



# Facilities Maintenance

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# Introduction and methodology

## Objective

This study was completed by *Plant Engineering* to evaluate the maintenance practices and strategies currently in place in manufacturing facilities and the effects of maintenance on productivity and profitability.

## Sample

The sample was selected from recipients of *Plant Engineering* for whom email addresses were available. Only respondents responsible for maintenance for all or part of their facilities were asked about maintenance strategies, outsourcing maintenance, training, technologies, and unscheduled downtime.

## Method

Subscribers were sent an email asking them to participate in this study. The email included a URL linked to the questionnaire.

- **Data collected:** Dec. 21, 2018, through Jan. 9, 2019
- **Number of respondents:** 199
  - *Margin of error: +/- 6.9% at a 95% confidence level*
- **Incentive:** Survey participants were offered the opportunity to enter a drawing for a chance to receive a \$100 Amazon.com gift card.

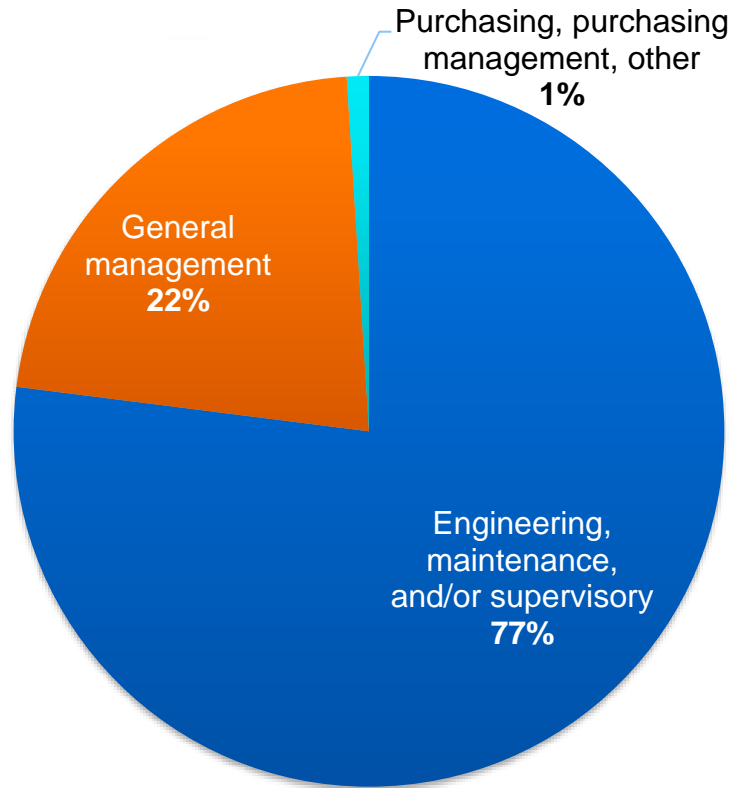
# Summary of findings

- **Maintenance strategies:** Seventy-eight percent of manufacturing facilities follow a preventive maintenance strategy; 61% have a computerized maintenance management system (CMMS), and 56% use a run-to-failure method.
- **Scheduled maintenance:** Fifty-three percent of facilities allocate up to 10% of their annual operating costs to maintenance processes; 30% devote more than 10% of this budget on maintenance. The average facility spends 20 hours each week on scheduled maintenance.
- **Attention to systems:** Rotating equipment (motors, power transmission, etc.), fluid power systems (air, hydraulic, etc.), and plant automation systems are the three areas where facilities dedicate the most maintenance support, followed by internal electrical distribution systems and material handling equipment.
- **Unscheduled downtime:** The leading cause of unscheduled downtime within respondents' facilities remains aging equipment (40%), followed by mechanical failure (24%) and operator error (12%). Four in 10 facilities plan to upgrade their equipment and improve/increase training.
- **Training:** Maintenance teams are mostly trained on basic mechanical (73%) and electrical skills (72%), as well as safety (72%). Other types of training include lubrication (55%) and motors, gearboxes, and bearings (52%).
- **Technologies:** The most common technologies facilities use to monitor/manage maintenance are CMMS (58%), in-house spreadsheets/schedules (45%), and paper records of maintenance rounds (39%).
- **Outsourcing:** The average facility outsources 19% of their maintenance operations, and the leading causes are lack of skills among current staff and too many specialized skills being required.

# Respondent profile

# Job title

Seventy-seven percent of respondents have engineering, maintenance, and/or supervisory responsibilities at their facilities.



Q: Which of the following best describes your job title? (n=199)

# Industry experience, facility size

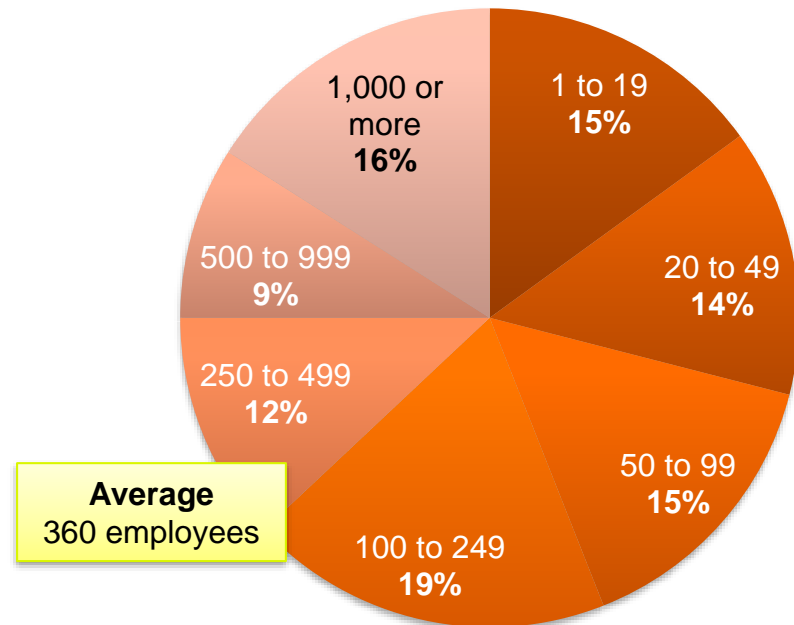
Respondents have worked in a plant or engineer-related position for an average of 23 years, with 34% having been in the industry for 30 years or longer. The average facility employs 360 people.

## Industry experience



## Facility size

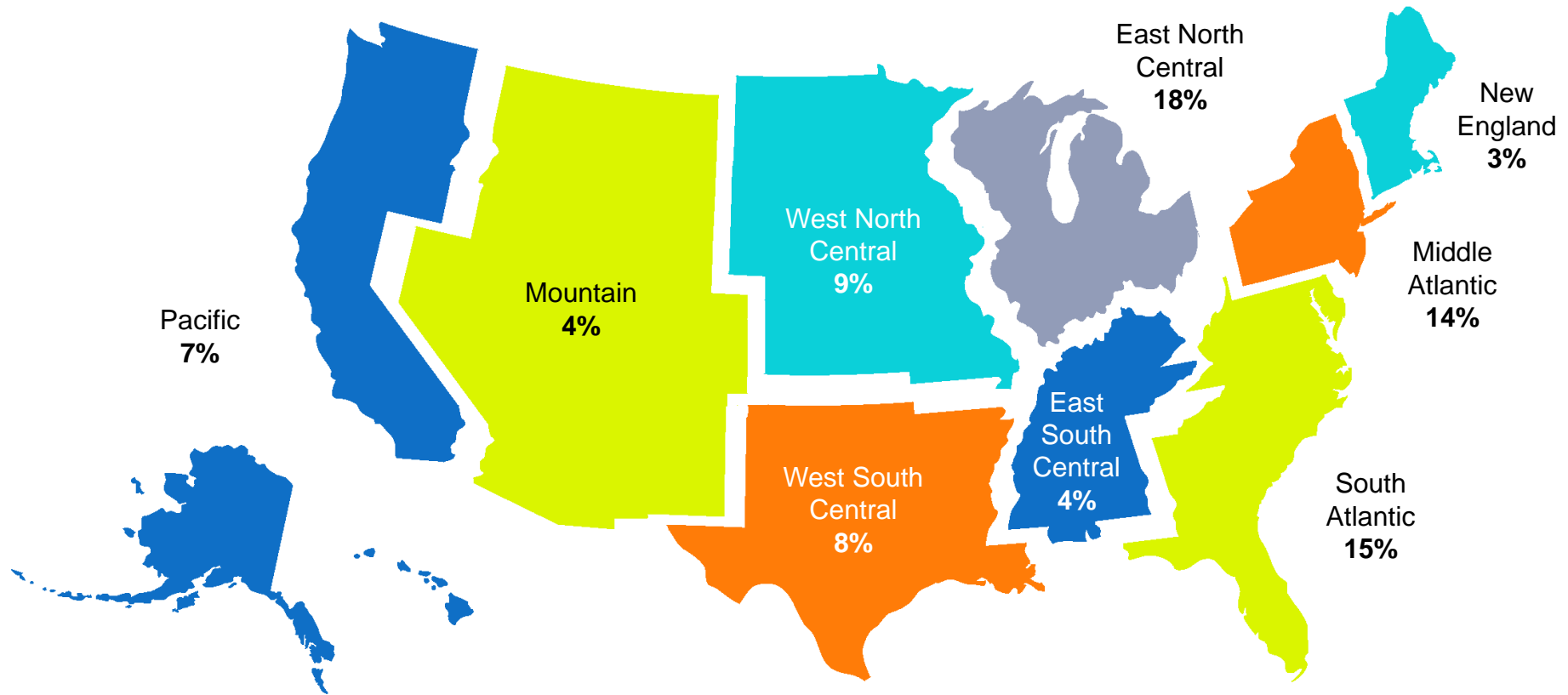
No. of employees



Q: For approximately how long have you worked in a plant or engineering-related position? (n=180); Q: How many people work at your location? (n=199)

