
Plant Services

SPECIAL REPORT

2021 Predictive Maintenance Study: Status and Trends Report



ATS

Advanced Technology Services, Inc.

Manufacturers are moving toward more proactive maintenance programs

Results from 2021 Plant Services PdM survey show increased program satisfaction, data sharing with outside partners

By Thomas Wilk, Editor in Chief

At a time when manufacturers are improvising to overcome supply chain challenges, staggering their worker shifts to help productivity, and installing space and barriers between workers to protect them from infection, the status of the plant's proactive maintenance program might be the last thing on anyone's mind. However, based on the results of the latest Plant Services PdM survey, it is clear that plants are

taking advantage of this massive business disruption to move toward more proactive maintenance modes.

For the 2021 PdM survey, Plant Services editors reached out to 100 North American industry professionals to uncover the current state of proactive and reactive maintenance. The good news is that the emerging portrait of PdM in 2021 is one where (a) respondents are still increasingly satisfied with their

programs; (b) respondents plan on increasing their PdM budget over the next three years; and (c) respondents are increasingly comfortable with partnering outside the organization as needed to maintain program strength.

Let's take a look at what manufacturers think of their proactive maintenance programs now, one year after the onset of the COVID-19 pandemic in the United States.



1. ARE YOU SATISFIED WITH YOUR PDM PROGRAM?

This year’s survey results story starts with a key KPI: are you satisfied with your Pdm program? For the second time in a row, a majority of respondents expressed satisfaction or better. From a low of 35.1% in 2016 to this year’s high of 53.4%, program satisfaction has trended steadily upwards (see Figure 1).

“It’s no wonder Pdm program satisfaction is increasing,” said Tate Pearson, Senior Director, Engineering and Technical Support Services at Advanced Technology Services (www.advancedtech.com). “Time and again, Pdm technologies are proving their ability to reduce equipment failures and downtime, drive down costs, and improve the reliability and productivity of critical assets.”

Several demographic questions such as job title, size of maintenance and reliability staff, and annual revenue help put this KPI into context. On Figure 2, the job title chart, note that the general percentage of types of job titles stayed stable for several years, suggesting that for the moment, the race to add full-time reliability positions is slowing. In fact, whereas the number of maintenance-titled respondents grew by 6% from 2020, the number of reliability titles who responded in 2021 dropped by almost that same amount.

	2014	2016	2018	2020	2021
Not effective	15.5%	15.6%	12.5%	16.9%	4.7%
Needs some improvement	40.3%	49.4%	45.3%	32.5%	41.9%
Satisfactory	24.8%	18.2%	21.9%	20.8%	36.0%
Effective	15.5%	14.3%	15.6%	23.4%	15.1%
Very effective	3.9%	2.6%	4.7%	6.5%	2.3%

53.4% (50.7%) vs 46.6% (49.3%)

Figure 1. Pdm Program: performance comparison, 2014-2021

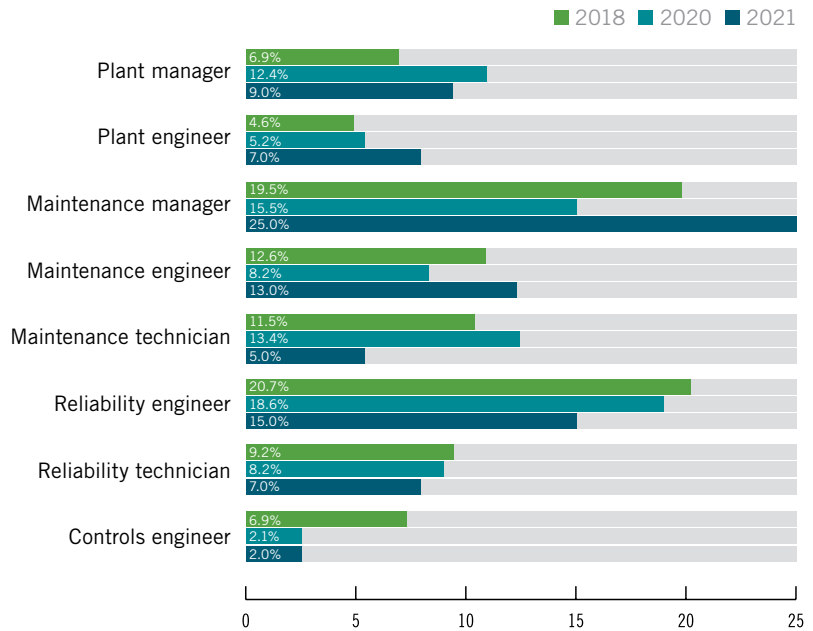


Figure 2. What is your primary job function?

