

Maintenance Study

February 2014

Introduction and methodology

Objective

Plant Engineering performed this research to better understand maintenance practices and strategies currently in place in North American 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.

Method

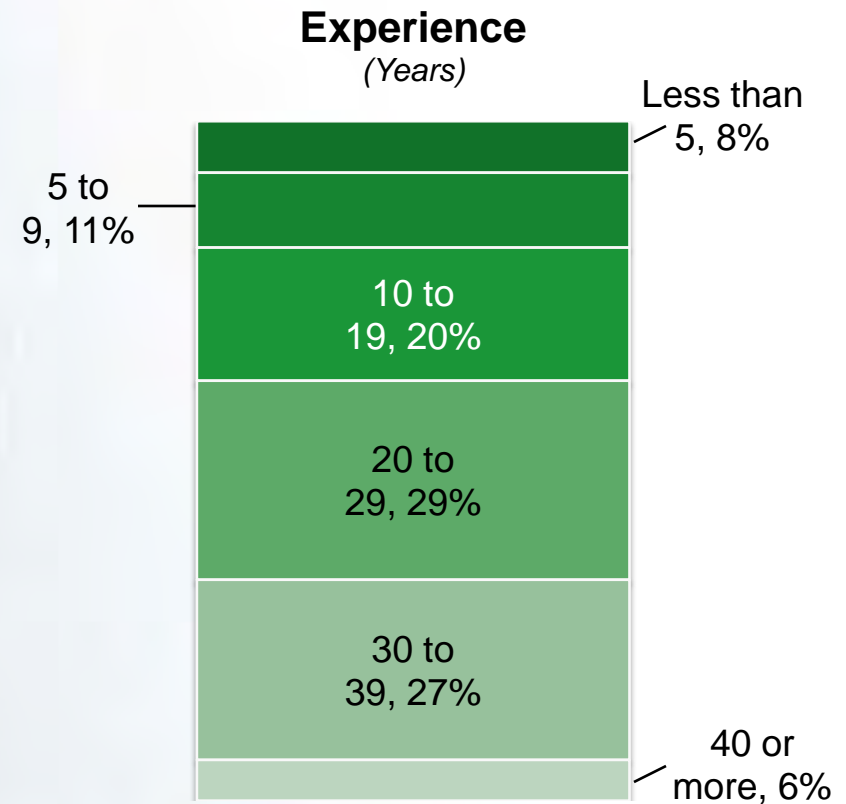
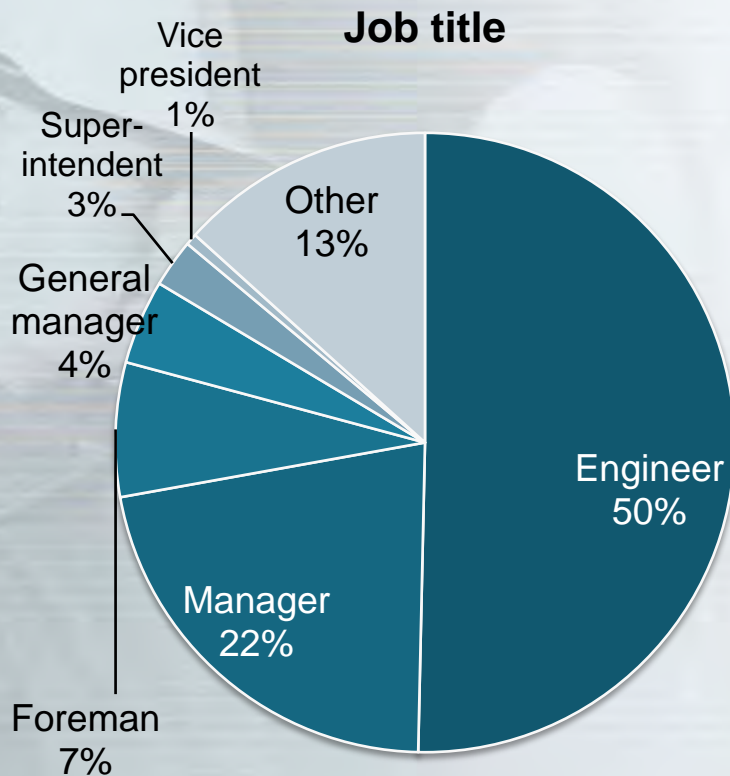
Subscribers were sent an email asking them to participate in this study. The email included a URL linked to the questionnaire.