# Location

Twenty-seven percent of respondents are located in the North Central region of the United States, and another 18% are based outside of the U.S. Other countries represented include Canada, India, Mexico, the United Kingdom, and Venezuela.

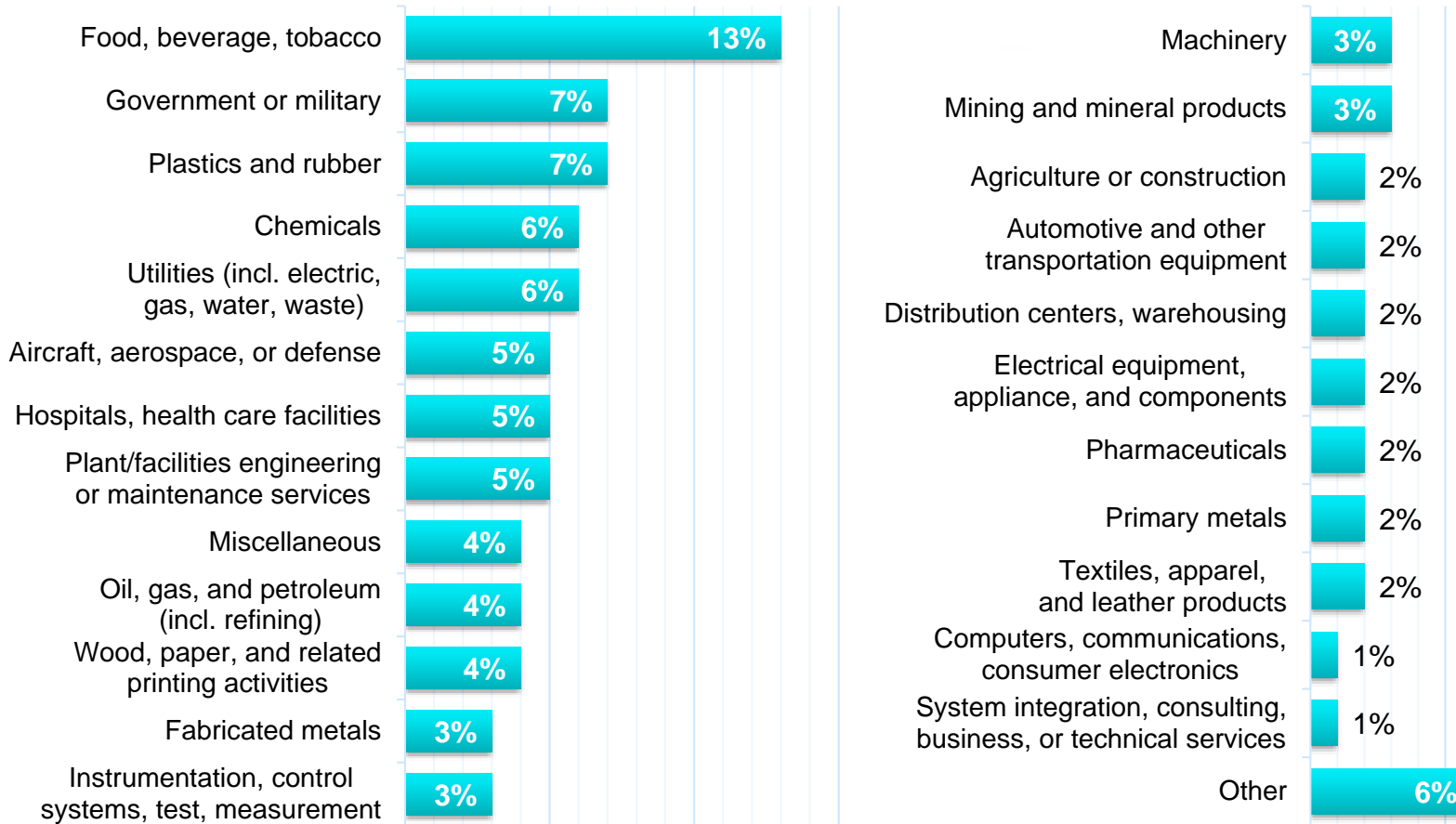


*\*Data gathered by matching respondents to their Plant Engineering audience profile.*



# Primary business

The top primary businesses represented by respondents are food, beverage, and tobacco (13%), government or military (7%), and plastics and rubber manufacturing (7%).

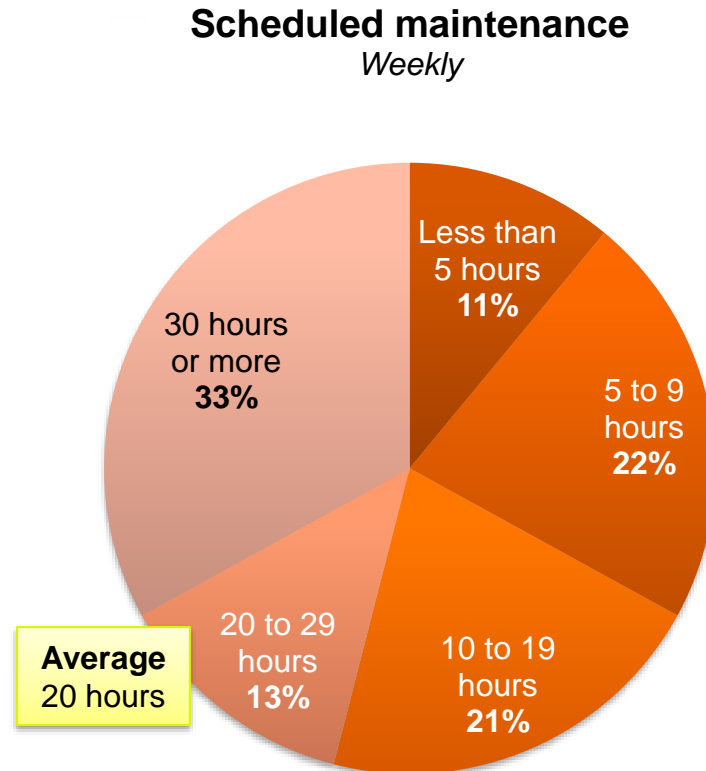
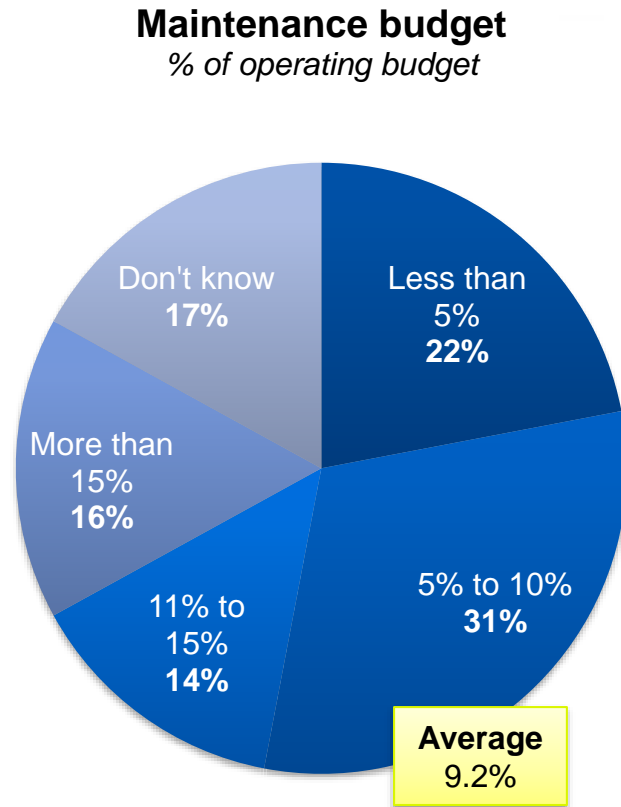


Q: What is the primary business at your location? (n=180)

# Facility maintenance

# Scheduled maintenance

The average facility allocates approximately 9.2% of its annual operating budget to maintenance processes. One-third of facilities spend 30 hours or more each week on schedule maintenance; average is 20 hours/week.

