

AATCC Review®

Journal for Textile Professionals

Vol. 10, No. 3 May/June 2010

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Carpet Maintenance for Schools



Carpet Maintenance Strategies for Schools

By Eddie Flicker, District School Board of Pasco County

Carpet has long been the preferred floor covering choice for schools. In addition to enhancing student comfort and safety by reducing slips and falls, carpet promotes good acoustics in a classroom by reducing potentially distracting background noise. Studies find that if properly maintained, carpet results in improved test scores and a more productive learning environment.¹ However, the absence of a quality maintenance strategy can compromise a carpet's appearance and reduce its overall life expectancy.

Carpet pile in high-traffic areas such as entryways, hallways, and areas adjacent to hard-surface flooring will catch, hold, and hide tracked-in soil. Studies show that tracked-in soil accounts for 80% or more of soil in a building.² Without a proper maintenance strategy and appropriate cleaning tactics, this soil can build-up in those areas and spread. Studies call this reaching the “point of equilibrium.”² This catch-hold-hide performance characteristic of carpet can be managed as a blessing compared to hard-surface floors which reflect soil and allow it to spread fast and far.

Case Study: Pasco County School District

The Pasco County School District, Fla., USA uses carpet as a primary floor covering in a majority of its 45 elementary schools and seven administration buildings. Carpet is a secondary floor covering in the county's 30 secondary schools.

At a meeting of school system plant managers in 2004, various members reported similar carpet problems—severe wick back or browning, streaking, reoccurring spots, and a poor overall appearance. In many situations, carpet looked as bad or worse a week after cleaning and managers were forced to replace carpet prematurely. The Pasco County School Board had begun to recommend the replacement of carpet with hard floor surface coverings such as vinyl composition tile (VCT).

In addition to appearance-related issues, many plant managers were experiencing complaints of malodors when just-cleaned carpets were drying. Individuals with respiratory sensitivities found the process irritating, making it difficult for them to breathe. It also caused other adverse reactions such as watery eyes or sneezing.

While the group acknowledged that inadequate training contributed to the issue, it was not the primary source of their carpet maladies. They recognized both the positive impact of carpet on student performance and the importance of maintaining optimal indoor air quality (IAQ). To find a solution to meet both needs, the Pasco County Plant Managers Association Steering Committee began a study involving trials with several different cleaning methods. Its objective was to determine which carpet cleaning method, in its combined effects, removed the most soil from fibers and re-soiled the least while delivering the best-looking carpet that fit within the budget.

Carpet Cleaning Methodologies

To determine the best cleaning methodology, the Pasco County Steering Committee (PCSC) established a cleaning trial protocol to test five different cleaning methods at Pasco's Schrader Elementary School. The methods tested included:

- High-flow wet extraction
- Portable wet extraction
- Low-moisture encapsulation
- Dry extraction (absorption)
- Truck-mount wet extraction

Prior to the trials, representatives from the manufacturers of the selected cleaning methods met at the school and agreed to the test site. They all agreed that all 5 ft × 7 ft test areas were evenly soiled. Test areas were assigned to representatives by drawing lots.

All representatives gathered at the test site for cleaning on the same day. Each representative used his or her respective cleaning method on a section of vinyl-backed, nylon-faced, blueberry-colored carpet that was 10-years-old and heavily soiled. The representatives were instructed that the tests were not a time trial and that they should take as much time as they chose to use. Manufacturer representatives were allowed to use all standard cleaning parameters that applied to their type of cleaning system. To clean carpets at optimal levels, each representative was given the latitude to deviate from these parameters.

Area 1: High-Flow Wet Extraction

In Area 1, representatives vacuumed the carpet in all directions to remove loose soil. After vacuuming, the area was pre-sprayed with an encapsulating wet extraction chemical that was left to dwell for two minutes. Next, the representatives used a counter-rotating, horizontal, twin brush pile-lifting machine, running it in all directions over the carpet. In the final step, the area was wet extracted three times with clear water using a high-flow wet extraction unit. After each of the wet extraction passes, they used the machine to remove as much water as possible by dry-vacuuming the carpet using an additional three passes. The carpet was then left to air dry. The test process was completed by three individuals in 20 minutes.

Area 2: Portable Wet Extraction

Representatives vacuumed Area 2 in all directions using a canister machine without a power-head attachment. After vacuuming, a diluted encapsulating pre-spray solution was applied and left to dwell for 10 minutes. A counter-rotating, horizontal, twin-brush pile lifter was then used to agitate the pre-spray solution into the carpet. Representatives then used a self-contained walk-behind wet extractor with brush agitation to wet extract the carpet three times. It was then left to air dry. The test process took two people and 35 minutes to complete.

