

Implementing Facility Maintenance Programs and Best Practices

March 5th, 2024



Introductions



Craig Wall
Vice President



Michael McKeethen
Manager of Maintenance Solutions

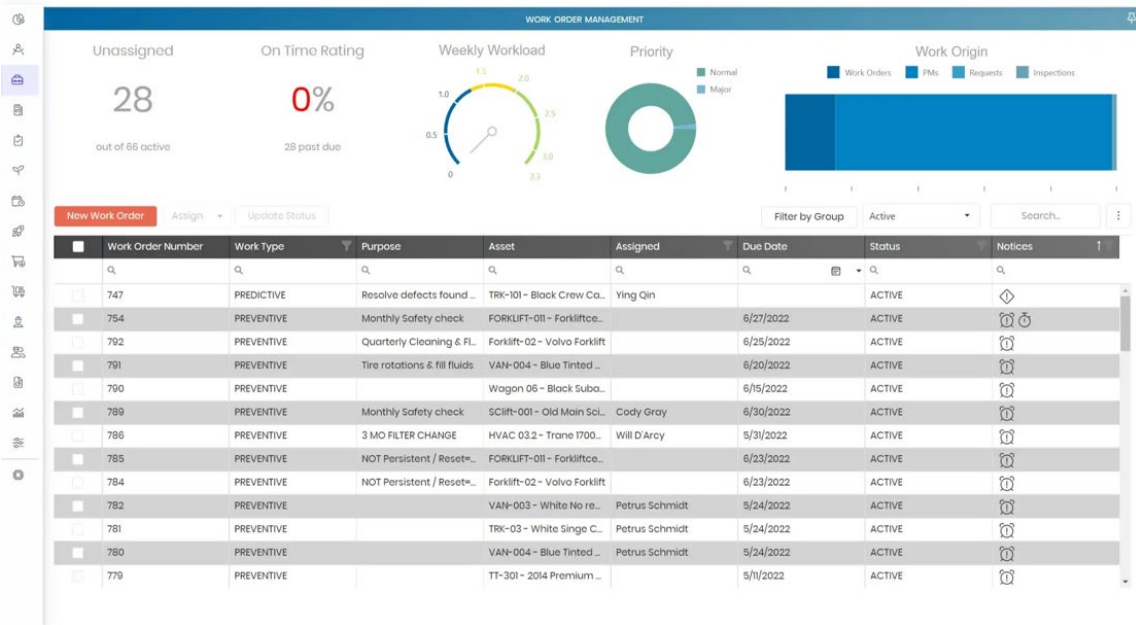


Herb Dennis
Manager of Property & Fleet

Age of Building



Formal Maintenance Program?



Equipment Maintenance Calendar (November 2019 - October 2020)

(Created 11/6/2019, X - Maintenance Due/ Open Work Orders)

Location	Equipment	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Week Starts On Sunday: 03 10 17 24 01 08 15 22 29 05 12 19 26 02 09 16 23 01 08 15 22 29 05 12 19 26 03 10 17 24 31 07 14 21 28 05 12 19 26 02 09 16 23 30 06 13 20 27 04 11 18 25													
Week #: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52													
Building B	-None-												
	HVAC-B : HVAC - B Building	X	X	X	X	X	X	X	X	X	X	X	X
Main Building	Air Compressor #1												
	: Ingersoll Rand 100HP Air-compressor	X	X	X	X	X	X	X	X	X	X	X	X
Main Building	EPJ #1 : Electric pallet jack # 1	X	X	X	X	X	X	X	X	X	X	X	X
	EPJ #2 : Electric pallet jack # 2	X	X	X	X	X	X	X	X	X	X	X	X

Agenda

1. Discuss Why Maintenance is So Critical
2. Review Top Assets to Properly Maintain and What to Look For
3. Case Studies Analyzing the Problem, Solution, and Impact
4. How to Take Action / Next Steps

WHY?