- **Data collected:** Jan. 2, 2014, through Jan. 16, 2014.
- Respondents were asked if they are responsible for maintenance of all or part of their facilities. Those responding positively were asked about maintenance strategies, outsourcing maintenance, training, technologies, and unscheduled downtime.
- **Number of respondents:** 317
 - *Margin of error: +/- 5.5% at a 95% confidence level*
- **Incentive:** Survey participants were offered the opportunity to enter a drawing for a \$150 VISA gift card.

Respondent profile

Job title and industry experience

Half of respondents indicated their job title as an engineer, while 26% are in a management position. Sixty-two percent have 20 or more years of industry experience.



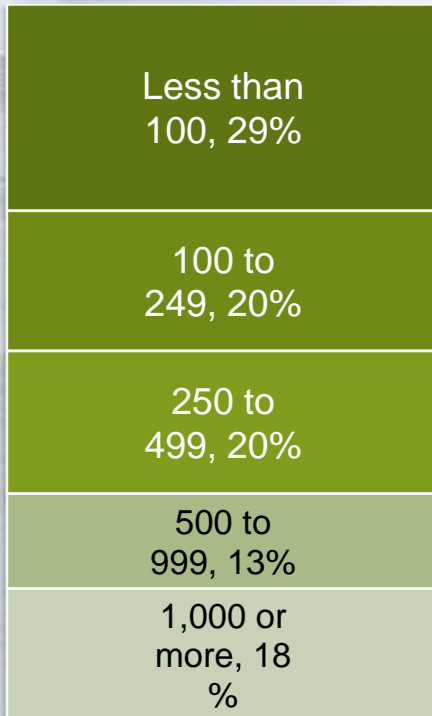
Q: Which of the following best describes your job title? (n=316)

Q: For approximately how long have you worked in a plant or engineering-related position? (n=317)

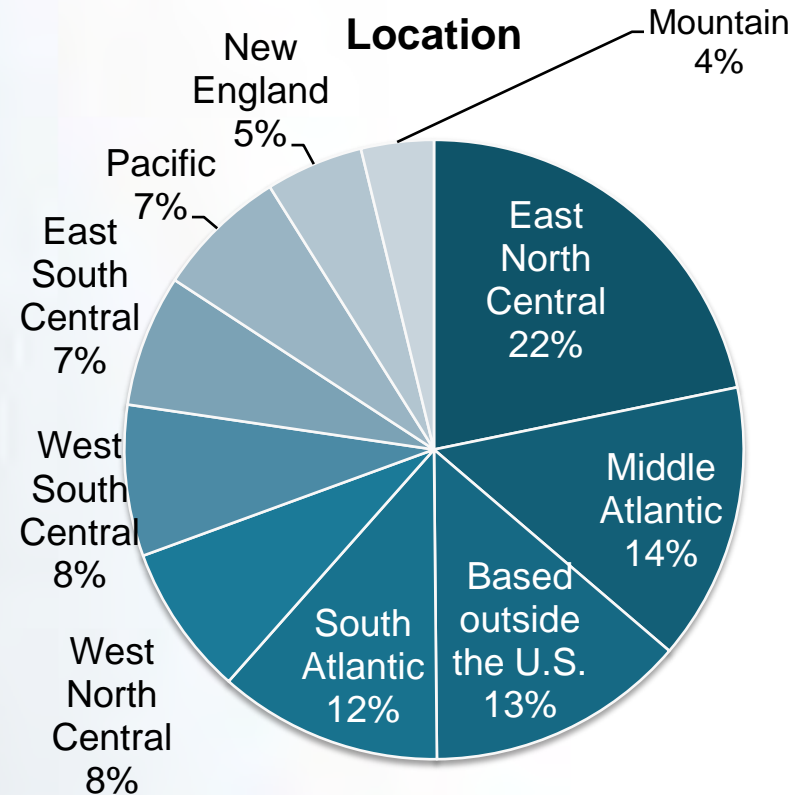
Company size and location

Sixty-nine percent of respondents have less than 500 employees at their respective locations, and 30% of respondents are based in the North Central region of the United States.