Area 3: Low-Moisture Encapsulation

In the third area, the representative vacuum-cleaned the carpet in all directions using an upright machine equipped with a beater brush. The area was pre-treated using an encapsulating detergent solution with no dwell time. Next, the representative agitated the carpet using a counter-rotating, horizontal, twin-brush machine requiring standard number 11 brushes. The area was then left to air dry. The test process took one person and five minutes to complete.

Area 4: Dry Extraction (Absorption)

The dry-extraction process representative used a twin, counter-rotating brush machine to simultaneously vacuum clean and lift pile twice in all directions. Area 4 was then pre-treated with a light chemical mist and allowed a two-minute dwell time. Next, organic sponge-like materials, impregnated with water and chemical, were applied to the carpet and worked back and forth through the carpet pile with the same machine used for vacuuming and pile lifting, with the vacuum function turned off. Next, the vacuum was turned on and used to remove the soil-saturated sponges from the carpet. The process of applying the low-moisture sponges, working them through the pile, and vacuuming the soiled sponges was completed three times. No additional dry time was required. The representative observed that his machine brushes were excessively worn. The entire process took one person 22 minutes to complete.

Area 5: Truck-Mount Wet Extraction

In Area 5, representatives vacuumed the area using an upright machine for four minutes in all directions. For the next two minutes, representatives ran a horizontal single-brush pile lifter over the carpet before vacuuming the area again with the upright



for two additional minutes. Next, they applied a pre-spray treatment, leaving it to dwell for two minutes. The carpet was then scrubbed in all directions using a 175-rpm rotary machine with a nylon brush and then wet extracted using a truck-mount unit located outside the school.

Three dry vacuum passes were made after each wet extraction pass to remove as much water and dirt as possible using the truck mount. Finally, a carpet spotting solution was applied, scrubbed, wet extracted, and rinsed twice—with the three dry passes after each rinse. The carpet was left to air dry. This was the only test area that was also treated with an anti-soiling topical treatment after the cleaning was completed. The representatives applied the anti-soiling treatment, acknowledging that the carpet should be dry for maximum chemical performance. The test process was completed by four people in 35 minutes.

Drying and Re-soiling

On the first day of the tests, only Area 4 was dry. Floor fans were placed in other areas and the HVAC was left on overnight to facilitate the drying process. On the second day, all areas were dry as measured by a digital moisture meter. None of the areas showed signs of wick back or streaking. Each area was again vacuumed according to the respective cleaning system manufacturer's recommendation. All test areas appeared the same in initial results according to the Pasco evaluators.

The test areas were opened to student traffic on the sixth day following a holiday weekend. At the conclusion of the first week of traffic, PCSC determined that all areas retained a similar appearance; however, Areas 3 and 4 seemed brighter. Over the next four weeks, each test section was attended in a manner consistent with the existing carpet maintenance plan for Pasco County schools, which included daily vacuuming and spot removal. Each week, the appearance of each carpet section was evaluated and pictures were taken to record any appearance degradation.

Conclusions

The PCSC concluded that the dry-extraction method yielded the best results and most closely fit the needs of their system. The following observations were submitted by the PCSC:

Carpets were immediately available for use. In schools, maintenance time is precious due to limited budgets and multiple tasks. Dry-extraction carpet cleaning can be completed before, during, or immediately following school hours. Carpet cleaning systems that require dry times limit scheduling flexibility.

Limited time and resources required. The dry-extraction system requires no additional water and only one piece of equipment. Its design reduces the opportunity for clogging or broken components. Once the unit is in place, staff can immediately begin cleaning carpets. After carpets have been cleaned, minimal equipment cleanup is required, further reducing labor, time, and cost.

Reduced cost. Compared to other systems tested, the dry-extraction system requires less labor, training, energy, and water. The system leaves carpets cleaner for longer periods of time, so the frequency of carpet cleaning is reduced. This enables workers to focus on other tasks throughout the school that result in enhanced levels of overall cleanliness. In addition, air conditioners or other drying mechanisms are not required, further reducing energy costs.

Ease of operation. Requiring only one machine that does not use additional water, the dry-extraction system reduces worker strain from setup and cleanup because workers are not required to lift or transport multiple machines. This method also enhances worker productivity and reduces the opportunity for injuries.

Enhanced IAQ. By eliminating extra water in the carpet cleaning process, downtime is reduced along with the opportunity for the development of mold spores. In addition, one manufacturer of dry-extraction methods conducted extensive research that revealed a dry-extraction system can reduce mold spores by 85%; dust mites by 78%, and dust mite allergens by 75%.³⁻⁵

To best accommodate maintenance considerations in schools, the selected carpet care tactics should leave floors available for use while effectively removing soil and allergens, improving IAQ.