**PLANNED AND
PREVENTATIVE
MAINTENANCE**



**REDUCING
UNSCHEDULED
MAINTENANCE**



**CONTROLLING
BUDGETS AND
COST**



MANAGING ASSETS



**KEEPING
ACCURATE
RECORDS AND
SUCCESSION
PLANNING**



**REDUCING /
ELIMINATING
MANUAL
PROCESSES**



**TEAM
COORDINATION
AND TASK
DELEGATIONS**

**How do you plan for
line maintenance?**

**How about your
facility Maintenance?**

**Proactive vs.
Reactive**



Cost of Maintenance

In 2023, it is estimated that Companies in the US spent a staggering \$222B in maintaining property and assets.

Why such high cost?

- ✓ More than 50% of companies are using reactive maintenance approach to taking care of their assets.

Solution:

- ✓ *Predictive Maintenance* can yield a cost savings of 8 – 12% over *Preventative Maintenance*. Additionally, *Preventative Maintenance* can yield a cost saving of up to 40% over *Reactive Maintenance*.

Common Assets

BUILDING

- ✓ Doors
- ✓ Gutters
- ✓ Masonry
- ✓ Overhead Doors
- ✓ Pre-Engineered Bldg.
- ✓ Roof
- ✓ Teller Equipment
- ✓ Windows

SITE

- ✓ Asphalt
- ✓ Caulking
- ✓ Concrete
- ✓ Fencing / Gates
- ✓ Flagpole
- ✓ Grounds
- ✓ Irrigation
- ✓ Retention Ponds

UTILITIES / EQUIPMENT

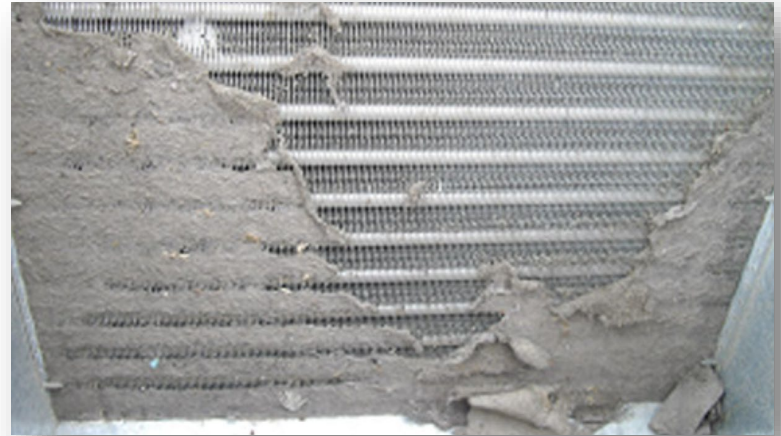
- ✓ Air Compressors
- ✓ Building Security and Cameras
- ✓ Electrical – Transformers, Panels, Etc.
- ✓ Fire Protection
- ✓ Fuel Island and Equipment
- ✓ Generators / Automatic Transfer Switch (ATS)
- ✓ HVAC
- ✓ Plumbing
- ✓ UPS – Battery Backup
- ✓ Vehicle Maintenance Equipment
- ✓ Cranes, Lifts, Wash Bay, Etc.

Top Maintenance Work Orders

- HVAC – HVAC – HVAC
 - Gates
 - Overhead Doors
 - Generators
 - Roofing/Gutters
- Façade Leaks
 - Concrete
 - Water Heaters
 - Electrical Equipment
 - Maintenance Equipment

HVAC

✓ Filters / Coils



Drain Lines and Condensate Pumps



ENERGY EFFICIENCY

Programming and Schedules

- Per ASHRE website:
By running your HVAC on a setback of 7-10 degrees for just 8 hours per day you can reduce the operating cost of that unit by 10%!!!

