

STUDY TO DETERMINE LIFE CYCLE COSTING FOR SPORTS FLOORING

A Summary of Findings

Purpose of the Study

The issue of life cycle costing is a critical evaluation criterion for facility owners and managers in the comparison and selection of gymnasium flooring materials. The purpose of this study is to determine life cycle costs for the most frequently specified materials: maple and synthetic flooring. The study was designed and conducted between December 1993 and February 1994 by Ducker Research Company Inc., of Birmingham, Michigan, specialists in industrial marketing research. Funding was provided by the Maple Flooring Manufacturers Association.

Study Objectives: To obtain and evaluate material, installation and maintenance costs associated with maple flooring, PVC and poured urethane flooring.

1. To obtain cost estimates in several forms including per square foot charges and hourly rates with corresponding labor hours for each maintenance procedure.
2. To calculate total annual costs for each type of flooring by cost category:
 - a. Initial cost: total installed cost for a standard floor size of 10,000 square feet, life expectancy, and initial cost amortized over the life of each floor type.
 - b. Major refinishing cost: total refinishing costs for a 10,000 foot floor, life expectancy of the refinished floor and total costs amortized over the life of the floor.
 - c. Cost for daily maintenance: material and labor costs over a one year period.
 - d. Other maintenance procedures: material and labor costs for other procedures that take place throughout the year or the life of the floor.
3. Report total costs associated with each type of sports floor on an annual basis.

Methodology

Total installed costs and maintenance costs were obtained from end users (owners and maintenance personnel at primary schools, secondary schools and colleges/universities) as well as contractors. Contractor interviews were used to verify information obtained from end users since contractors are generally more familiar with current installation and maintenance costs. Information was gathered through in-depth telephone interviews. Unprompted and prompted discussions were utilized to allow for qualitative as well as quantitative responses. In total, 145 interviews were conducted to complete this study as follows:

Interviews Conducted	

<i>Respondent Type</i>	<i>Number of Respondents</i>
Building owners/maintenance personnel	110
Contractors	35
Total	145

Respondent Profile	
-End Use-	
Primary	22
Secondary	48
College/University	40
Total	110

Respondent Profile	
-Region-	
<i>Region</i>	<i>Number of Respondents</i>
Northeast	22
South	24
West	24
Midwest	40
Total	110

Maintenance schedules were found to vary by level of school with primary and secondary schools following less rigorous schedules than colleges and universities. However, for the purpose of this study, annual costs were based on manufacturers' recommended maintenance procedures. Costs were calculated on a per-square-foot basis and expanded to estimate annual costs based on the frequency of each procedure. Square foot charges will not vary by type of school. However, the frequency of conducting any one of the maintenance procedures will vary.

Life Cycle Cost Analysis

Maple Flooring

Based on an average sports floor of 10,000 square feet, annual costs for maple flooring are shown in the table below. For these floors, the following maintenance schedule is common:

- Daily maintenance primarily consisting of one dust mopping*
- Screening, cleaning and recoating conducted on an annual basis
- Major sanding, sealing and resurfacing conducted once every ten years

It is important to note that respondents report life expectancy of maple flooring to average 38 years. This average is used in the calculations below. Annual costs include materials and labor.

Annual Costs Associated with Maple Sports Flooring	
<i>Maintenance Procedure</i>	<i>Annual Cost</i>
Total Installed Cost (Strip Flooring) \$81,300: 38 years life expectancy	\$2,139
Daily Maintenance Dust mopping 174 hours per year @ \$12/hr	\$2,088
Annual Maintenance Screening and recoating	\$2,800
Major Maintenance Refinishing \$10,700: 10 years life expectancy	\$ 845
Total	\$7,872

*Several respondents reported conducting dust mopping more than once a day, but these costs are not factored. A small number of respondents reported cleaning with a damp mop, a procedure not recommended for maple flooring: this cost was not factored into the study.

Synthetic Flooring

This type of flooring is represented by PVC and poured urethane. When evaluating life cycle costing for synthetic flooring, the following recommended maintenance procedures are used:

- Daily mopping, wet or dry
- Bi-weekly scrubbing with a chemical cleaner
- Quarterly scrubbing and recoating
- Annual stripping and recoating

PVC

Annual costs for PVC are calculated on an average life expectancy of 15 years. Respondents report that these floors would be replaced rather than resurfaced after 15 years. Annual costs include materials and labor.

Annual Costs Associated with PVC Sports Flooring	
<i>Maintenance Procedure</i>	<i>Annual Cost</i>
Total Installed Cost \$65,000: 15 years life expectancy	\$ 4,333
Daily Maintenance Mopping 174 hours per year @ \$12/hr	\$ 2,088
Bi-Weekly Maintenance	\$ 1,848

Scrub with chemical cleaner	
Quarterly Maintenance Scrub and recoat	\$ 1,230
Annual Maintenance Strip and recoat	\$ 1,966
Total	\$11,465

Poured Urethane

The major difference between poured urethane and PVC is urethane's 38-year life expectancy when it is resurfaced every ten years. Annual costs include materials and labor.

