DEFERRING NOW COSTS YOU LATER

PREVENTIVE MAINTENANCE: IMPROVING FACILITIES CONDITIONS AND DECREASING DEFERRED MAINTENANCE
Introduction

Across the U.S., schools are working to keep their facilities in good condition, but a critical aspect of the equation is often forgotten - preventive maintenance. Preventive maintenance (PM) has become a ‘nice to have,’ not a ‘must have.’ School buildings nationwide are in threat of failing, new buildings are not well maintained, and capital investments are being compromised.

As budgets increase and schools reallocate funds, experts are seeing operational funds allocated toward teacher salaries and smaller classrooms; however, research suggests decreasing the backlog of deferred maintenance should be a top priority. Studies show that there is over $500 billion in deferred maintenance in U.S. schools. This number will continue to grow if the focus isn’t shifted to preventive maintenance and decreasing the backlog of deferred maintenance.
Let’s Do the Math

Currently, U.S. schools occupy around 6.6 billion square feet of facility space. If it costs about $204 per square foot to build a new school, then the current replacement value (CRV) of every school in the U.S. is $1.3 trillion. Assuming each building has a 50-year lifespan, about 2% of the CRV should be re-invested in each building every year to maintain the forecasted lifecycle. Using this math, $26 billion is needed this year in capital expenditures for building repairs and replacements. Every year this sum is deferred, it will increase due to inflation and further deterioration of the buildings. In addition, not completing the recommended amount of preventive maintenance each year can also reduce your systems’ lifecycle by as much as one-third.

A school’s facilities is one of its largest assets within the capital budget, therefore, regularly re-investing in it with scheduled maintenance can mitigate some budgetary constraints. Research has shown that 80% of facility’s maintenance issues can be addressed by performing preventive maintenance on only 20% of the facility’s systems. Reducing the risk of system failure is not only efficient and cost-effective; it provides a safer and more conducive learning environment.

It’s easy to prioritize other needs over facility needs, but think about it this way: If you don’t have a roof on your home, or your air conditioning system went down in the middle of a hot day, how much focus would you put on cooking dinner that night? Likewise, if a building fails or a major system goes down, how can we expect our students and staff to focus on learning? A lack of preventive maintenance compromises the overall mission of any organization, especially education. Consider the $100M+ investment that was made toward your learning environment. Preventive maintenance is an incremental investment that can use a school’s operational budget to protect the assets critically needed for an adequate learning environment. Proper preventive maintenance ensures the optimal life of equipment with minimal costs, therefore maximizing the core mission of the institution.

Methodology

To evaluate preventive maintenance further, SchoolDude examined data from thousands of educational institutions using SchoolDude’s cloud-based solutions for work order management and preventive maintenance. SchoolDude has gathered a wealth of data by serving over 6,000 educational institutions across the U.S. for many years. Since each client is served from SchoolDude’s data center, we are in a unique position to use our unique ‘data-mining’ tools to obtain insight into how the best schools are doing with preventive maintenance.

The purpose of this study was to find organizations that have excelled in implementing a preventive maintenance program and to compile data on the actual cost and energy savings they have seen.
The study further delves into a sampling of 15 “PM All Stars,” who are leading performers in the area of preventive maintenance. To qualify as a PM All Star, a school must complete a minimum of .7 work orders per student. They must also show a minimum ratio of 30% preventive maintenance to 70% corrective maintenance. Data showed that the PM All Stars have a minimum work order completion rate of 83% and have a minimum preventive maintenance completion rate of 90%.

Recently, SchoolDude interviewed these 15 PM All Stars in a roundtable format at SchoolDude’s annual user conference. The roundtable consisted of private colleges, public K-12 districts, public universities, independent K-12 schools and even a representative from the YMCA for a different perspective on PM. Locations of schools were nationwide and represented all regions of the country.