No. of employees



Location

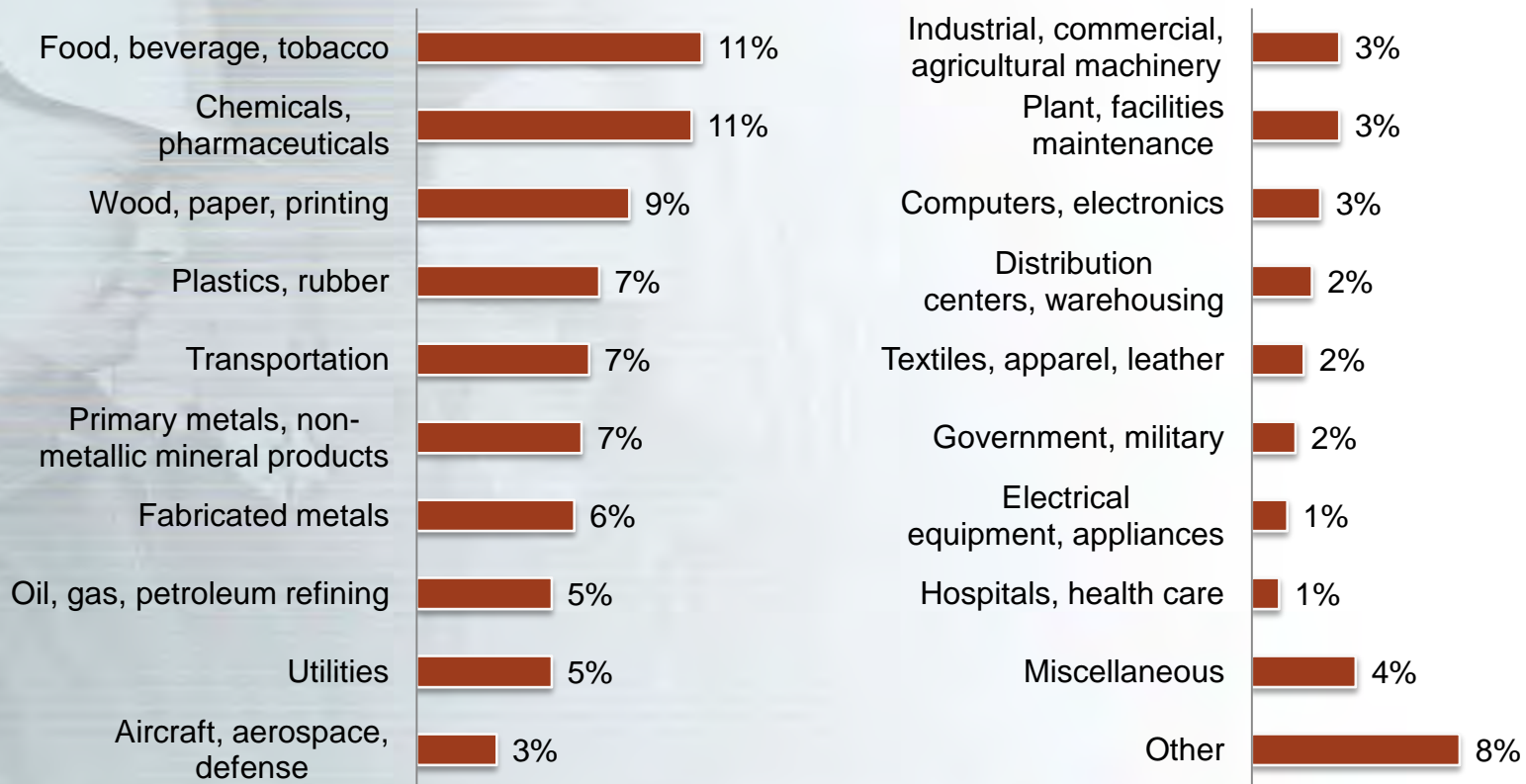


Q: Approximately how many people work at your location? (n=316)

Q: In what region of the country are you based? (n=317)

Business or product manufactured

The top three industries represented are by respondents are food, beverage, or tobacco (11%); chemicals or pharmaceuticals (11%); and wood, paper, printing, or related products (9%).