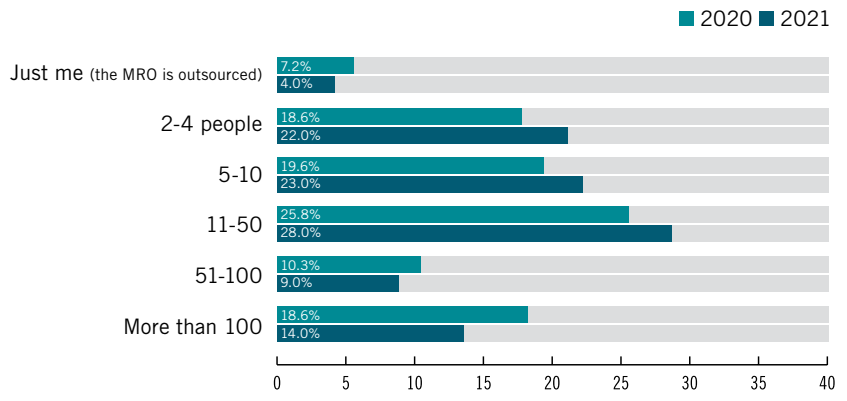


Figure 3. How big is the maintenance and reliability staff at your plant?

Figure 3 indicates that the number of respondents who work in moderately sized maintenance teams (5-50 people) continues to rebound from a low in 2018. Almost half of respondents report they work on plant teams of 10 or less people, and large teams (51+ employees) are holding steady at 23%. Finally, Figure 4 shows that 65% of respondents work in organizations with 5 or fewer plants.

2. WHAT DOES YOUR PDM PROGRAM LOOK LIKE?

If Figure 1 is the traditional key KPI, then Figure 5 is the baseline index of what types of predictive maintenance technology people report they are using. In 2011, the four technologies at the top of our survey are oil analysis, vibration, IR thermography, and electrical motor testing, with each technology being checked by more than 55% of survey respondents. Ultrasound and corrosion

testing follow closely, with each being checked by more than 45% of respondents.

Just as telling as the numbers of people who report they are using these technologies are those who report they have no plans whatsoever to use them. Five of the six leading technologies earned a “No Plans” score under 30%, meaning that at least 70% respondents have plans now or in the future to use them. Of that set, only corrosion testing earned a “No Plans” score above 30%; also, oil analysis, IR thermography, and vibration each earned “No Plans” scores of under 20%.

As for obstacles to PdM success, respondents feel challenged by the budgets they are given, as well as capturing and/or communicating the ROI that PdM programs can deliver; those two options have been the most commonly cited obstacles since 2016. It’s also

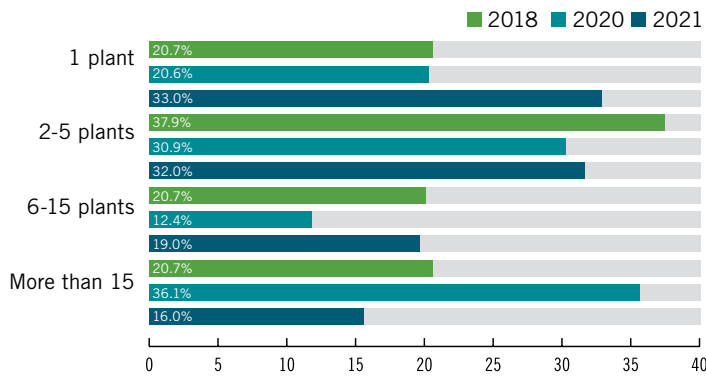


Figure 4. How many total plants does your organization manage?