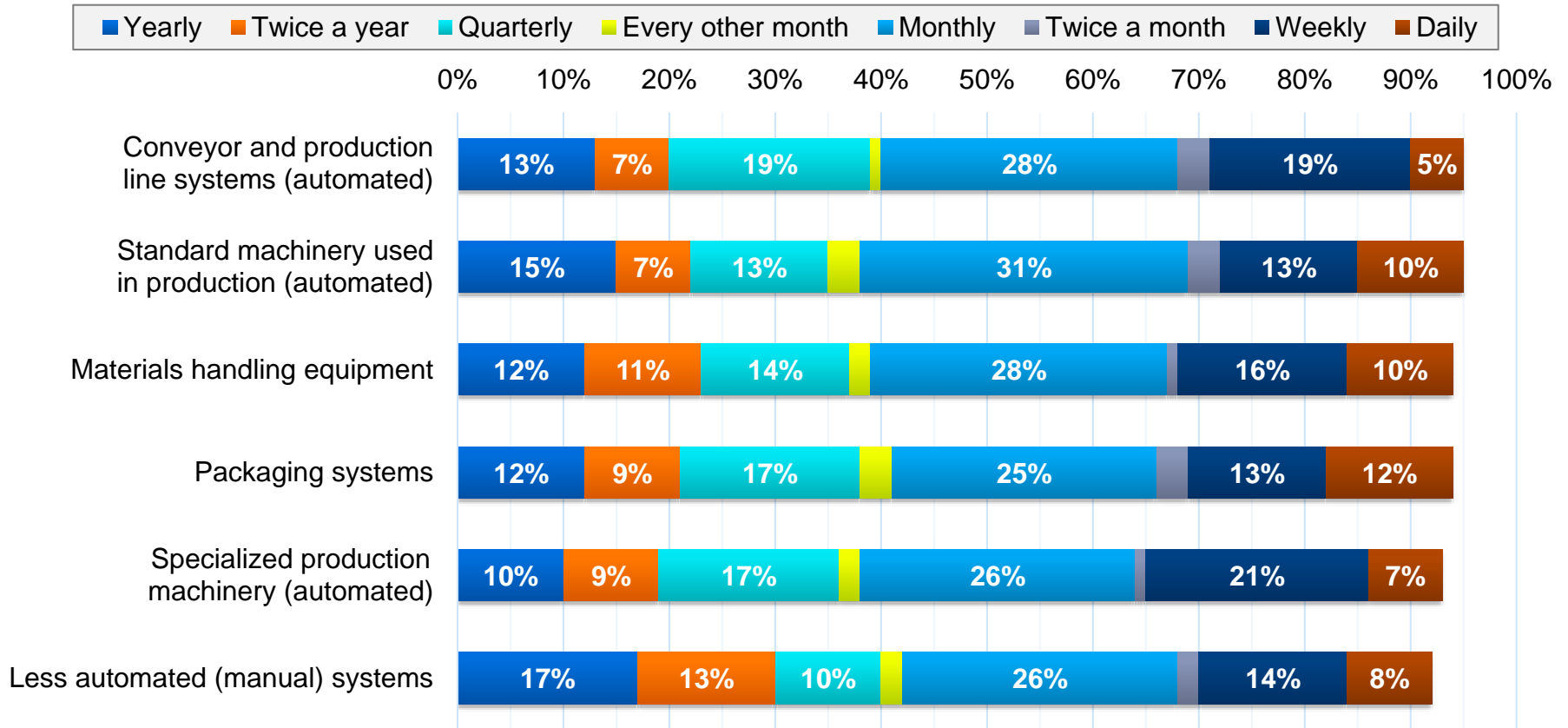


Q: What percentage of your plant's annual operating budget is spent on maintenance processes? (n=199);

Q: Approximately how many hours per week does your plant spend on scheduled maintenance? (n=199)

# Scheduled maintenance shutdown frequency

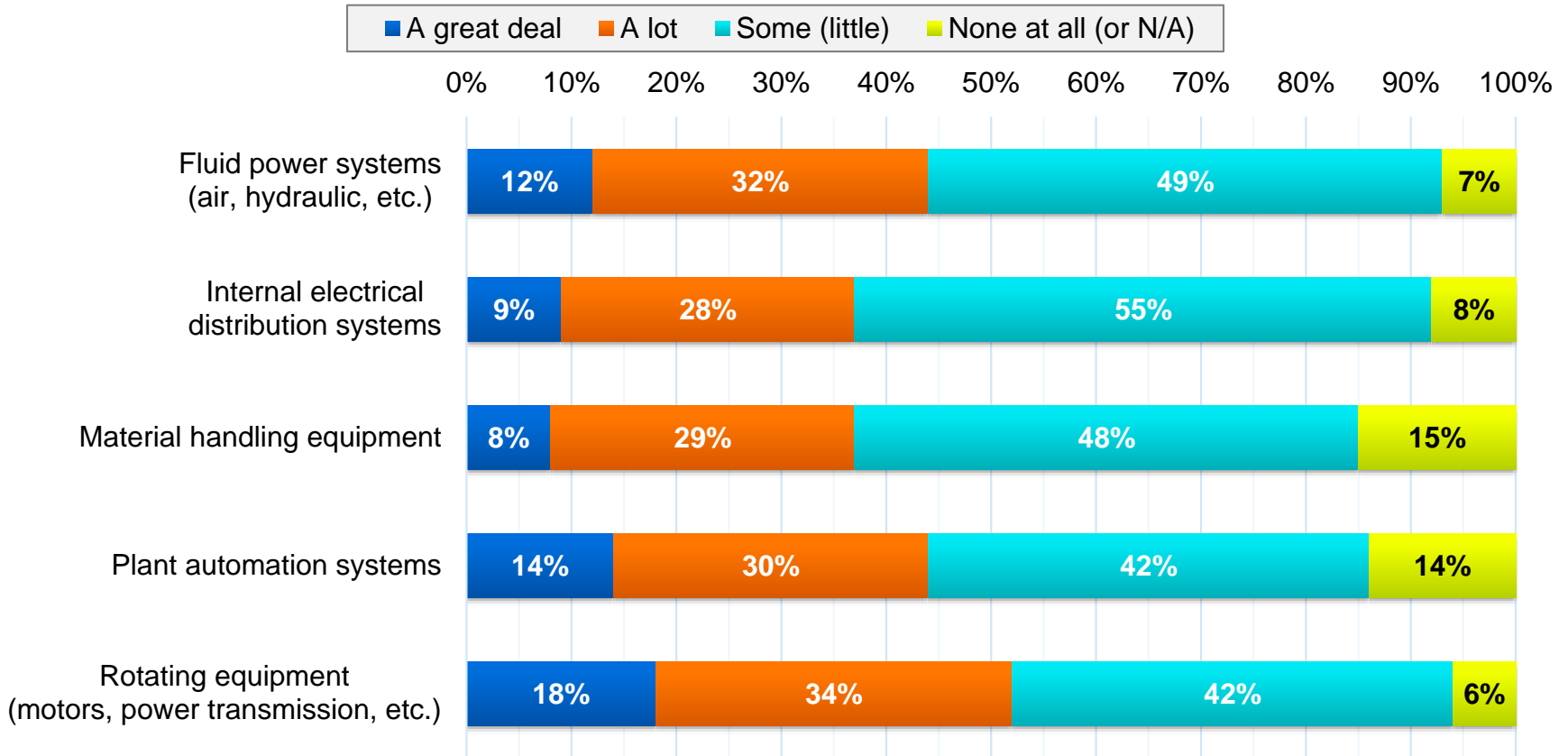
Thirty-one percent of facilities shutdown standard machinery used in production every month for scheduled maintenance; 25% shutdown their materials handling equipment two to four times each year for regular maintenance.



Q: How often are the following areas of your plant shutdown for scheduled maintenance? (n=130;175;165;127;169;184)

# Attention to systems maintenance

Rotating equipment (motors, power transmission, etc.), fluid power systems (air, hydraulic, etc.), and plant automation systems receive the most maintenance support.