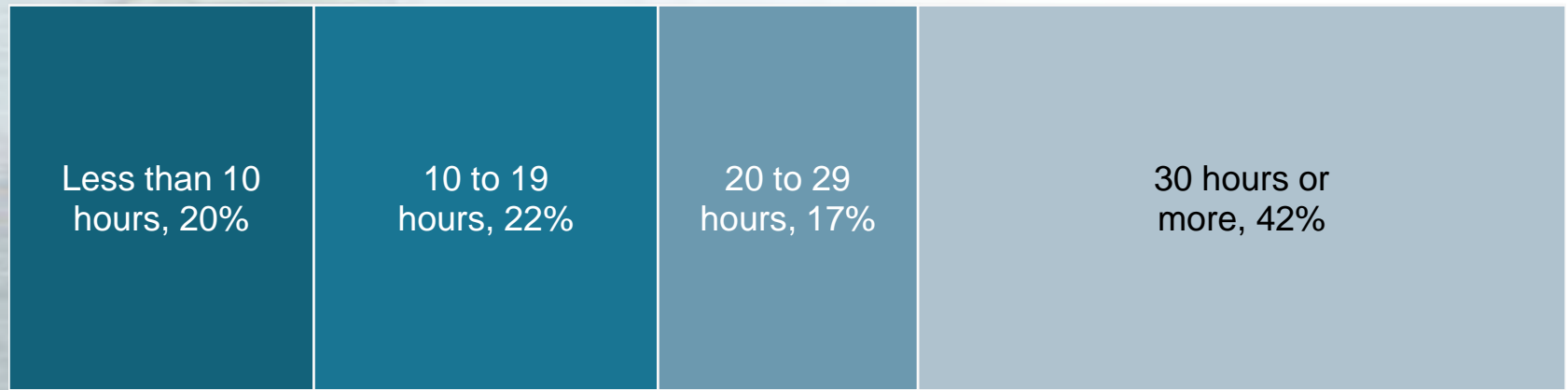


Q: What is the primary business or product manufactured at your location? (n=317)

Facility maintenance

Time spent on maintenance each week

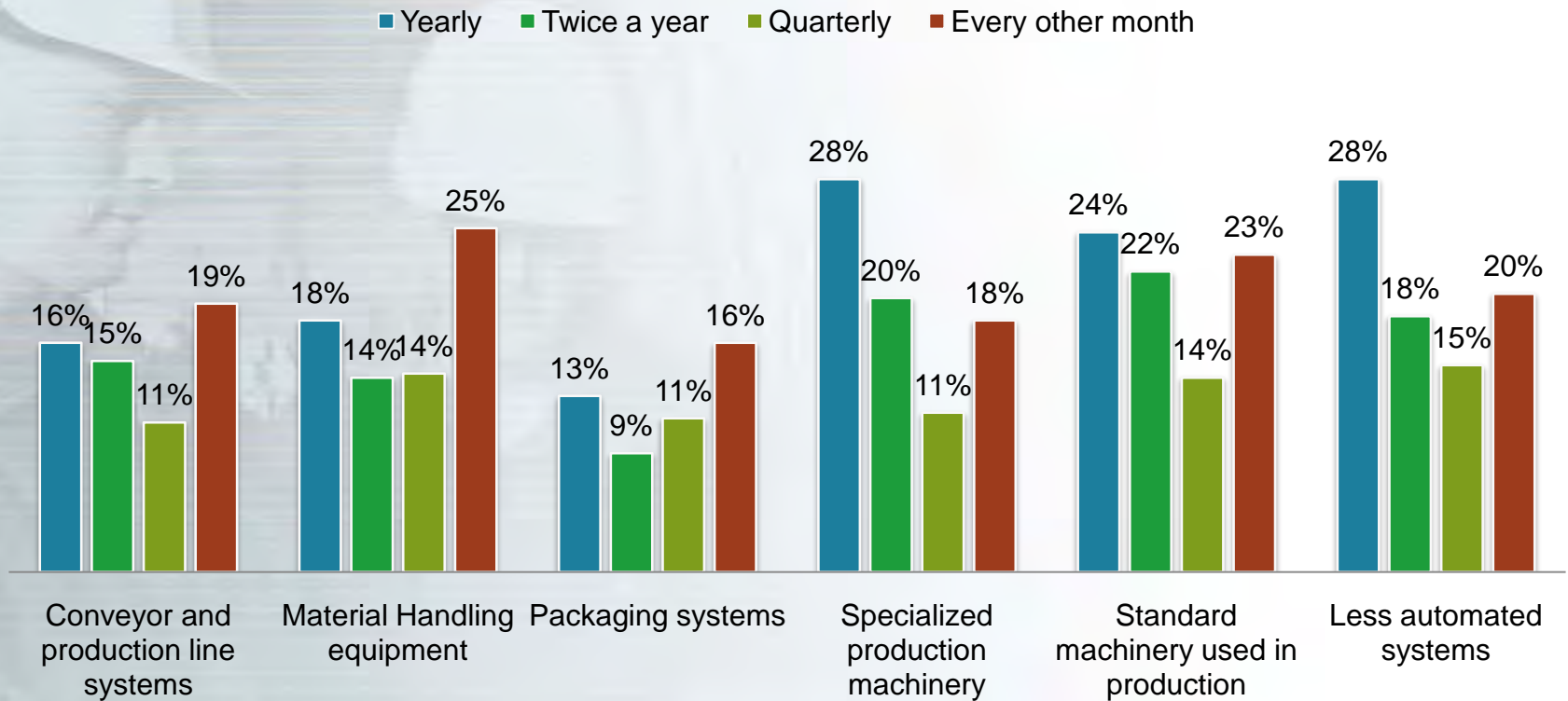
Fifty-nine percent of respondents indicated that their plants spend 20 hours or more each week on scheduled maintenance, while 20% spend less than 10 hours per week.