Our PM All Stars panel consisted of:

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<thead>
<tr>
<th>Organization</th>
<th>Panelist</th>
<th>State</th>
<th>Student Size</th>
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<tbody>
<tr>
<td>Beaufort County School District</td>
<td>Robert Luebke</td>
<td>SC</td>
<td>19,500</td>
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<tr>
<td>Central Methodist University</td>
<td>Herman Fortman</td>
<td>MO</td>
<td>1,100</td>
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<td>Coppell ISD</td>
<td>Louis Macias</td>
<td>TX</td>
<td>10,000</td>
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<td>Elgin Community College</td>
<td>Cal Byrd</td>
<td>IL</td>
<td>12,000</td>
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<tr>
<td>Elmhurst College</td>
<td>Paul Lund</td>
<td>IL</td>
<td>3,000</td>
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<tr>
<td>Indiana Wesleyan University</td>
<td>Mike Cooper</td>
<td>IN</td>
<td>15,000</td>
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<tr>
<td>Indiana Wesleyan University</td>
<td>Randy Dewing</td>
<td>IN</td>
<td>15,000</td>
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<tr>
<td>IslandWood</td>
<td>Dean Newcomb</td>
<td>WA</td>
<td>4,500</td>
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<tr>
<td>Le Moyne College</td>
<td>Pat O’Neill</td>
<td>NY</td>
<td>3,500</td>
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<td>Little Rock School District</td>
<td>Kevin Yarberry</td>
<td>AR</td>
<td>26,000</td>
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<td>Mullica Township</td>
<td>Randy Ficken</td>
<td>NJ</td>
<td>700</td>
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<td>Old Dominion University</td>
<td>Frank Thrift</td>
<td>VA</td>
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<td>Park Hill School District</td>
<td>Jim Rich</td>
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<td>Prince William County Public Schools</td>
<td>Edwin Zelek</td>
<td>VA</td>
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<td>River Vale Board of Education</td>
<td>Ken Peterson</td>
<td>NJ</td>
<td>1,400</td>
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<td>YMCA of Greater Houston</td>
<td>Stuart Duke</td>
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They shared their insight into the importance of preventive maintenance in their schools, campuses, and districts, why preventive maintenance is a priority for their department, and how they have achieved success and buy-in throughout their school and administration to perform preventive maintenance. This whitepaper will review:

- The importance of preventive maintenance to maintain your assets and prevent deterioration
- How to get started with a PM program in your department
- Additional key resources that can help you get started
Why is PM Important?

Though every school is different, the common thread among all of our PM All Stars was that preventive maintenance is critical to:

- Save money and reduce emergencies
- Reduce lifecycle costs
- Improve customer service
- Increase energy efficiency of buildings and equipment
- Improve safety and reduce risk

SAVE MONEY AND REDUCE EMERGENCIES

A preventive maintenance program reduces an institution’s unexpected costs and disruptions. Reducing the cost of corrective and emergency maintenance brings dollars back to schools’ operating budgets and allows the maintenance and facilities department to focus on other critical areas of need.

In a comprehensive study with schools performing PM, PM All Stars realized a 50% to 65% reduction in the rate of emergency work. PM All Stars in higher education institutions saw a 51.5% reduction in emergencies and work orders costs were reduced by 37%. All Stars in K-12 saw a 64.5% reduction in emergencies and work order costs were reduced by 28%. Studying this data over time, the amount of corrective work needed over time was reduced by 16% in institutions with a solid PM program.²

PM COMPLETION % RESULTS

Based on data collected, the top performing All Stars showed a minimum completion percentage of 90%.

WHO IS A PM ALL STAR?

- More than 30% of maintenance resources are allocated to PM work.
- Average completion rate > 98%
- History of 3+ years of PM data
Our roundtable of All Stars commented on just how important PM is in their school or district to reduce costs and emergencies. Paul Lund of Elmhurst College said, “Equipment lasts longer if we get to that equipment before it breaks.”

Randy Ficken, Director of Facilities at Mullica Township, spoke about the importance of having a PM schedule, which ensures work gets completed and saves his district money.

“A work order is stamping out the fire; PM is caring for the equipment. If you care for the equipment, it lasts longer. Corrective maintenance handles emergencies, but you put a schedule in and it never is forgotten. What’s nice about PM is it’s always on a schedule and our long-term budget is saved.”

As Ken Peterson of New Jersey’s River Vale Board of Education noted, “Our philosophy has always been it’s easier and cheaper to maintain than to replace.” The data certainly supports that.

REDUCE LIFECYCLE COSTS

Preventive maintenance can significantly extend the life of equipment and systems. This can reduce the cost of replacements and deferred maintenance as well as provide better visibility into capital needs and planning.