HVAC Preventative Maintenance:

- ✓ Changing filters.
- ✓ Clean condenser coil.
- ✓ Check belts (if equipped).
- ✓ Flushing condensate drains. Treatment if required.
- ✓ Inspecting for and repairing refrigerant leaks.
- ✓ Clean heating components – inducer motor, burner, etc.
- ✓ Inspect electrical components.

Note: Replacement cost – a 5-ton RTU cost roughly \$10-12K to replace.

HVAC Preventative Maintenance:

Condenser Units Maintenance

SAFETY / DANGER: *Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.*

NOTE: The required frequency of inspections depends upon the total operating time and the indoor and outdoor environmental conditions. Routine maintenance should cover the following items:

Maintenance Schedule

Condenser Unit:

- Visually inspect for rust, dirt, and obstructions.
- Clean condenser coil if needed. Inspect coil fins for bent or damaged fins.
- Check unit for proper operation, interlocks, controls, and excessive noise or vibration.
- Visually inspect unit for leaks. Look for oily substance.
- Inspect refrigerant piping insulation.
- Turn off power to the unit and lock out. Inspect for loose electrical connections and burnt connection. Repair or replace any notable issues prior to turning power back on.
- Turn power back on and put unit back into service.

Notes:

VAV Fan Coil Units Maintenance

SAFETY / DANGER: *Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnects may be required to de-energize the unit.*

NOTE: The required frequency of inspections depends upon the total operating time and the indoor and outdoor environmental conditions. Routine maintenance should cover the following items:

Maintenance Schedule

- Air Filter:** Replace air filters as required.
 - Replace the air filter at the beginning of the heating or cooling season. Dust and dirt in the air filter reduce airflow, lowering the unit's capacity.
- Fan Motor:** Unit motors are equipped with permanently lubricated bearings. Inspect fan and motor assembly for accumulation of dust and dirt as required by operating environment. Clean as necessary.

Notes:



Most manufactures warranties are void if the equipment owner cannot show documentation that the equipment was properly maintained.

