

Matrixes reveal true costs of flooring, finishes

By Donald R. Thomas

When are flooring and other finish materials selected during the planning, design and construction of surgical suites? Often in the middle—and sometimes at the end—of the project.

Why so late? Because interior materials and finishes generally are viewed as decoration, to be procured with whatever amount of money remains in the larger construction budget near the end of the project.

Yet a strong case can be made for including the materials-selection process during the earliest part of the project's design phase. Used judiciously, such a practice won't necessarily mean that surgical suite interiors will inflate the project's total construction cost. Rather, it can lead to more appropriate product selections while simultaneously helping health-facility owners and architects anticipate overall project costs more realistically.

How? A simple gift of time up front can engender a better, more thorough understanding of the available products, including their functional performance levels and life-cycle economies. The result: Instead of simply relying on past choices or selecting the cheapest products, your health facility will be able to choose the best materials from an array of the best available options.

Team approach. In addition to operating rooms, surgical suites include preparation areas, staff locker rooms and lounges, offices, corridors and storage rooms. Demarcation from one area to another is

typically made through bold signs and subtle transitions in construction finishes.

As a result, building finishes constitute the stage and backdrop of surgery. They are susceptible to surface and structural damage, and they must endure chemical spills and harsh cleaners.

Damaging the physical parts of the surgical suites was the last thing officials at Abbott-Northwestern Hospital, Minneapolis, wanted staff to worry about. "Our people sometimes face life-or-death situations; they shouldn't be hindered by poorly planned facilities or have to worry about banging carts into

walls," says Gene A. Torrey, senior facilities-planning director.

At the 687-bed hospital, flooring materials and other finishes for a recent surgical suite renovation and expansion project were evaluated and tested at the advent of programming and schematic design—long before the questions of "how big?" and "for what specific use?" were even answered. This gave the project team (consisting of facility-management staff, users, architects and interior designers) several weeks to examine a number of products available for floors, ceilings, walls and other finish areas—all before the choice of con-

Surgical suite flooring materials: performance evaluations

Key criteria	Epoxy terrazzo	Sheet vinyl	Epoxy coating	Maximum rating
Sterile properties (10*):				
• Few or no seams	10	6	10	
• Integral base	10	8	10	
• Low porosity	9	6	10	
• Water tightness	9	5	9	
Average rating:**	95.00	62.50	97.50	100.00
Durability (7):				
• Impact resistance	8	6	9	
• Stain resistance	7	6	7	
• Chemical resistance	7	5	7	
• Abrasion resistance	8	7	9	
Average rating:	52.50	42.00	56.00	70.00
Maintenance (3):				
• Ease of cleaning	9	7	8	
• Low maintenance	8	7	9	
• Longevity	10	7	7	
Average rating:	27.00	21.00	24.00	30.00
Aesthetics (1):				
• Color availability	10	6	1	
• Glare control	8	8	4	
• Clean impression	10	8	6	
• Attractive appearance	10	8	1	
Average rating:	9.50	7.50	3.00	10.00
Total weighted rating:***	184.00	133.00	180.50	210.00
Percent of perfect rating:	87.62%	63.33%	85.95%	100.00%

*Weight factor (1 to 10)

**The average of the column's values multiplied by the weight factor

***The sum of the average ratings

Source: Abbott-Northwestern Hospital, 1993

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struction methods helped narrow the finish options.

Why did the team bother to formalize the materials-selection process and make it an up-front priority? Two key reasons: the pressing need for highly functional surgical suites and the desire to reduce long-term maintenance and replacement costs.

To help define "functionality," the project's architects recruited a 15-member materials and finishes "sub-team" from Abbott-Northwestern's 200-plus member surgical staff. The sub-team evaluated the hospital's existing surgical suites, toured the facilities of other Minnesota hospitals and were asked to describe their ideal surgical environment.

Sub-team members' concerns ranged from the style and the location of door handles to the level of glare from wall materials to the overall use of light, color and texture. Above all, they were able to pinpoint the materials and finishes that, for them, best seemed to enhance function.

Dark-colored flooring under and around surgical tables, for example, would hide blood and betadine stains, yet certain gradations of black would allow staff to more quickly locate dropped needles and other small surgical instruments.

Stringent criteria for sterile properties, durability, maintenance and aesthetics further narrowed the sub-team's preferences to much more manageable numbers. Options for the surgical suite's floors, for example, included terrazzo tile, sheet vinyl and epoxy-coated materials.