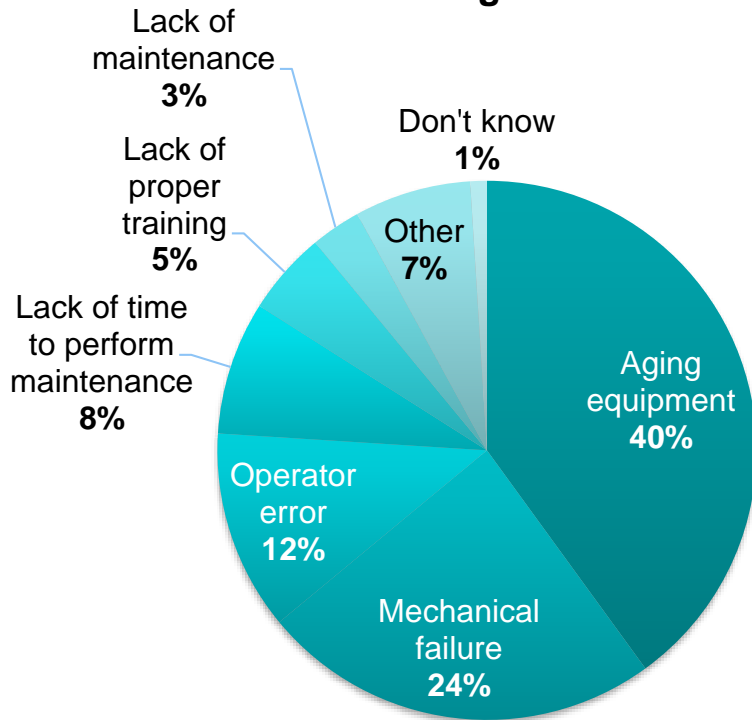


Q: How much maintenance support do the following areas of your facility receive? (n=199)

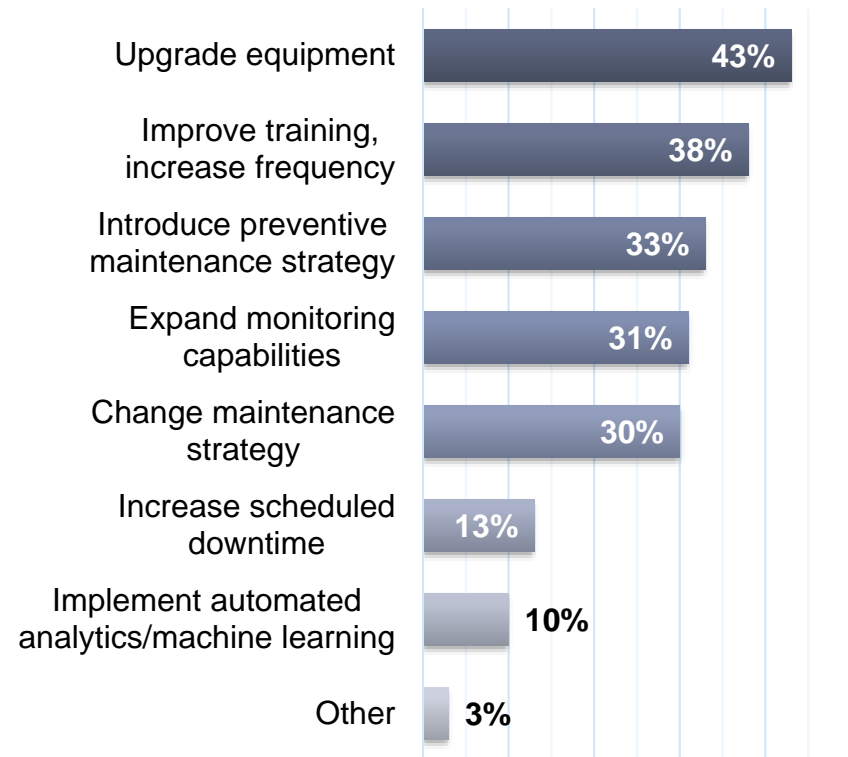
# Unscheduled downtime

Aging equipment (40%) and mechanical failure (24%) are the leading causes of unscheduled downtime. In an effort to decrease downtime, 43% of facilities plan to upgrade equipment, 38% aim to improve/increase frequency of training, and 33% will introduce a preventive maintenance strategy.

**Leading cause**



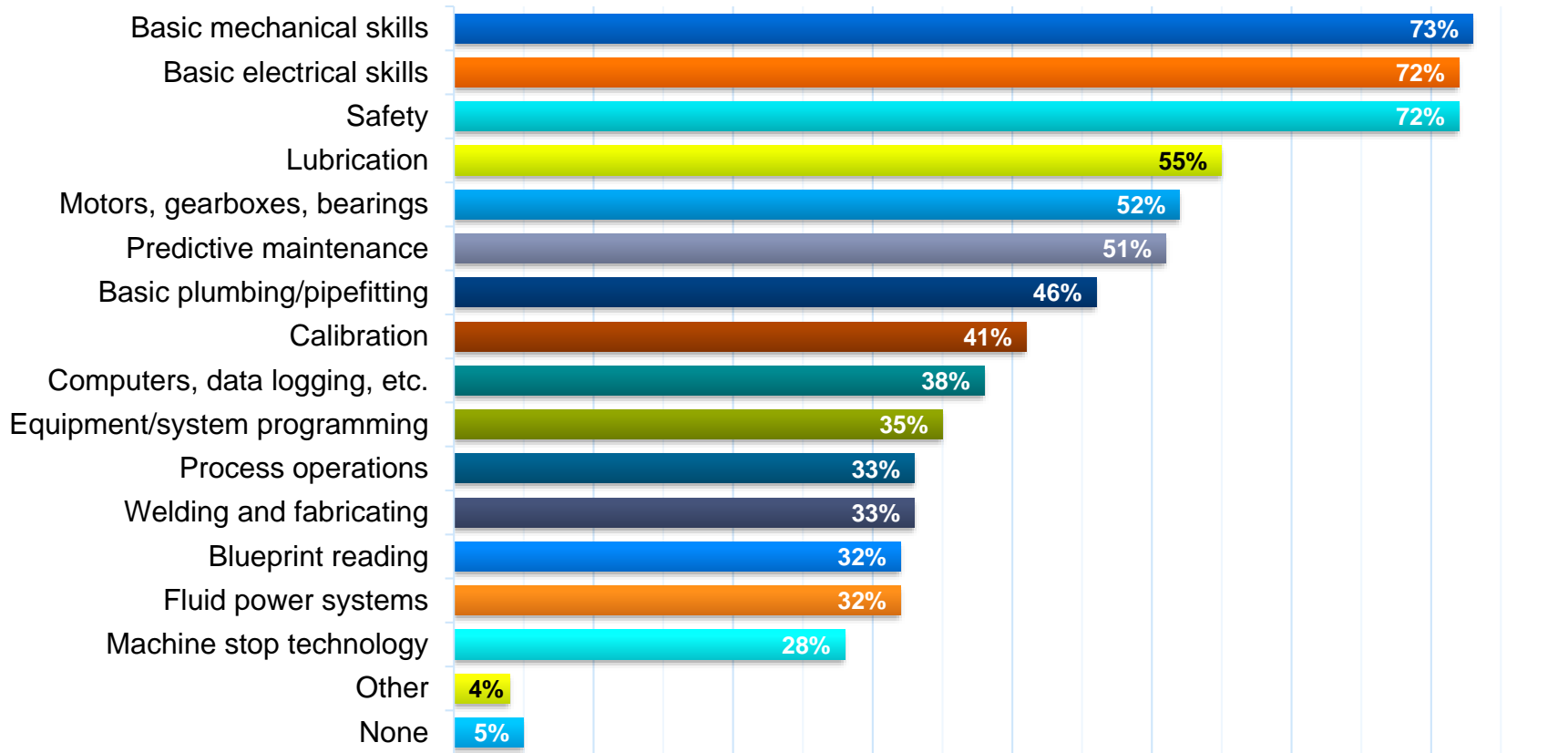
**Plans to decrease downtime**



Q: What is the leading cause of unscheduled downtime in your plant? (n=199); Q: How do you plan to decrease unscheduled downtime in your plant? Check all that apply. (n=199)