Research shows it costs $4 long-term to remedy every $1 saved by deferring maintenance now. Preventive maintenance can help systems, equipment, and buildings last longer, resulting in less costly repairs and delays in replacement needs. For example, a PM program can extend the life of a roof by 30% and repairs for an HVAC unit can costs 3 to 4 times more than PM costs. Not only are these equipment pieces costly; they affect student performance. If a room is too hot or cold due to a non-working HVAC system, student and faculty learning will be disrupted. Louis Macias with Coppell ISD in Texas noted:

“With budget cuts, we have to maximize the life of our equipment...a preventive maintenance program is our focus and what we plan around with maintenance and facilities.”
Some schools have board mandates around their capital costs and projecting these needs. Randy Dewing from Indiana Wesleyan University spoke to his university’s mandate:

“We have a board mandate to project capital replacement costs of facilities 30 years out with a goal of always having money on hand for needs in the current calendar year to deal with those replacements. With predictive work…it doesn’t take much looking at the data to see that any extension to the life of the equipment we can achieve has drastic effects on total lifecycle costs.”

All of our PM All Stars see the importance of PM for capital planning to ensure they maximize the life of equipment and reduce long-term costs as much as possible.

IMPROVE CUSTOMER SERVICE

Having a PM program in place can improve customer satisfaction. Many PM All Stars noted improvements in customer service due to the higher level of accountability and transparency that a PM program brings. With well-running equipment and attractive facilities, All Stars interviewed mentioned their customers are happier and students and faculty can work better in a well-maintained environment, resulting in a positive effect on learning and achievement.

Stuart Duke, A PM All Star at YMCA of Greater Houston sees the impact PM has on customer satisfaction daily:

“Memberships go away if equipment doesn’t work, i.e. treadmills and other cardio equipment. My department must keep them up and running and be proactive to not upset members. As a result, we do PM on a monthly basis.”

While the YMCA is a nonprofit service organization, this mindset can transfer to schools – well-running equipment and facilities leads to happier customers and end users. Indiana Wesleyan University, for example, sees the importance of reducing costs; however, keeping customer complaints minimal is equally important. Mike Cooper said:
“Our goal everyday is to wipe out all complaints and make sure everything is functioning...we’re trying to preempt the unexpected and the cost is much less if we catch issues prior to breakdown.”

Little Rock School District’s Kevin Yarberry expressed the importance of increasing efficiency while still keeping customers satisfied and limiting classroom disruptions by completing work when students and faculty are not in the buildings:

“We take a proactive approach...we work behind the scenes and try not to fix something at an inopportune time. We often try to schedule repairs and maintenance work around Spring break, Winter break, or Summer break when students and faculty are not there. PM helps with this a great deal.”

INCREASE ENERGY EFFICIENCY OF BUILDINGS AND SYSTEMS

Energy expenses can make up over 30% of a school’s operating budget. By reducing this with better PM practices, schools can see money return to their budget quickly. Research shows PM can yield 10% energy savings from the HVAC system alone. Based on AS&U average energy costs per student in both K-12 and Higher Ed, educational institutions can save $10-$16 per student annually in energy savings with a solid PM program.

IMPROVE SAFETY AND REDUCE RISK

PM ensures life safety mandates are met in schools. Many maintenance and facilities departments start PM programs by focusing on life safety needs first to ensure student wellness is the number one priority. The majority of our PM All Stars were in agreement that the first place they started their PM program was life safety, followed by major equipment items like the HVAC system.

Along with safety, risk and insurance claims are also a major issue for institutions. Schools with effective PM programs saw a 70% reduction in insurance claims and these claims were less severe than those without a PM program in place. To reduce risk and liability, regularly scheduled PM should focus on areas such as life safety equipment and playground equipment.
How do you start a PM program?

Preventive Maintenance is critical to perform regularly, but it can be a daunting task to begin. Here are four simple steps for beginning a PM program at your institution based on feedback from our PM All Stars.

**STEP 1: DETERMINE YOUR PM PLAN AND PM SCHEDULES**

Put together a plan for how your department will conduct preventive maintenance. This includes how much staff is needed, what equipment you will start with, how to determine schedules, and a roll-out timeline.