Since Pasco schools implemented the dry-extraction system, they have experienced fewer odor-related complaints from students, teachers, and

Table I.
VCT Maintenance Costs

| | \$/ft ² /year |
|---|--------------------------|
| Annual stripping & refinishing | 0.11 |
| Scrub & finish recoating (twice/year) | 0.05 |
| Daily vacuuming, wet mop × 40, spot mop | 0.62 |
| Burnishing (four times per year) | 0.02 |
| Total | 0.80 |

Table II.
Carpet Wet Extraction/Encapsulation Costs

| | \$/ft ² /year |
|--|--------------------------|
| Carpet restoration using annual wet extraction | 0.25 |
| Weekly spot cleaning & quarterly encapsulation | 0.11 |
| Routine daily vacuuming | 0.38 |
| Electrical cost to dry carpet during restoration | 0.02 ^a |
| Total | 0.76 |

^a Pasco is located near Tampa, Fla., USA, where the average outside humidity is 88%. The electrical cost is for a 24-hour period only. In Florida, it may take the school a week to complete wet extraction cleaning.

Table III.
Carpet Dry Extraction Cleaning Costs (Including Restoration)

| | \$/ft ² /year |
|---|--------------------------|
| Initial restoration and maintenance plan including quarterly vacuuming & pile lifting | 0.16 |
| Planned daily vacuuming | 0.38 |
| Total | 0.54 |

Table IV.
Carpet Dry Extraction Cleaning Costs (No Restoration Required)

| | \$/ft ² /year |
|--|--------------------------|
| Planned Cleaning with extensive quarterly pile lifting/vacuuming | 0.09 |
| Planned daily vacuuming | 0.27 |
| Total | 0.36 |

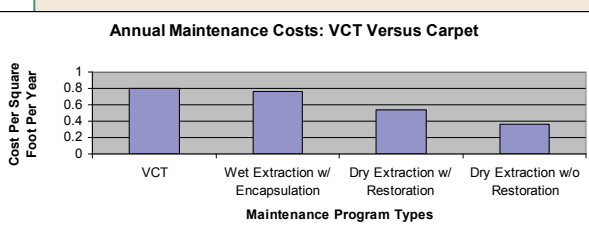


Fig. 1. Annual maintenance cost of VCT versus carpet.

| Carpeted School, New Construction* | Carpeted School, Renovation* |
|---|---|
| 4.3 years to recover cost difference with maintenance savings compared to VCT | 5.28 years to recover cost difference with maintenance savings compared to VCT |
| 9.2 years to recover total cost (including replacement) with maintenance savings compared to VCT | 11.70 years to recover total cost (including replacement) with maintenance savings compared to VCT |

* Figures include new carpet, installation, and maintenance. Calculations are based on renovation costs at the time of the study. Renovation figures also include removal of carpet and floor preparation and the cost of replacement carpet. These figures are based on the carpet used by Pasco. Use of different carpet and installation would have to be calculated separately.

Fig. 2. Cost recovery analysis of carpet installation.

administrators. In addition, the system has afforded greater scheduling flexibility, because plant management staff members are able to clean carpets when students are temporarily out of the classroom for recess or other activities.

School systems present a unique set of challenges when it comes to maintaining the integrity of fiber and yarn systems. Cleaning product and labor expenses, time required, ease of training, and impact on IAQ are all considerations for plant managers determining the best strategy for their schools.

A Closer Look at Costs

To further justify the continued use of carpet and the purchasing of a new carpet cleaning system for the Pasco County School District, a cost analysis for the maintenance and installation of VCT versus carpet was conducted from 2004 to 2008 (Tables I-IV).

The analysis found that while the upfront investment for installed carpet is more than installed VCT, carpet costs a significant amount less to maintain (Fig. 1).

With the savings from its carpet maintenance strategy compared to appropriate VCT maintenance costs, based on its four-year cost study (2004-2008), the PCSC estimates that carpet will pay for itself and its replacement, if desired, in 12 years. This includes the cost of the present carpet, its maintenance, its replacement and the cost of removing the old carpet and reinstalling the new.

Cost Recovery

Up-front costs for the purchase and installation of carpet are more than VCT. However, as seen in



Fig. 2, the overall savings on carpet maintenance versus VCT maintenance costs allows this initial cost difference to be recovered.

The savings on carpet maintenance compared to the maintenance costs of VCT cover the costs of the carpet, its installation and the replacement carpet installed.

Acknowledgements

Thank you to Woody Mader, PhD and Jim Keener who have graciously taken the time to review this paper and assure the accuracy of its content.

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