Wall options, meanwhile, included structural glazed facing tile with epoxy mortar, glazed or matte ceramic tile with epoxy grout, vinyl wall covering with protective coating, and epoxy or enamel painted plaster or gypsum board. Various ceiling options included acoustical

Surgical suite flooring materials: life-cycle costs

Key criteria	Epoxy terrazzo	Sheet vinyl	Epoxy-coating
Initial cost:	\$0.620*	\$0.224	\$0.356
Replacement cost:	0.000	0.444	0.398
Maintenance cost:	0.832	1.110	1.110
Total cost (per square foot per year):	\$1.452	\$1.778	\$1.864
Total cost (per year**):	\$14,520.00	\$17,780.00	\$18,640.00
Total cost (over 20 years):	\$290,400.00	\$355,600.00	\$372,800.00

*Per square foot per year

**Based on 10,000 square feet and 1,600 lineal feet

Source: Abbott-Northwestern Hospital, 1993

ceiling board or gypsum board with an epoxy paint finish.

Miscellaneous finishes for corner guards, wall-guard rails, column covers, wall bases and door frames and door finishes included stainless steel, Acrovyn, kydex, wood, plastic laminate and painted metal.

Matrix fix. Faced with all these choices, the architects developed product matrixes for each type of finish material. Each matrix contained this critical information for comparison purposes:

- Four key criteria (sterile properties, durability, ease of maintenance and aesthetics) identified by team members after visiting five hospital surgical suites in the Twin Cities metropolitan area
- Criteria weight factors (from 1 to 10, with 1 being not important and 10 being very important)
- Product-characteristic ratings (from 1 to 10, with 1 being poor and 10 being excellent)

From this subjective information, objective product calculations can be made and compared. Product-characteristic ratings, for example, were multiplied by the appropriate criteria-weight factor and then divided by the number of subcategories within each criteria category to establish an average.

The resulting averages were then compared with the maximum rating available in each category. Ultimately, finish materials were selected based on how well they met established criteria as well as how well certain types of materials had performed in the past.

Moreover, such a rational approach will help justify surgical suite expenditures, making them much more palatable to top facility officials, who control the project's purse strings.

Floor materials, typically the most expensive material in surgical suites, provide a good illustration of the matrix-based system that's described here. The figure on page 62 shows a sample matrix for floor materials.

As the data illustrate, epoxy-coated flooring received the highest ratings for sterility and durability, but terrazzo received the highest ratings for maintenance and aesthetics. In the end, though, terrazzo tallied 87.62 percent (out of a possible overall score of 100 percent), epoxy-coated flooring scored 85.95 and sheet vinyl racked up 63.33.

Similar matrixes were developed for wall and ceiling options. But even all of this information is only a starting point; life-cycle costs must be examined, too.

Life-cycle costs. Life-cycle cost data must be based upon variables that may be hard to pin down. Some flooring, for example, requires different types of substructures or substrates; and remember that inflation will vary over time.

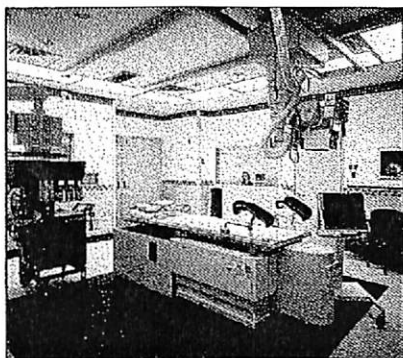
With Abbott-Northwestern's surgical suite project (10,000 square feet of space and 1,600 lineal feet of partitioned space), officials projected life-cycle costs, assuming a 20-year time frame, a 4 percent average annual inflation rate and no financing costs. Some technical infor-

mation (such as typical maintenance costs) was obtained from the manufacturers of the products being evaluated.

The results? As the figure shows, high-quality materials, although they may cost more up front, really are more economical in the long run. Epoxy terrazzo, for example, initially costs almost three times more than sheet vinyl. But after considering the average life span of the material and allowing for its maintenance and replacement, epoxy terrazzo remains a competitive alternative.

"With the amount of cleaning and maintenance that's required for surgical suites, it can be hard to get enough cleaning people in the department's annual budget," Torrey says. "So it's important to go beyond initial construction cost by planning ahead for maintenance, repair and eventual replacement."

Ultimately, Abbott-Northwestern officials chose floors of terrazzo;



Subtle transitions in flooring and other finishes demarcate different areas of surgical suites.

corridor walls with a vinyl covering and a matte ceramic tile wainscot; operating-room walls of floor-to-ceiling matte ceramic tile; corridor ceilings of acoustical tile; and operating-room ceilings of painted epoxy. Other finishes include painted metal doors with Acrovyn protection.

The "design theme" or color palette includes a combination of

white, gray, blue and black—as well as a multicolor border at the top of the wainscot and at ceiling height.

"We hope that we've put enough quality into the floors and walls that our solution will last 20 years or more with only moderate attention," Torrey says.

He offers this advice on selecting finish materials to health-facility managers who are planning renovation and/or new-construction projects at their institutions: "Performance is a priority; pretty is a bonus. Base decisions for materials and finishes on function first and aesthetics second."

And finally, involve the finance, surgical and maintenance staffs early enough in the project so that everyone appreciates the project's total life-cycle costs rather than just its initial costs. As with surgery itself, Torrey notes, timing is critical to success. ■