HVAC Improperly Installed



Gates

- Sensor obstruction:
 - ✓ Weeds/Vegetation
 - ✓ Weather



- Environmental
 - ✓ Frozen components
 - ✓ Storm / Wind Damage

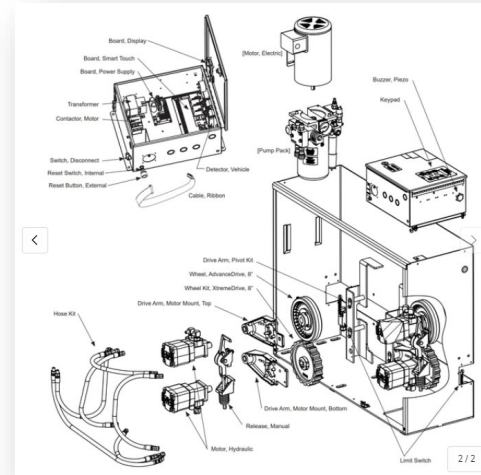


Gates

- Electrical issues
 - ✓ Power
 - ✓ Frayed Wires
 - ✓ Fuses
 - ✓ Control Board

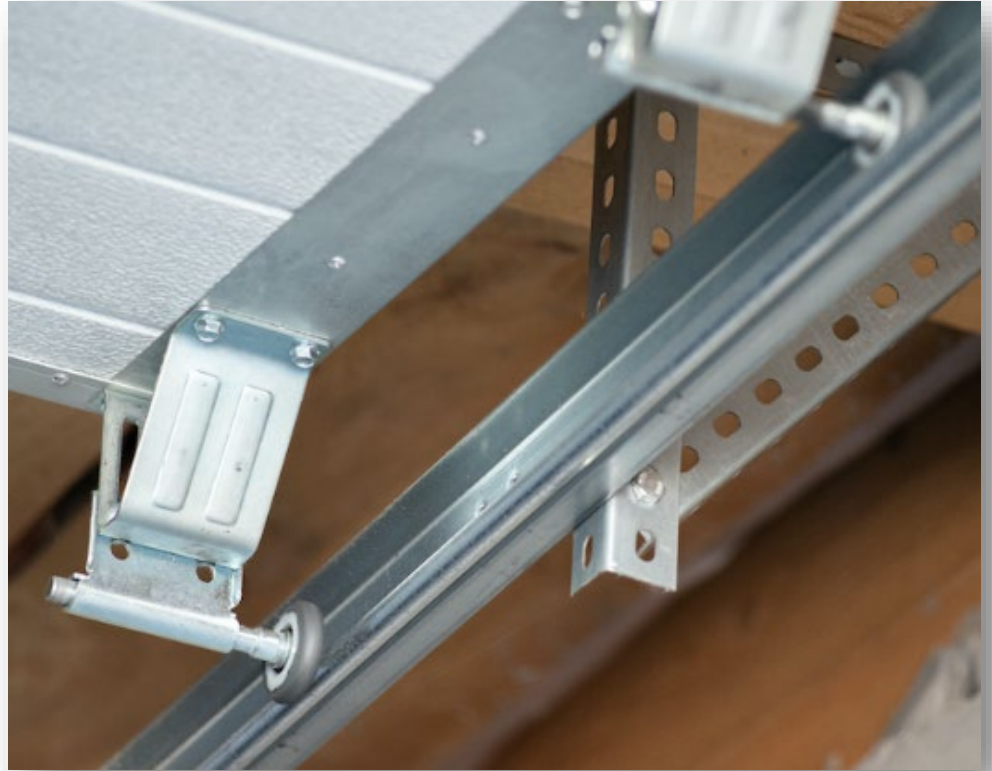


- Mechanical Failures
 - ✓ Worn or Broken Gears/Pulleys
 - ✓ Misalignment



Overhead Doors

- ✓ Photo Eye – misalignment, obstruction, or environmental
- ✓ Pressure Sensitive Sensing Edge – damaged sensor (wires or moisture).
- ✓ Track issue – loose bent.
- ✓ Rollers – worn, loose, or bent.
- ✓ LED Lighting Interference



Generators

- ✓ Need to be on a Preventative Maintenance Plan!!!
- ✓ Planned Shutdown / Testing – Full Load.
- ✓ Oil Analysis – at least yearly. This will Optimize operational health and ensure equipment reliability.





Roofing / Guttering

Triggering events that cause roofing issues:

- ✓ Driving Rain
- ✓ Heavy or Melting Snow
- ✓ Ice Damming (consistent freezing and thawing)
- ✓ Wind
- ✓ Structural Damage
- ✓ Other Weather Occurrences

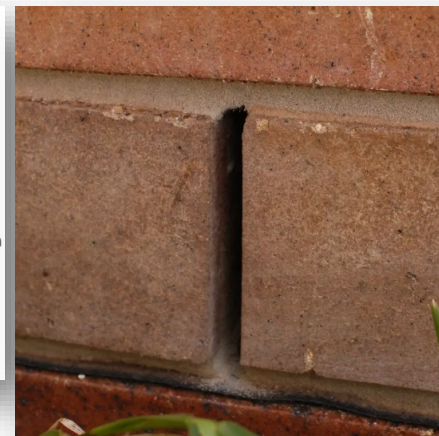
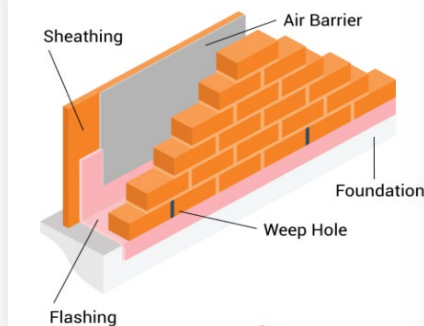
Building Façade – Leak Issues

- Caulking – cracking or deteriorating.
- Weep Holes – clogged or obstructed.