# Maintenance personnel training

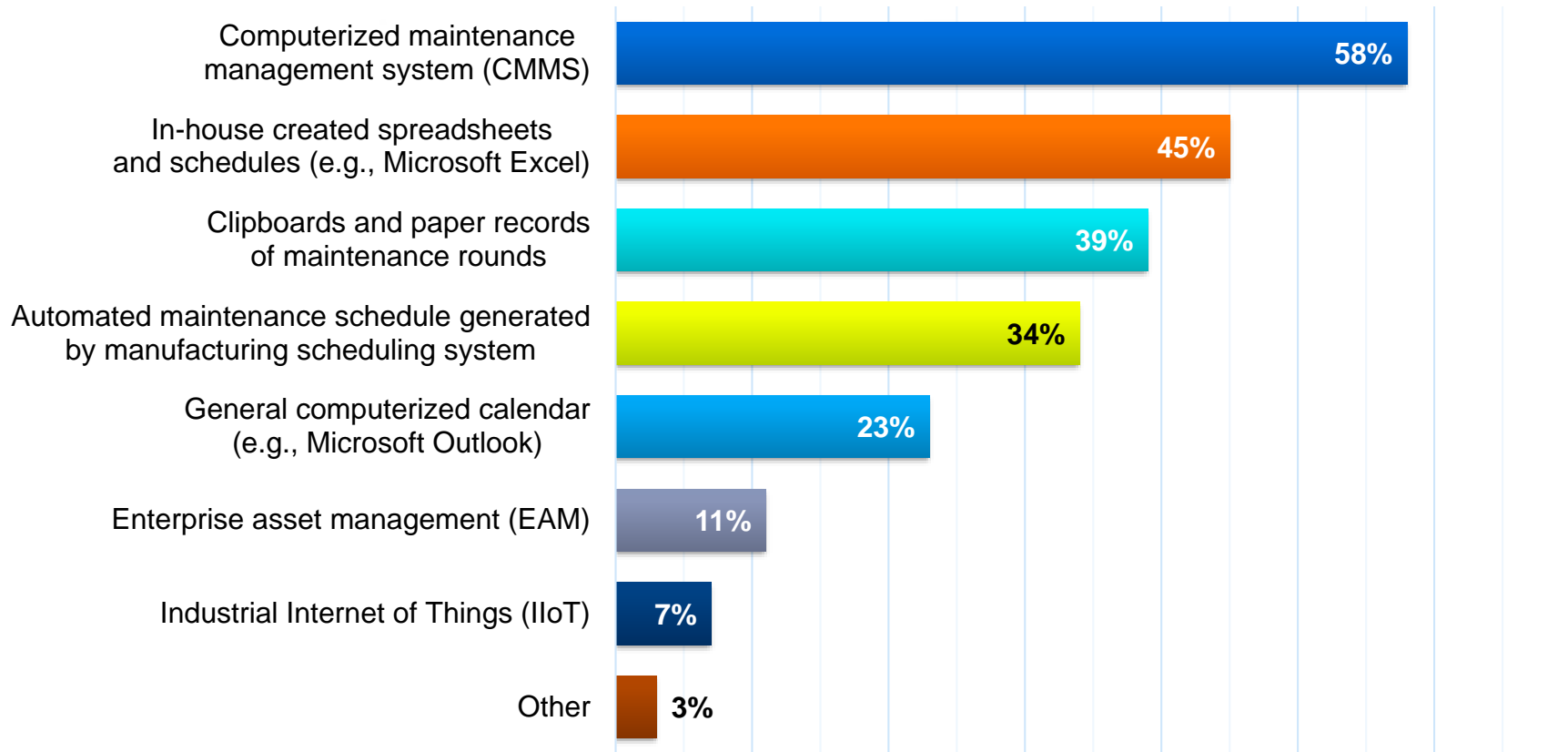
More than half of facilities' maintenance personnel receives training in basic mechanical skills (73%); basic electrical skills (72%); safety (72%); lubrication (55%); motors, gearboxes, and bearings (52%); and predictive maintenance (51%).



Q: What kind of training does your maintenance personnel receive? Check all that apply. (n=199)

# Maintenance technologies

Fewer facilities are using in-house created spreadsheets and schedules to monitor or manage maintenance than last year (45% versus 55% in the 2018 report).

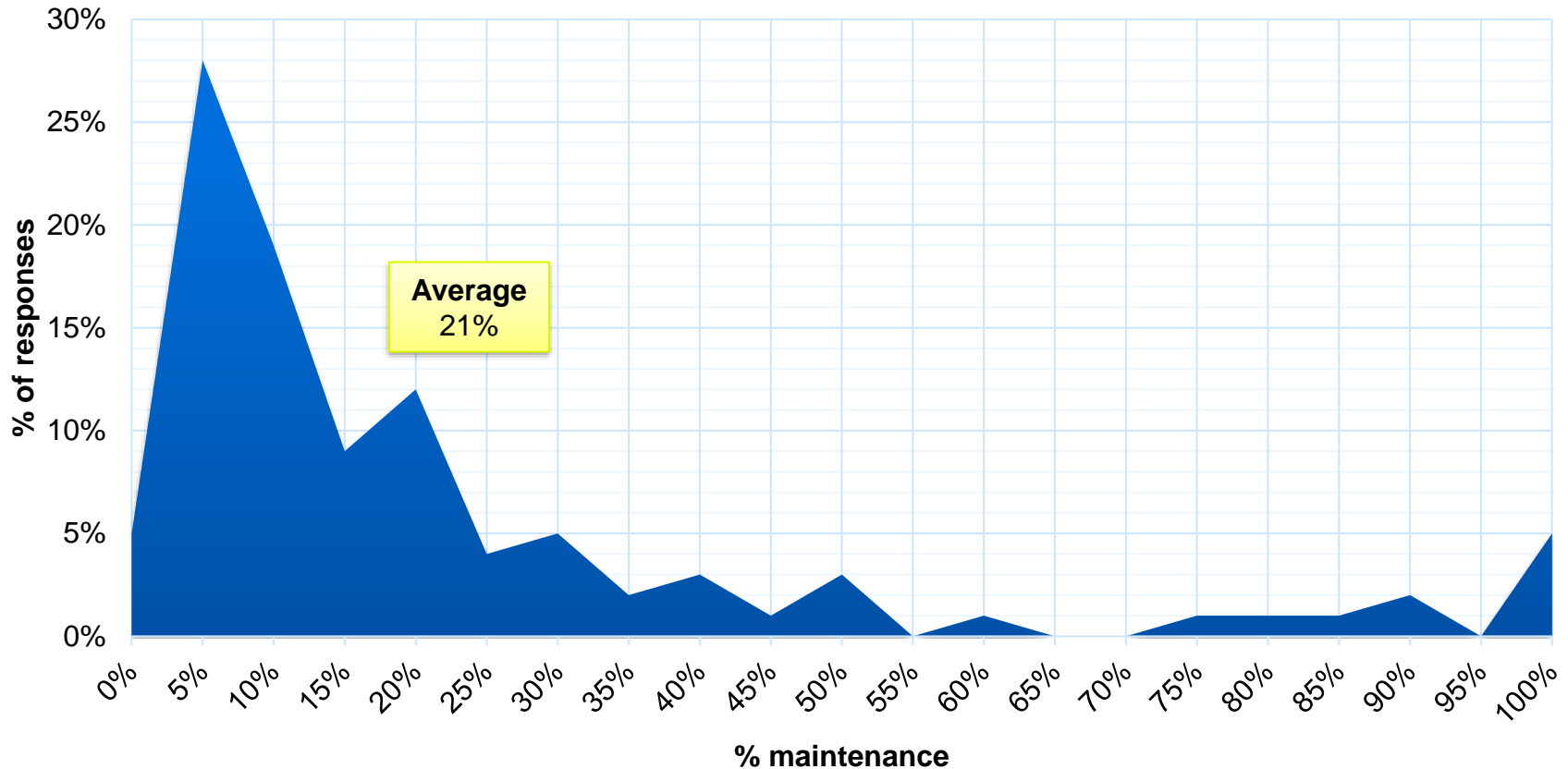


Q: What technologies are used to monitor or manage maintenance within your plant? Check all that apply. (n=198)



# Percentage of operations that is part of maintenance

Looking at the relationship between operations teams and maintenance departments, an average of 21% of a facility's operations personnel are also responsible for maintenance duties.

