Deerfield	MA	01373	(413)665-2163 x2109
Larry Johnson	Marketing Manager	Deerfield Urethane	8 Farview Way	Deerfield	MA	01373	(413)665-7010
Wayne Bugley	VP - Sales and Marketing	New England Molders, Inc.	67 Hartford Turnpike	Shrewsbury	MA	01545	(508)842-2002
Joseph Rizzo	Director, Program Management	Nypro, Inc.	101 Union Street	Clinton	MA	01510	(978)365-7078
Joe Nickerson	CEO	Pro Pel Plastech	378 Long Plain Road	S. Deerfield	MA	01373	(413)665-7479
Richard Michelson	VP - Sales/Marketing	Tubed Products, Inc.	44 O'Neil Street	S. Hampton	MA	01027	(413)529-1506
Duncan Cooper		Precision Spools	1510 West Housatonic Street	Pittsfield	MA	01201	(413)
Dan Harkins	General Manager	Brockton Plastics	230 Elliot Street	Brockton	MA	02402	(508)587-2290
Timothy Kuski		Moldmaster Engineering Company	PO Box 1875	Pittsfield	MA	01201	(413)443-4406