	Using now / In 2021 budget					Within 3 years					No plans				
	2014	2016	2018	2020	2021	2014	2016	2018	2020	2021	2014	2016	2018	2020	2021
Vibration	65.8%	79.1%	71.9%	75.2%	71.1%	12.9%	9.3%	12.5%	10.4%	18.1%	21.3%	11.6%	15.6%	14.3%	10.8%
Ultrasound	50.7%	61.6%	67.2%	52.6%	47.6%	16.9%	17.4%	7.8%	21.1%	22.6%	32.5%	20.9%	25.0%	26.3%	29.8%
Acoustic	31.2%	30.6%	26.6%	31.6%	25.3%	14.3%	22.4%	15.6%	18.4%	22.9%	54.5%	47.1%	57.8%	50.0%	51.8%
Corrosion	41.6%	37.7%	39.7%	54.0%	45.1%	14.9%	22.4%	14.3%	9.2%	17.1%	43.5%	40.0%	46.0%	36.8%	37.8%
Infrared	69.7%	73.3%	74.6%	76.3%	68.2%	15.5%	10.5%	6.3%	7.9%	14.1%	14.8%	16.3%	19.0%	15.8%	17.6%
Oil analysis	66.8%	79.1%	80.9%	76.6%	78.3%	15.6%	4.7%	4.8%	5.2%	7.2%	17.5%	16.3%	14.3%	18.2%	14.5%
Predictive modeling software	24.0%	33.0%	17.4%	28.6%	23.2%	25.3%	23.5%	33.3%	22.1%	29.3%	50.6%	43.5%	49.2%	49.4%	47.6%
Electric motor testing	55.8%	54.6%	52.4%	59.8%	57.2%	14.9%	23.3%	17.5%	13.0%	14.3%	29.2%	22.1%	30.2%	27.3%	28.6%

Figure 5. Which of these mature PdM technologies have you deployed?

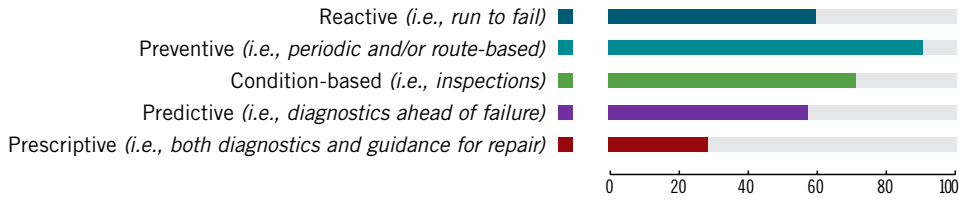


Figure 6. Which types of maintenance approaches are currently employed by your plant?

worth noting that lack of executive support has been steadily increasing as an area of high concern since 2014.

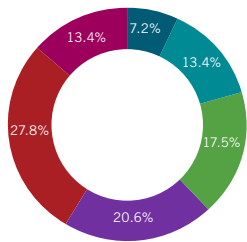
ATS’s Pearson clarifies the challenge of bringing executive champions on board: “Convincing the C-suite of the bottom-line benefits of advanced maintenance practices remains a challenge in too many companies. Shifting budgets toward PdM and RxM and showcasing their substantial value is crucial to developing sustained executive support.”

3. WHAT ARE YOUR MAINTENANCE MODES?

For the next section of the survey, respondents were asked to weigh in on the types of maintenance modes they are engaged in, from proactive and reactive maintenance to the balance of PdM and CBM. Figure 6 indicates an ever-increasing readiness for programs that push the proactive envelope by engaging in prescriptive maintenance (i.e., RxM, or outcome-based maintenance) as well as predictive.

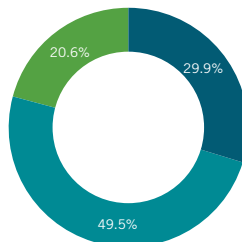
“A combination of technical, labor, and parts prowess is necessary to drive the journey to Industry 4.0,” says Pearson. “Companies are increasingly willing to look outside for the necessary expertise.”

Maintenance teams also often have to make hard decisions about how to spend their limited budget. Based on responses in Figure 7, more than 60% of respondents currently favor condition-based maintenance work over predictive PdM, and about 38% of respondents positioned themselves square in the middle, with a balance



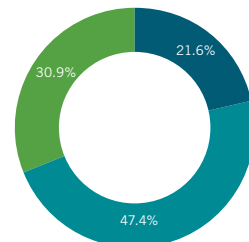
- All or mostly PdM
- About 80% PdM and less than 20% CBM
- About 60% PdM and less than 40% CBM
- About 40% PdM and less than 60% CBM
- About 20% PdM and less than 80% CBM
- All or mostly CBM

Figure 7. How much of your maintenance technology effort is predictive routes (PdM) versus condition-based maintenance (CBM)?