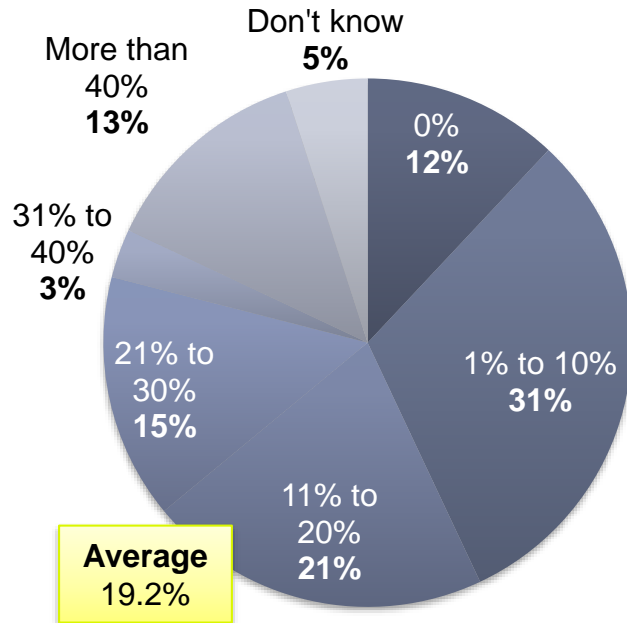


Q: What percentage of your plant's operations team is part of your maintenance department? (n=199)

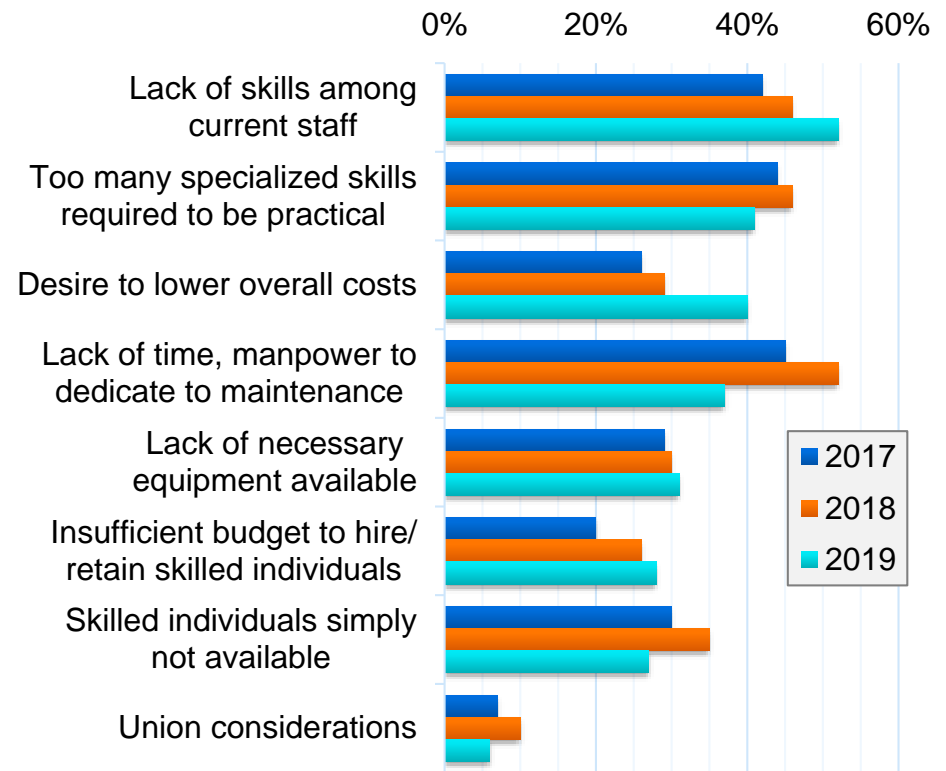
# Outsourcing maintenance

The average facility outsources 19.2% of their maintenance operations. The top reasons for outsourcing, according to 2019 data, are lack of skills among current staff (52%), too many specialized skills required (41%), and a desire to lower overall costs (40%).

**Percentage outsourced**



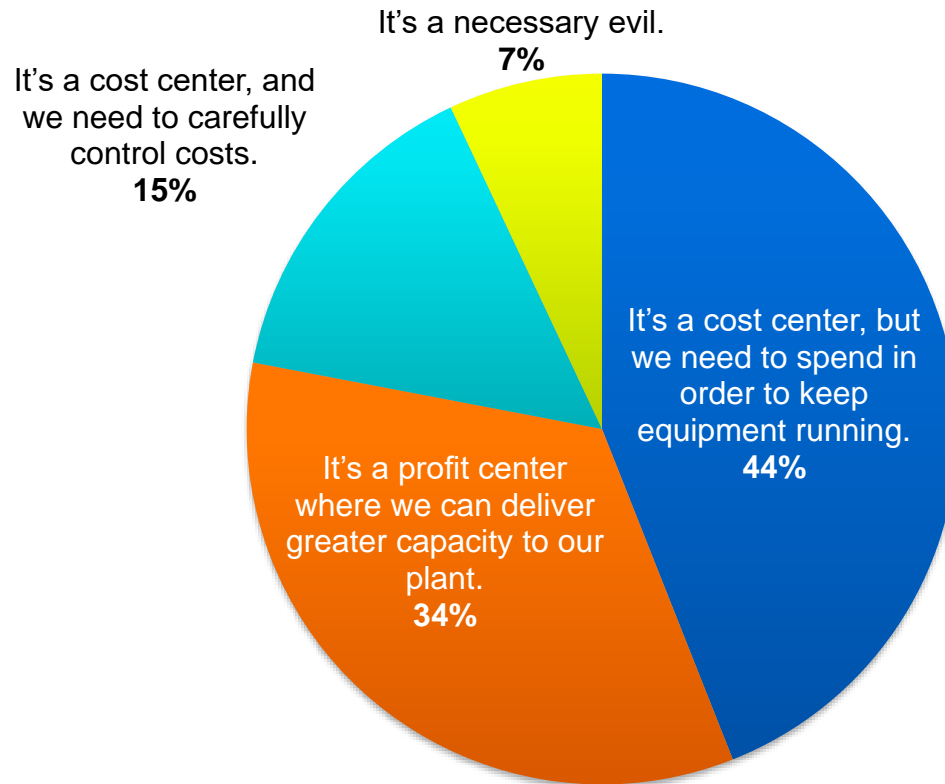
**Reasons for outsourcing**



Q: How much of your plant's maintenance operation is outsourced? (n=199); Q: Which factors led to the outsourcing of maintenance operation at your plant? Check all that apply. (n=268;167;165)

# Attitude towards maintenance

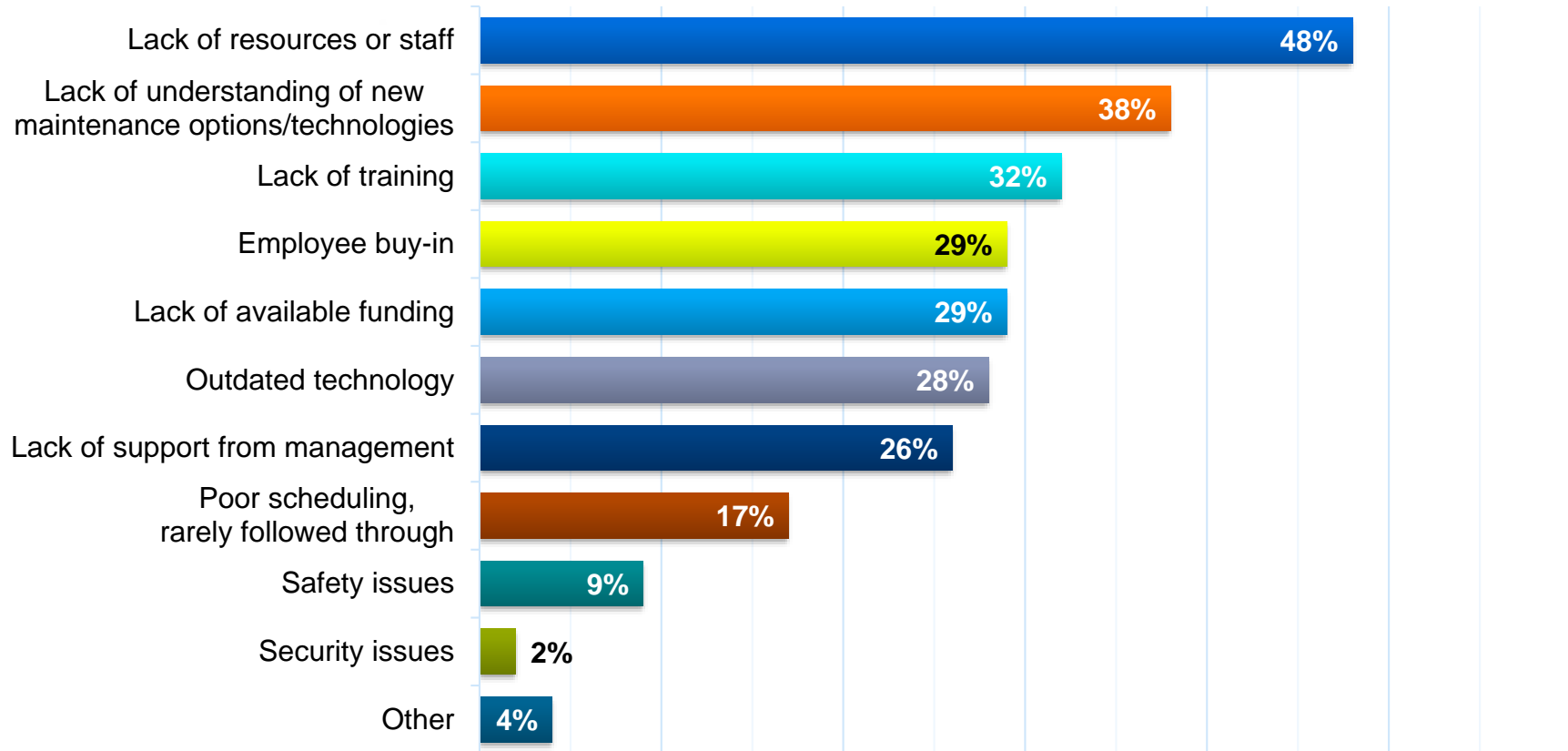
Fifty-nine percent of engineers and managers see maintenance as a cost center, most of whom understand the need to spend in order to keep equipment running. Another 34% see maintenance as a profit center that delivers greater capacity to their facility.