If you are determining how much staffing is needed, be sure you know the age of your buildings. An industry rule of thumb based on Facility Masters conferences indicates that buildings that are new to 10 years old should have one maintenance staff per 85,000 square feet. For buildings 30 years or older, there should be one maintenance staff member per 60,000 square feet. Performing preventive maintenance can also help you increase the square footage that staff and technicians can cover, ensuring a high ROI.

Our PM All Stars agreed that when beginning a PM program, start with life safety equipment first and develop safety inspection schedules. Then, move on to other large systems and equipment, such as HVAC and roofing. When deciding what equipment to start with and how to develop the schedules, work closely with your maintenance team. They have the best first-hand knowledge of what checks are needed for each system and equipment piece. Determine together what is reasonable. By getting your team’s buy-in, they will be on board with the plan for implementing a successful PM program and will understand the necessity of PM to keep buildings running at an optimal level.

PM All Stars recommend rolling out your PM implementation in phases to ensure it is achievable and sustainable, though their plans differed. Dean Newcomb with IslandWood divided his campus into 3 quadrants and phased in one quadrant at a time, rather than by equipment or rooms, to simplify the number of work orders per quadrant. Paul Lund of Elmhurst College emphasized that starting slowly was how they achieved success in their PM program:

“We started with just one piece of equipment, the HVAC system, and developed a schedule for that piece. We then continued to add one new piece of equipment over time to complete full implementation within one year.”

While the rollout execution differed from school to school, all PM All Stars agreed a roll-out plan and timeline is critical to achieve success.
STEP 2: DETERMINE WHO WILL PERFORM PREVENTIVE MAINTENANCE

We found our interviewees differed considerably on who performs PM at their institution. Despite their differences, the PM All Stars noted they had to develop a structure for the distribution of work within their departments. Without this structure, the PM work would not get completed as maintenance requests come in and priorities shift.

Possible structures for the distribution of PM work include:

- Dedicated full-time staff who only perform PM work
- Each staff member performs both corrective work orders and PM work orders, with a clear designation of how many labor hours they spend on each type
- Team members are divided with a certain percentage of employees performing only PM and a certain percentage of employees performing only corrective maintenance

All three options work well for our All Stars. Some found with a full-time dedicated staff there was better organization and special schedules could be accommodated; however, sharing knowledge can be a challenge. With a shared workload, it can be scalable as more people are hired and all team members are well-versed in PM needs; however, members may get distracted with outside requests and emergency work.

Regardless of the option you choose for distributing PM work, designate a certain percentage of labor hours to PM. This way, you can better determine how much staff is needed to complete the necessary PM work. All interviewees had approximately 30% to 40% of their team’s labor hours dedicated to PM.

STEP 3: SELL PM UP TO MANAGEMENT AND YOUR BOARD

Once you’ve determined your implementation plan and who will perform PM, you must sell a preventive maintenance program up to your managers, administrators, board, or other stakeholders. After-all, “you’re not going to buy a car and not change the oil,” as Robert Luebke with Beaufort County School District noted, which is a great analogy to performing PM. To get buy-in, our PM All Stars recommend a number of strategies that helped them show the importance of PM to their supervisors. You can get your board “on board” by:

1) Assess if there are any state mandates for inspections or a minimum amount of preventive maintenance required. This helps sell it to supervisors, as Kevin Yarberry of Little Rock School District experienced.

2) Make sure your program is achievable. A reasonable, sustainable plan for PM and a software system in place that manages preventive maintenance schedules will demonstrate to your supervisors the ease with which your department can complete PM effectively.
3) Highlight how PM helps achieve the institution’s goals and meets customers’ needs. For K-12 schools, highlight the importance of life safety issues to achieve a safe and comfortable learning environment for students and faculty. For higher-ed institutions, demonstrate the competition for students and how critical campus attractiveness is to attain top talent. PM All Star, Paul Lund, with Elmhurst College, spoke to this point at his campus:

“Private institutions have no mandates, but it’s very competitive to get students. When parents bring students out to look at colleges, the first impression of the campus is everything. They look at how clean the bathrooms are, how well the facilities are maintained, and make decisions based off that impression. If a room is too hot in orientation or a session, that student probably won’t choose that college... so it’s been an expectation for us [to perform preventive maintenance] and receive support from the administration.”

