PERCEPTIONS OF NEW AND ESTABLISHED WATERFRONT MATERIALS: U.S. PORT AUTHORITIES AND ENGINEERING CONSULTING FIRMS

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ABSTRACT

A demand exists for strong, cost-effective, durable, and environmentally benign building materials for weather-exposed infrastructure applications. In particular, port authority officials and engineers are seeking waterfront materials with a combination of "ideal" attributes that may not be currently available in the marketplace. Materials science advancements related to composite technologies are ongoing, and composite product lines for waterfront applications are expanding. This paper examines the perceptions of U.S. port authorities and engineering consulting firms regarding new and established waterfront materials in decking and fendering system applications. The findings from a nationwide survey indicate that the most important decking material attribute for U.S. port authorities and engineering consultants was *reliable strength,* followed by *resistance to impact, resistance to decay,* and *low life cycle cost.* The most important fendering material attribute for these two respondent groups was *resistance to impact* followed by *high energy absorption, reliable strength,* and *structural design flexibility.* The least important attribute for both decking and fendering was *use of recycled materials.* Material performance comparisons generally indicated a strong preference for concrete decking and steel fendering; composites were perceived as intermediate for both applications. In terms of cost, wood was perceived as the best; composites were perceived as the worst. Knowledge ratings of composite products and the receptivity to new technologies indicated that responding engineering consultants perceived themselves to be both more knowledgeable about composite materials and more progressive in the adoption of new technologies as compared to this study's port authority respondents.

Keywords: Decking, fendering, perceptions, product/market development, end-users, specifiers, composites.

INTRODUCTION

Traditionally, the development of new wood products has not been driven primarily by customer needs, but rather by resource availability, resource cost, and proven technology (Rosenberg et al. 1990; Trinka et al. 1992). There has generally been a resistance to customer-orientation as an organizing principle for new product development and marketing in high technology (Cahill 1994; Trinka et al. 1992). However, a new product's success depends on the relevance of the firm's offerings to the consumers' needs (Busch and Houston 1985). Undeveloped preference structures of new products typically require the firm to establish the relationship between the capabilities of the new technology and the existing needs of target consumers (Roberts 2000).

In addition to understanding customer

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needs, understanding how users, specifiers, and influencers perceive a product on important attributes and relative to competing products is referred to as a product's position (Kotler and Armstrong 1996). Products can be positioned on the needs they fill or the benefits they offer to a certain class of users or directly against or away from a competitor. As shown by Smith et al. (1999, 2000), market research into the perceptions of industrial end-users and specifiers on the relative attribute importance of alternative infrastructure materials can provide valuable information for developing materials and/or product positioning strategies.

Businesses and individuals differ in their openness to new ideas and technologies (Mitropoulos and Tatum 2000). The construction industry is generally perceived as conservative in adopting new technologies (Koebel 1999; Mitropoulos and Tatum 1999). The adoption and innovation of new products, defined as the process by which an innovation "is communicated through certain channels over time among the members of a social system," (Rogers 1995) have been the subject of considerable attention since innovation diffusion theory was introduced into marketing in the 1960s (Arndt 1967; Baptista 1999; Bass 1969; Mahajan et al. 1990; Rogers 1995). Much of the empirical research into the adoption and diffusion of building materials has focused on the home building industry (Fell and Hansen 1999; Koebel 1999; Mitropoulos and Tatum 1999; NAHB 2000) as opposed to industrial applications (Smith et al. 1999, 2000) considered in this study of waterfront applications.

This research examines the perceived importance of waterfront decking[1] and fendering[2] attributes by U.S. port authorities and engineering consultants. In addition, the various materials available for use in these applications are compared among eight select attributes to better understand the relative perceptual position of these materials by end-users and specifiers. This information may guide manufacturers and distributors of new and existing waterfront materials and products in the development of coherent market entry/market expansion strategies targeting these two key user/specifier groups.

Waterfront materials and products

Various combinations of materials are used for waterfront applications to take advantage of the best properties of each material within individual design configurations. Currently steel, reinforced concrete, prestressed concrete, aluminum, plastic, wood, and a variety of composite materials are used. Wood has been the traditional material of choice for many of the individual waterfront components due to its availability, cost, and versatility (Tobiasson and Kollmeyer 1991). However, over 30 U.S. companies now manufacture composite materials for waterfront applications, and the list of product offerings is growing (Anonymous 1999; Anonymous 1996; Craigie 2000; Hudson 1999; Kerber 1999; Knights 1996; Lancaster Composites [brochure not dated]; Lewis 1999; Petru 1999; Pianka 1999; Robinson 1999; Schuyler Rubber Co. [brochure not dated]; Seaward International Inc. [brochure not dated]; Toensmeier 1994; Troutman 1998). U.S. fiber-reinforced composite markets were up 4.9% from 1998 and many wood based composite materials show promise in these waterfront applications (Henriksen 2000).

Increasing marine borer populations, environmental concerns regarding the use and disposal of chemically treated wood in marine environments, and larger service load requirements are factors contributing to an interest in using new engineered materials for waterfront applications. Over the last two decades improved water quality has created flourishing marine borer populations resulting in accelerated decay of many shore facilities (Herszenhorn 1999; Kennedy 1999; March and Jarvis

[1] Components included in decking are the following: decking, bracing, batter piles, bearing piles, pile caps, stringers, string pieces, spacer blocks, step/ladders, hand rails (Malvar 1998).

[2] Components included in fendering are the following: chocks, wales, fenders, camel logs (Malvar 1998).