Q: Which of the following statements best describes your attitude toward maintenance? (n=199)

# Challenges to improving maintenance

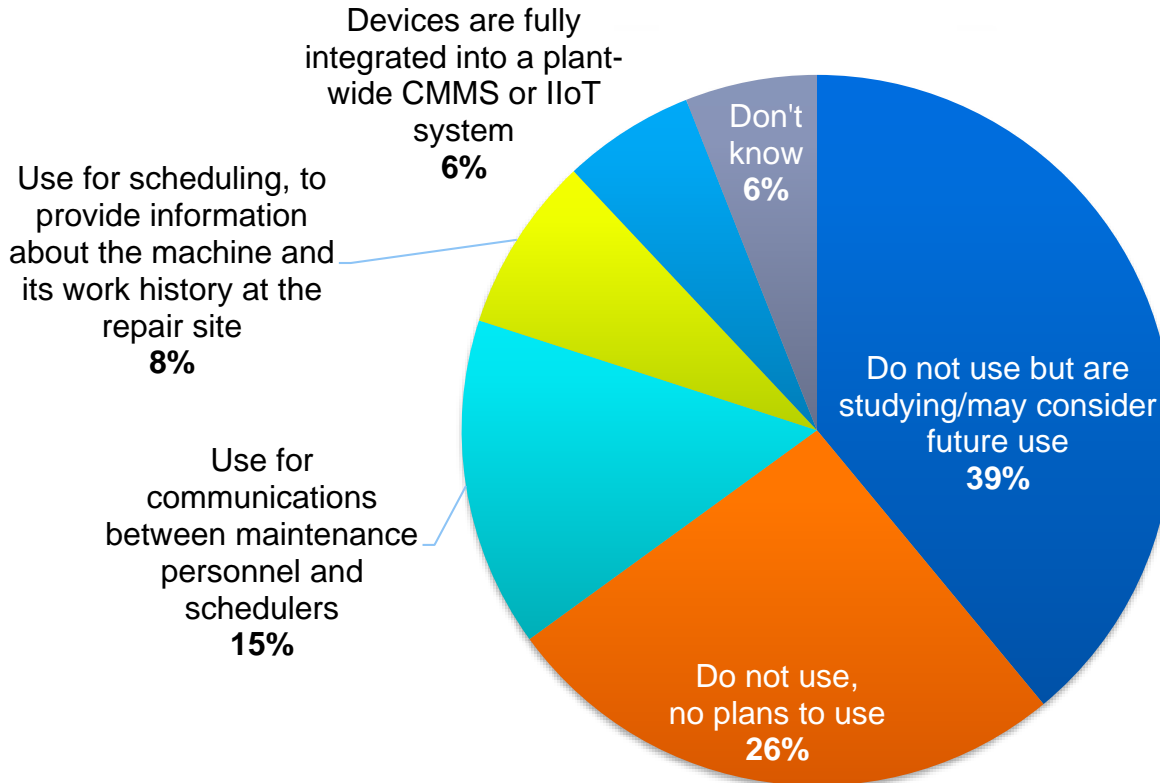
Key challenges to improving facility maintenance include lack of resources or staff (48%), lack of understanding about new maintenance options and technologies (38%), and lack of training (32%).



Q: What are the key challenges for improving maintenance at your facility? Check all that apply. (n=199)

# Plant usage of handheld/mobile devices

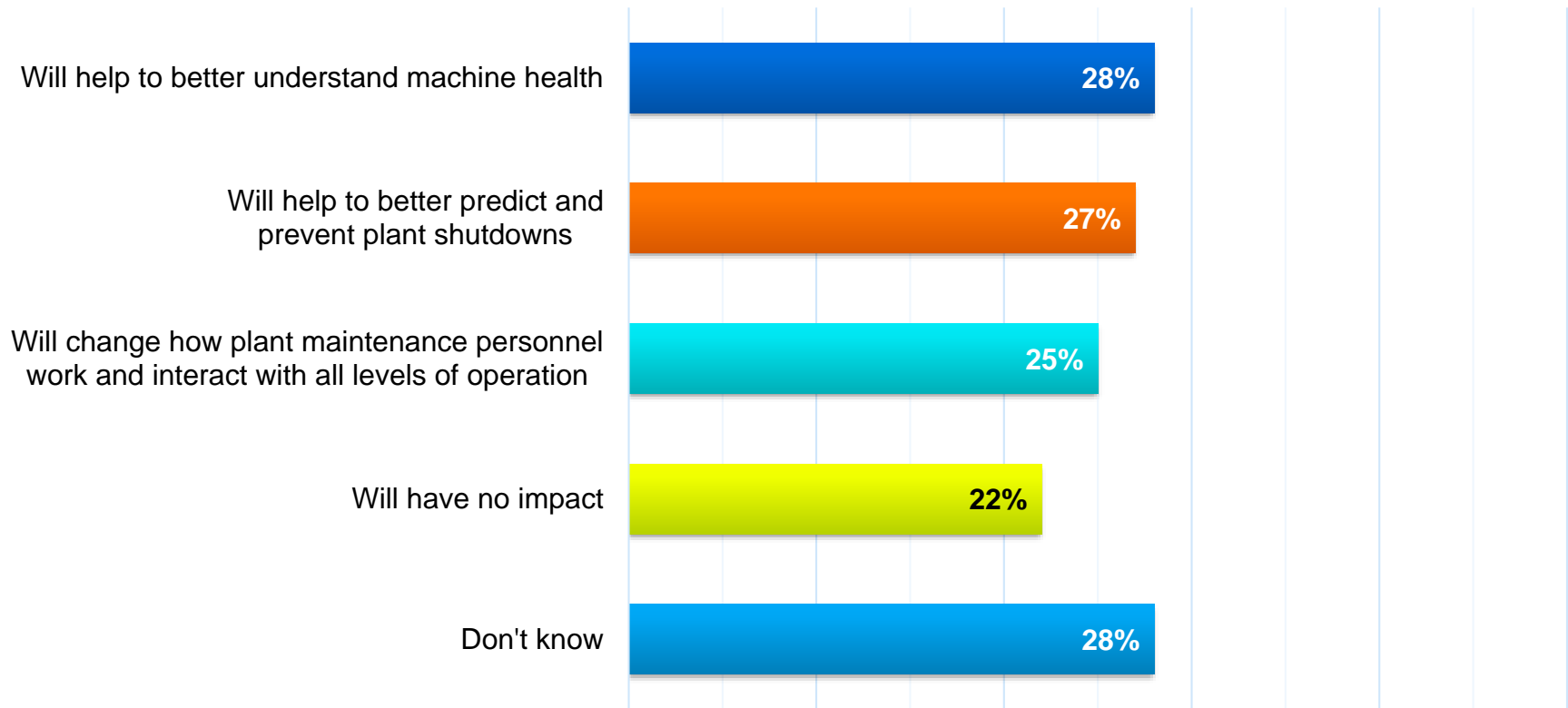
Fifteen percent of facilities allow the use of handheld or mobile devices for communications between maintenance personnel and schedulers; 8% allow these devices to schedule maintenance and provide information about machine health and work history.