Inspect Annually. Polyurethane Sealants Life 5-10 yrs. and Silicone Sealant Life is up to 20 yrs.

What is a weep hole?



Inspect Annually. Common issues – covering with landscaping and insect nesting.



Water Heaters

- Temperature Pressure Relief Valves – Test Annually



- Anode – Inspect and replace as needed.



Anode is sacrificial rod that is made up of magnesium or aluminum. It extends the life of the tank.

Electrical Equipment

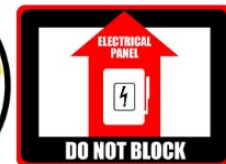
- The National Fire Protection Association (NFPA) Standard 70E Article 130.5 states that an arc flash assessment must be updated if a major modification or renovation takes place, and it must be reviewed periodically at intervals not to exceed 5 years.
- *Note: 18% of industrial / commercial fires is due to faulty equipment. Loose connections, exposed wiring or overloaded circuits.*



Electrical Panel Clearance

The NEC specifies electrical panels must have:

- A minimum clearance of 30 inches horizontally
- 36 inches in front of the panel
- Minimum headroom clearance of 6 feet 6 inches. These clearances are measured from the floor, ceiling, and any adjacent walls or obstacles.



Automotive Lifts

Inspections:

Per ANSI/ALOIM – Lifts must be inspected at least annually, more frequently when required by the manufacturer or an authority having jurisdiction. (ie. corporate health and safety, insurance provider or workers compensation trust)

Manufacturer recommendations could be as follows:

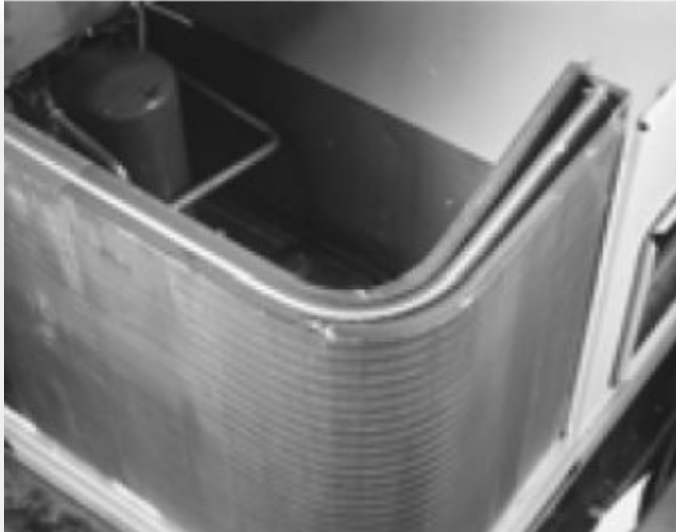
- ✓ Daily Pre-Operational Check (8-Hours)
- ✓ Weekly Maintenance (every 40-Hours)
- ✓ Yearly Maintenance



CASE STUDIES



Trane Voyager RTU Split Coils



Problem – Dirt and debris collects between the coils reducing or eliminating air flow

The Solution – Split the coils and clean from the inside out

Impact – High head pressure, possible compressor failure. High cost to repair. Compressor for a 5-ton unit could run \$1800 to \$3000 in parts alone.



Problem - Water damage due to condensate line or pump not being maintained.

Solution – Have a comprehensive Preventative Maintenance plan that cleans the condensate line or condensate pump on a regular basis.



Impact – Costly repairs to drywall and/or ceiling. Potential mold issue – remediation. Health hazard for employees.

Simple preventative/proactive maintenance can eliminate thousands of dollars in repair cost.

Air Compressor Automatic Blowdown

Problem – Air Compressor Automatic Blowdown not operational due to excessive noise while blowing down.

The Solution – Either pipe the blowdown outside the building or add a blowdown silencer.