- Majority CBM
- Balance between CBM and PdM
- Majority PdM

Figure 8a. When it comes to proactive maintenance, where is your 2021 budget being targeted?



- Change, with more going to CBM
- Change, with more going to PdM
- Stay the same

Figure 8b. Do you expect this to change over the next three years, or stay the same?

of PdM and CBM work. These responses were reinforced by the data in Figure 8a, which indicate that almost 80% of current budget spend is going mostly toward CBM activities or a balance of CBM and PdM.

Interestingly, when asked about future plans, almost half of respondents suggested they would be changing up their budgets to move more of the spend toward PdM. Taken together, this data suggests that modern plant teams understand the value of predictive maintenance, and are willing to increase activity in that direction to gain the associated financial benefits.

4. ARE YOU SHARING YOUR PDM DATA, AND WITH WHOM

Given the pressure that COVID-19 has placed on many facilities to develop remote or work-from-home options, the data in Figures 9 and 10 may be the most important of this year’s survey. In Figure 9, from our 2020 survey, the number of respondents who are using OEM-enabled

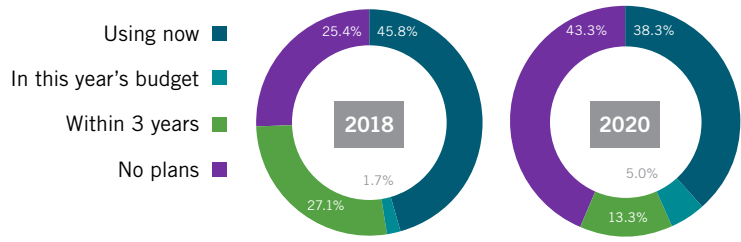


Figure 9. Are you using OEM-enabled remote monitoring technologies and/or services?

remote monitoring technologies and/or services is up to 38.3%, and the number of those with no plans to do so is down to 43.3%. There isn’t much of a middle ground left: those who want to engage with these service teams are not waiting to have those conversations.

“Sharing data with trusted partners opens the door to world-class maintenance practices,” argues Pearson. “Quality providers can help fill talent gaps, conduct real-time remote asset monitoring, provide strategic parts services, and so much more. For example, ATS offers a comprehensive maintenance solution that provides a skilled technical workforce, best-in-class process standards and

advanced technologies to deliver optimized reliability.”

The data-sharing trends of the past several years continue in the same direction, with Figure 10 showing some interesting increases in sharing data remotely on a monthly basis with teams outside the organization. Specifically, there has been a steady rise in the number of respondents willing to share PdM data with third-parties, especially on a monthly basis, and an increased willingness to share data with OEM suppliers on a quarterly basis. However, when it comes to weekly PdM reporting, in-house maintenance and reliability teams remain the primary audience for those data. □

	Never				Weekly				Monthly				Quarterly			
	2016	2018	2020	2021	2016	2018	2020	2021	2016	2018	2020	2021	2016	2018	2020	2021
In-house maintenance	3.9%	11.9%	13.0%	11.6%	55.8%	45.8%	54.5%	50.0%	27.3%	23.7%	22.1%	30.2%	13.0%	18.6%	10.4%	8.1%
In-house operations	24.7%	39.0%	23.7%	27.1%	36.4%	37.3%	40.8%	35.3%	23.4%	13.6%	30.3%	32.9%	15.6%	10.2%	5.3%	4.7%
In-house reliability engineers	16.9%	22.0%	23.7%	23.8%	44.2%	45.8%	47.4%	40.5%	24.7%	20.3%	23.7%	31.0%	14.3%	11.9%	5.3%	4.8%
Totally outsourced	59.7%	59.3%	53.9%	57.8%	6.5%	10.2%	5.3%	8.4%	16.9%	13.6%	21.1%	21.7%	16.9%	16.9%	19.7%	12.0%
Third-party remote monitoring	74.0%	81.4%	69.7%	62.7%	3.9%	5.1%	9.2%	7.2%	7.8%	3.4%	15.8%	16.9%	14.3%	10.2%	5.3%	13.3%
OEM supplier	77.9%	76.3%	61.8%	63.9%	2.6%	5.1%	5.2%	4.8%	6.5%	5.1%	22.4%	16.9%	13.0%	13.6%	10.5%	14.5%

Figure 10. Who uses the information provided by your PdM systems and with what frequency?

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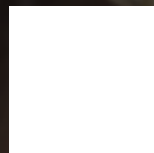
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