Q: To what extent is your plant using handheld/mobile devices for plant maintenance? (n=198)

# Impact of the Industrial Internet of Things

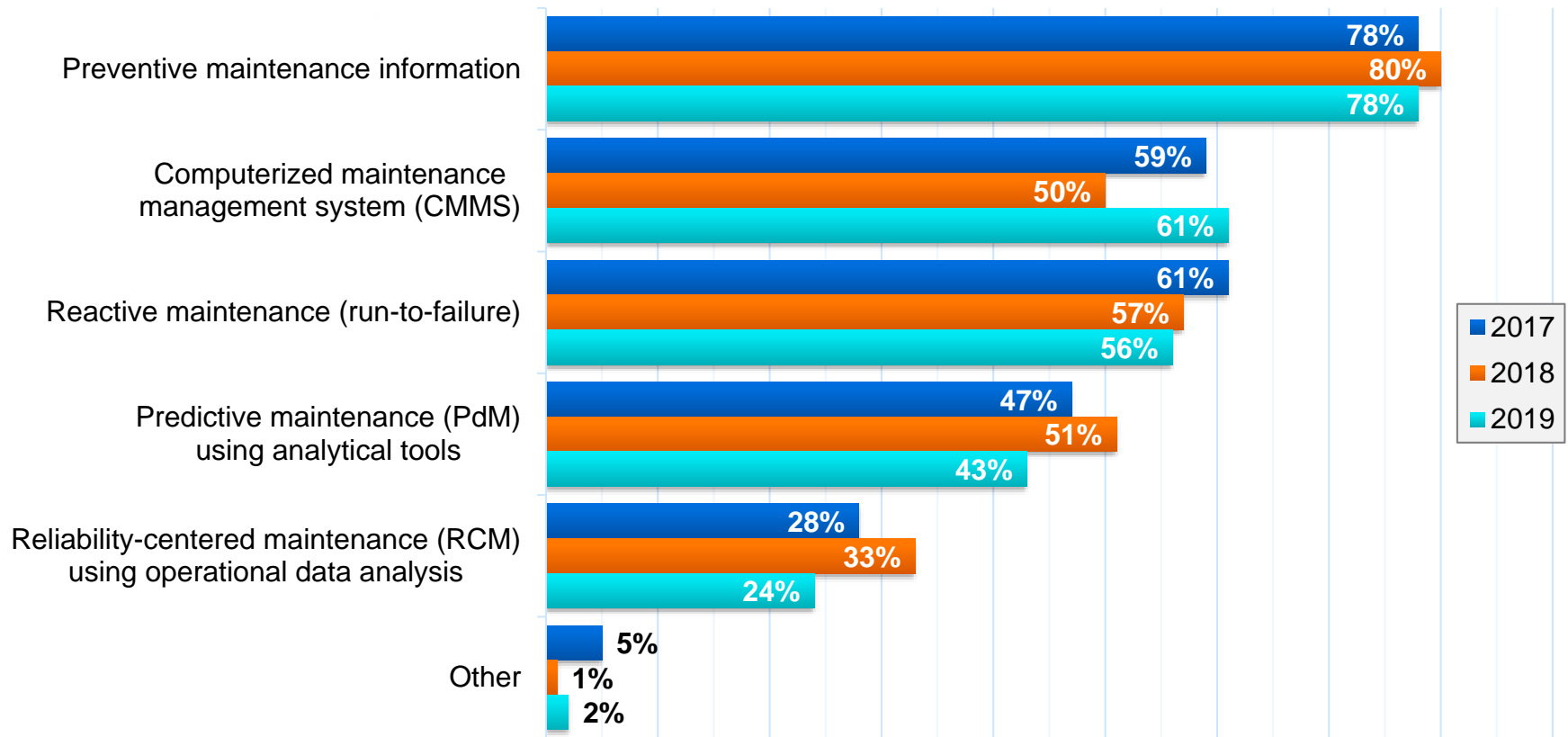
Twenty-eight percent of engineers and managers believe that adopting the Industrial Internet of Things (IIoT) will help them to better understand machine health, and therefore keeping up with planned routine maintenance. Another 28% are unsure of how or if IIoT would impact their facility's maintenance operations.



Q: How will the Industrial Internet of Things (IIoT) impact plant maintenance operations? Check all that apply. (n=199)

# Maintenance strategies

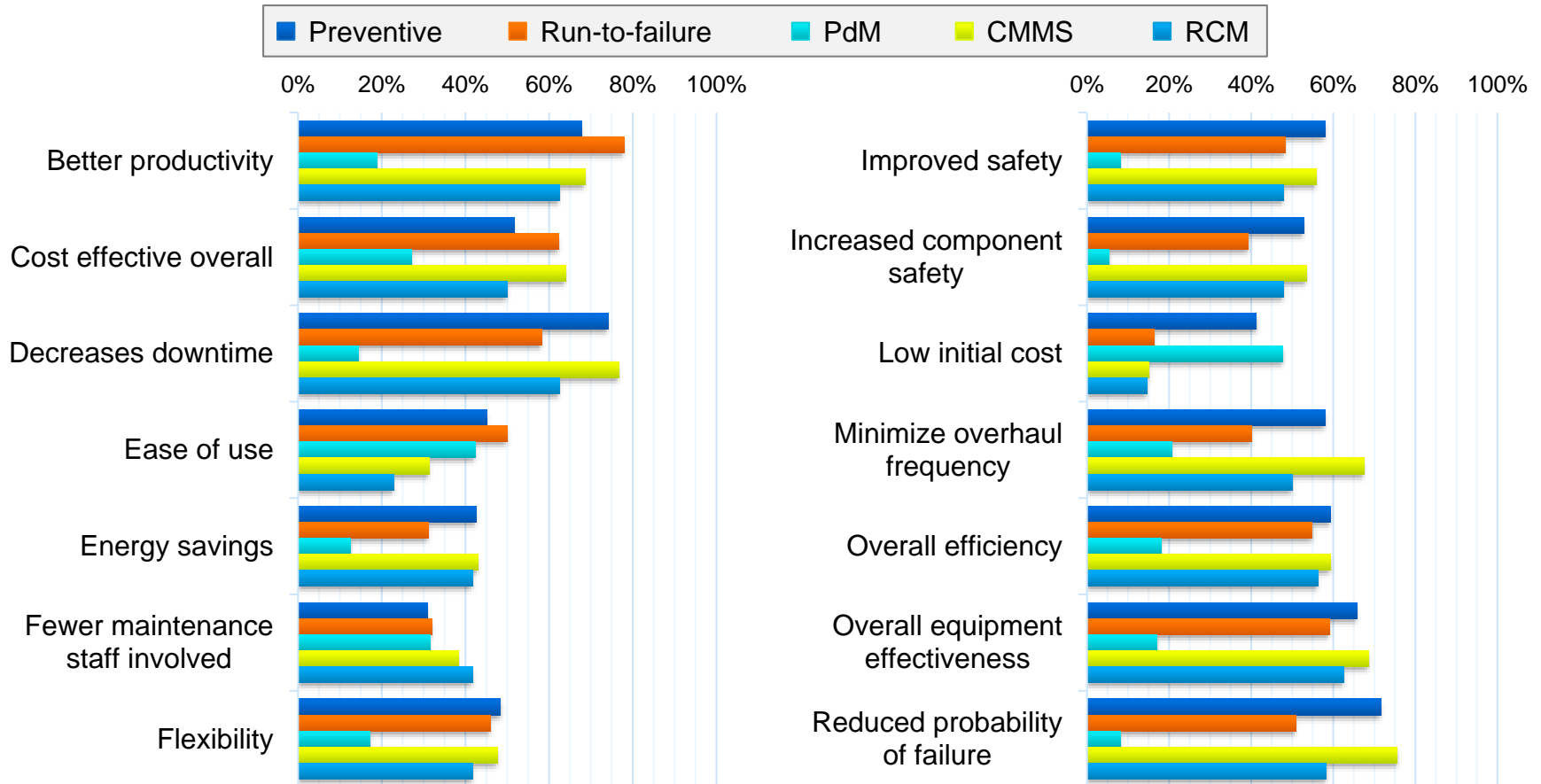
Facilities are using multiple maintenance strategies, depending on the equipment on the plant floor. Seventy-eight percent use a preventive maintenance strategy, while 61% employ a CMMS, and 56% opt to use a reactive maintenance approach.



Q: Which of the following maintenance strategies are present within your plant? Check all that apply. (n=322;201;199)

# Maintenance strategies: advantages

The top advantage to a predictive maintenance strategy is a low initial cost, followed by ease of use, while a preventive maintenance strategy also boasts low initial cost, ease of use, and other key benefits—such as decreased downtime, cost effective overall, and improved safety.



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? Check all that apply in each column. (n=155;122;111;86;48)



# Additional resources from *Plant Engineering*

Thank you for downloading the *Plant Engineering* 2019 Maintenance Study. Use the links below to access additional information on manufacturing facility maintenance strategies.

## Maintenance news and articles

- [Asset management](#)
- [Lean maintenance](#)
- [Contract maintenance](#)
- [Inventory](#)
- [Material handling](#)
- [Maintenance strategy](#)

## Other resources

- [New Products for Engineers](#)
- [Online training: CFE Edu](#)
- [Webcasts](#)
- [Case studies](#)
- [Ebooks](#)
- [Maintenance Connection newsletter](#)
- [Predictive & Preventive Maintenance newsletter](#)

## Editorial research studies

- 2018 Salary Survey
- [2018 Predictive Maintenance](#)
- [2018 Facilities Maintenance](#)
- Additional studies available at:  
[www.plantengineering.com/research](http://www.plantengineering.com/research)

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