Impact – Water/moisture accumulation in the tank causing the tank to rust out and result in premature tank failure. Replacement air compressor equipment cost is \$6000-7000.



Geothermal Pump or Pump Room

Problem – Leaks in equipment rooms going undetected until damage to building has already occurred.

The Solution – Install WetSwitch and Pig Mat to detect and alarm for even the slightest leak. WetSwitch can be stand alone or connected to BMS.

Impact – Flooded building displacing employees and equipment. Expensive repairs to building. Potential downtime to the utility.



Protect your property!!!!

Generator - Failure

Problem – Generator didn't come on at loss of utility power due to wiring issue during install.

The Solution – Correct wiring issue and perform simulated power outage and run full load test.

Impact – Loss of backup power that would impact operations.



What are the next steps?

- ✓ How to **Automate Facility Maintenance** and use **Technology** to your advantage, creating a long-term succession plan, bring order and organization to your maintenance program?

ACTION PLAN



Engage a Facilities Maintenance Expert.



Identify, Inventory, Organize and Tag Assets.



Implement into a Computerized Maintenance Management Software System.



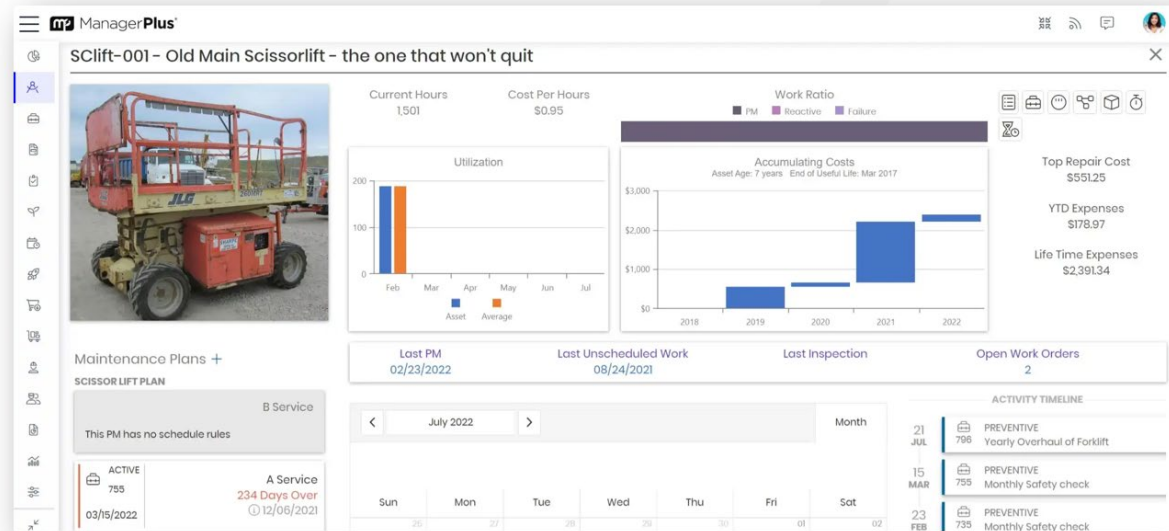
Create Preventative Maintenance and Inspection Plans.