4) Use tracking and reporting capabilities, often available in software solutions, to quantify the advantages of performing preventive maintenance in your facilities. For example, you can show how much money your institution spends on corrective work orders. Once you have PM data, you can also share data showing the reduction in costs of work orders to continue to justify your PM program.

STEP 4: KEEP IT GOING AND REPORT ON YOUR DATA

Identify Key Performance Indicators (KPI) and benchmarks that your department will use to measure success and the impact of PM on your budget. These can include:

- Reduction in completion time of work orders
- Reduction of total emergency work orders
- Cost of work orders
- Percentage of PM work orders to corrective work orders

Once you have performed PM for a period of time, use reporting capabilities to track these KPI’s. And don’t just create reports for internal use – share that data with your team, faculty and other staff, and supervisors. As you perform PM for several years, you can compare this data over time to show the effect of PM on your school’s facilities and the decrease in the backlog of deferred maintenance.
Last, our All Stars recommend remaining transparent and keeping communication open with all stakeholders, including faculty, staff, the community, the administration and board.

Final Thoughts

Our PM All Stars have mastered preventive maintenance at their institutions, saving their schools’ operational dollars and improving their facilities. They have shared their advice and tips to help their peers successfully implement effective PM programs. However, before they could master PM, they had to master corrective maintenance. Schools must have a good corrective maintenance model before they can embark on PM. It is impossible to maintain equipment and systems proactively until schools fix what is broken.

To achieve this, educational institutions must develop efficiencies and automate their corrective maintenance model. Software systems that automate the work order request, creation, and completion process streamline the work order process and can provide reports analyzing where efficiencies have been achieved and what areas still need help. Research shows that a 30% to 70% ratio of preventive maintenance to corrective maintenance is ideal in an educational environment. This can’t be achieved if a school’s maintenance department is in a 100% reactive state.

With the growing amount of deferred maintenance every year in America’s schools, shifting the focus to decreasing the backlog of deferred maintenance and conducting preventive maintenance regularly is an absolute must. While other needs will come up, educational institutions need to make a preventive maintenance program a ‘must-have.’ A small roof leak or slow running HVAC may seem minor now, but news reports show how major these can become when nothing is done to proactively remedy the problems.

In Arizona, millions of capital budget dollars were spent to tackle deferred maintenance with replacements that could have been avoided with ongoing preventive maintenance. According to a CBS article, the state may even need to shut down a school entirely due to the condition of its facilities. Meet your organization’s overall mission by protecting your institution’s assets and providing the best facilities and learning environment possible.

REFERENCES


ABOUT SCHOOLDUDE

SchoolDude, the market leader in education enterprise asset management, offers cloud-based software solutions to help institutions of all sizes better manage their facilities and business operations. SchoolDude helps clients save time and money, operate their facilities more efficiently, and provide a safe learning and teaching environment. SchoolDude maintenance suite of solutions offers:

- **MaintenanceDirect** - a complete work order management solution
- **PMDirect** - a preventive maintenance scheduling solution
- **InventoryDirect** – an inventory management solution that tracks all transactions
- **PlanningDirect** – a capital planning solution to forecast facility needs
- **Critical Alarm Automation** – a building automation alarm solution that integrates with MaintenanceDirect to tackle problems before they turn into emergencies

RESOURCES

1) SchoolDude PM templates available within PMDirect. Contact SchoolDude at sales@schooldude.com or 877-868-3833 for more information.

2) Facility Masters Preventive Maintenance Resources

3) Facility Masters Capital Planning Resources


5) Arkansas Division of Public School Academic Facilities and Transportation Preventive Maintenance Schedule Suggestions

6) Alaska School Facilities Preventive Maintenance Handbook

7) New Mexico Preventive Maintenance Guidelines

8) What School Board Leaders Need to Know about School Facilities by New Mexico School Board Association

9) National Clearinghouse for Education Facilities Resource List- Preventive Maintenance of School Buildings

10) The Center for Green Schools 2013 State of Our Schools Report

11) An Ounce of Prevention is Worth a Pound of Cure, a whitepaper by SchoolDude examining the costs and benefits of a preventive maintenance plan for educational institutions