Q: Approximately how many hours per week does your plant spend on scheduled maintenance? (n=317)

Systems shutdown schedule

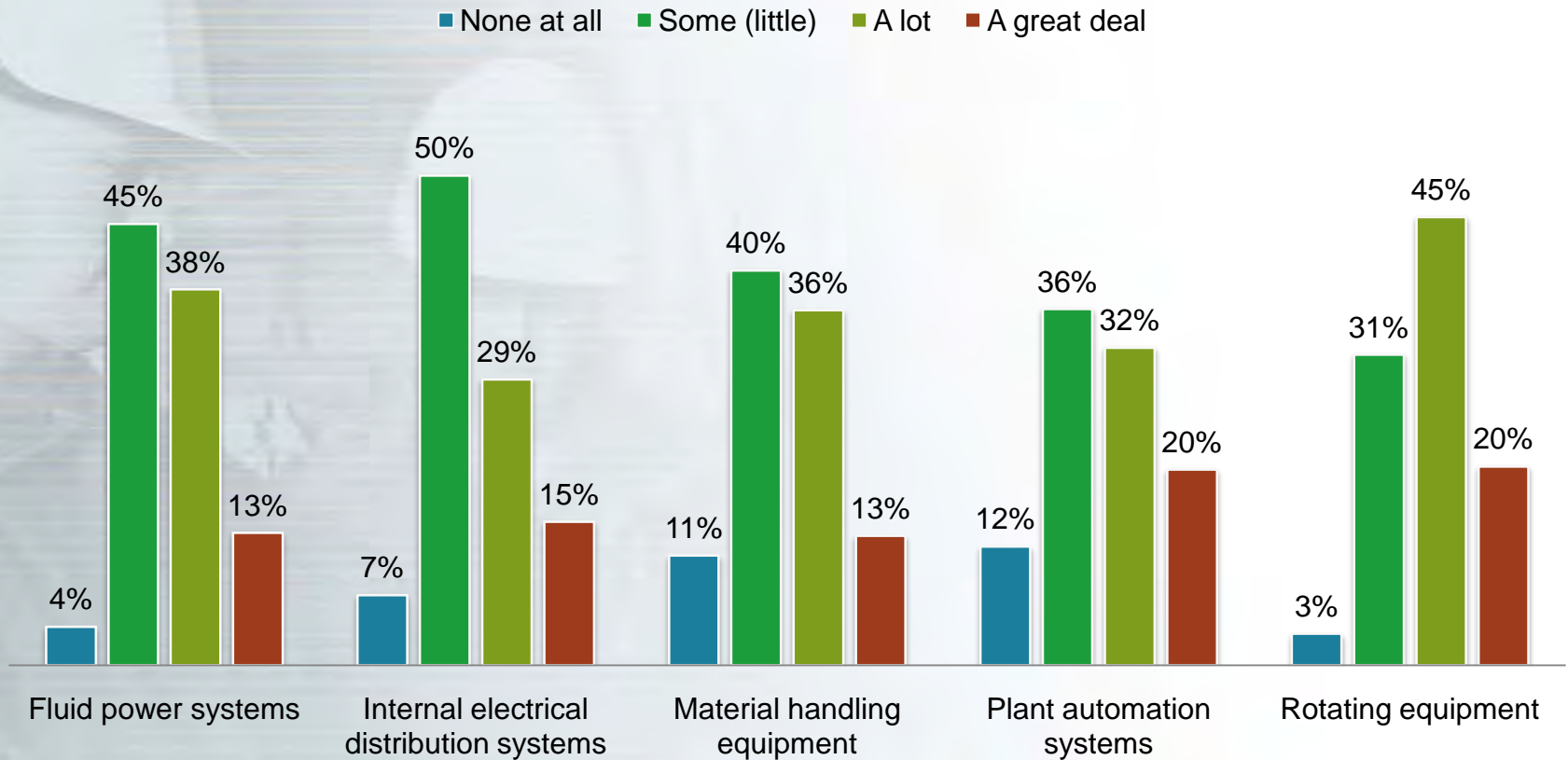
Twenty-eight percent of respondents indicated that their plants shutdown specialized production machinery only once each year for scheduled maintenance, while 25% say their material handling equipment is shutdown every other month.