Annual Costs Associated with Poured Urethane Sports Flooring	
<i>Maintenance Procedure</i>	<i>Annual Cost</i>
Total Installed Cost \$50,000: 38 years Life expectancy	\$ 1,316
Daily Maintenance Mopping 174 hours per year @ \$12/hr	\$ 2,088
Bi-weekly Maintenance Scrub with chemical cleaner	\$ 1,848
Quarterly Maintenance Scrub and recoat	\$ 1,230
Annual Maintenance Strip and recoat	\$ 1,966
Major Maintenance \$32,500: 10 years Life expectancy	\$ 2,566
Total	\$11,014

Total Life Cycle Cost Analysis

When comparing the life cycle cost of maple flooring to that of PVC and poured urethane, maple flooring shows a significant advantage. The life cycle cost of PVC is 42 percent higher than maple flooring. In addition, the life expectancy of one maple floor is two and one half times that of a PVC floor. Assuming a 38 year life span, one maple floor is the equivalent of more than two PVC floors.

Likewise, the life cycle cost of poured urethane flooring is 40 percent higher than that of maple flooring.

Life Cycle cost Analysis (Model: 10,000 Square Feet)

<i>Influencing Factors</i>	<i>Annual Costs</i>		
	<i>Maple</i>	<i>PVC</i>	<i>Poured Urethane</i>
Total Installed Costs (amortized over life expectancy)	\$ 2,139	\$ 4,333	\$ 1,316
Daily Maintenance	\$ 2,088	\$ 2,088	\$ 2,088
Bi-Weekly Maintenance	- - - -	\$ 1,848	\$ 1,848
Quarterly Maintenance	- - - -	\$ 1,230	\$ 1,230
Annual Maintenance	\$ 2,800	\$ 1,966	\$ 1,966
Major Maintenance (amortized over life expectancy)	\$ 845	- - - -	\$ 2,566
Life Expectancy	(38 years)	(15 years)	(38 years)
Annual Cost	\$ 7,872/year	\$11,465/year	\$11,014/year

Qualitative Findings

Installation Costs

The majority of respondents report that synthetic flooring is less expensive to install than maple. However, on a long term basis respondents indicate that maple floors have a longer useful life than synthetic floors. Many respondents report dissatisfaction with their facility's previous decision to contain costs by installing synthetic floors. Moreover, the perception that synthetic floors are comparable in performance and length of useful life is being questioned by end users:

"Even though I know maple floors cost more up front than synthetic floors, I'd rather pay the higher cost. Synthetics do not last and you are either replacing them in 15 years or spending a lot of money refinishing them - if they are salvageable."

End User

Maintenance

Maintaining the finish, durability and aesthetics of maple floors is reportedly easier and less costly. The majority of respondents agree that, despite the disadvantage of yearly screening, cleaning and recoating, the proper maintenance of maple floors is well worth it and pays in the long run:

"I'd much rather have maple floors in our school because I know I can make them last forever by correctly maintaining them. Synthetic floors are a guessing game and they do not last nearly as long as maple floors do."

End User

Perceived Maintenance Concerns		
<i>Maple</i>	<i>PVC</i>	<i>Urethane</i>
Water, moisture damage	Cracks, especially at the edges	Cracks, especially at the edges

Buckling Warping	Gouges/holes Pieces/chunks "fall out"	Gouges/holes Pieces/chunks "fall out"
Expansion/contraction due to climate changes	Damage is irreparable	Applied finishes do not bond with the floor
Finish is easily scratched/marred by street shoes (sand and debris tracked in) Black marks Scuff marks	Floor only lasts 15 or so years and must be replaced No finish to revive the floor	Floor loses its aesthetic appeal No shine Looks dirty
	Surface wear dramatically	Floors develop bubbles and begin to peel
	Floor becomes slippery over time regardless of treatment or finish applied	Surface, when worn, becomes soft and mushy Hard to sweep/mop Shoes stick, causes injuries
		Refinishing is expensive

Major Perceived Advantages	
<i>Maple</i>	<i>Synthetic</i>
Ease of maintenance	Low installation cost
Ideal surface for sports floors	Good surface for multi-purpose events (pep rallies, meetings, some sports)
Less frequent injuries	Floors not as affected by climate changes
Durable finish	
Longevity of finish	

The *STUDY TO DETERMINE LIFE CYCLE COSTING FOR SPORTS FLOORING*, remains on file at the Maple Flooring Manufacturers Association offices in Deerfield, Illinois, and will be made available in its entirety to anyone interested.

[Life Cycle Cost Comparison Worksheet](#)

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