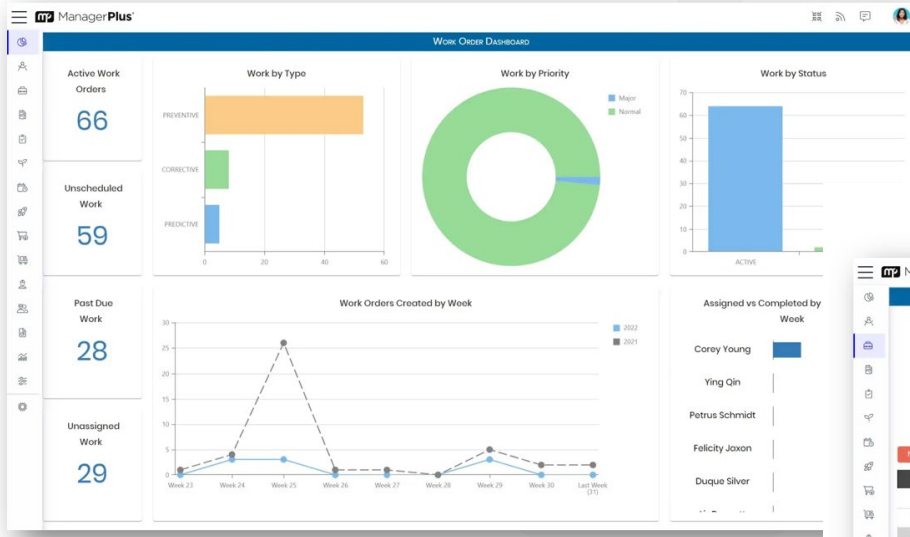
Execute Preventative Maintenance Plans.

Computerized Maintenance Management System

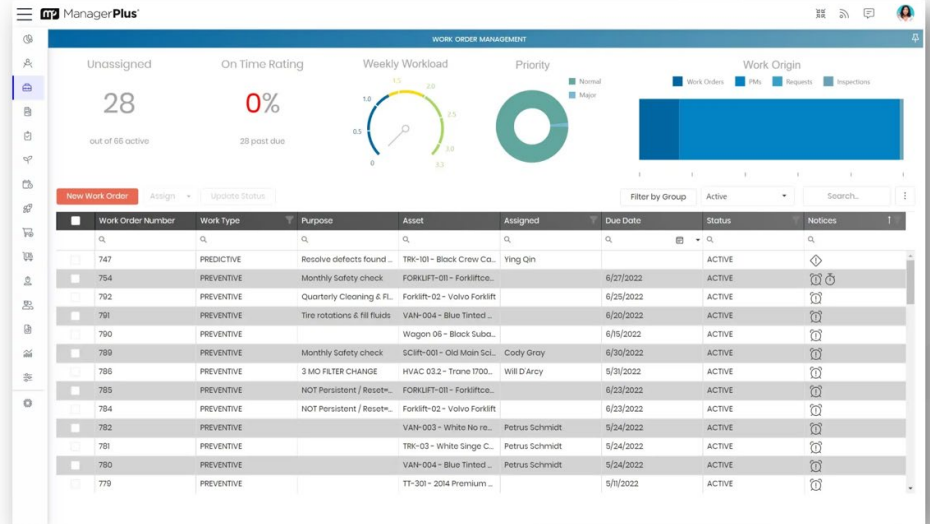
Asset Management



Facility Management



Work Order Management



Maintenance Planning

The screenshot displays the ManagerPlus 'PLANNING AND ASSIGNMENT BOARD' interface. At the top, the 'Entity' is set to 'Corporate Towers, LLC' and the 'Selection' is 'Top 10 Recent'. A 'Publish Changes' button is visible. Below this, the current week is '17-23 Jul 2022'. The main area is a grid with time slots from 10:00 AM to 6:00 PM and days from Sunday to Saturday. Two technicians are assigned: Corey Young and Ying Qin. Corey Young has two tasks: 'Change Belt' (771) on Wednesday, July 20th, and 'Replacing fan' (777) on Friday, July 22nd. Ying Qin has one task: 'Ensure working order' (775) on Thursday, July 21st. A right-hand sidebar shows a search bar and a list of tasks with details like duration and assignees.

Task ID	Task Name	Category	Duration	Assignee	Due Date
771	Change Belt	PREVEN.	345 min	Corey Young	4/13/22
775	Ensure working order	CORRE.	240 min	Liz Bennett	1/1/23
777	Replacing fan	CORRE.		Corey Young	

Thank You!

Questions

For more information contact Mike McKeethen

314-304-7372

mmckeethen@coopbuildingsolutions.com