Q: How often are the following areas of your plant shutdown for scheduled maintenance? (n=317)

Attention to systems maintenance

Half of respondents said that their internal electrical distribution systems receive “some” maintenance support, while rotating equipment receives “a lot” (45%) or “a great deal” (20%).

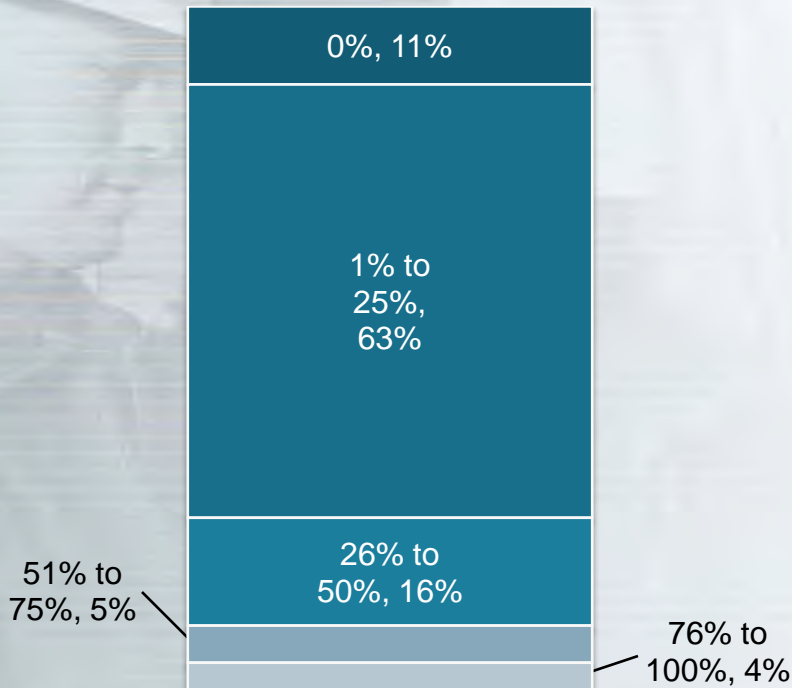


Q: On a scale of 1 to 4, where 1 means "none at all" and 4 means "a great deal," rank the following areas of your plant based on the amount of maintenance support they receive: (n=311)

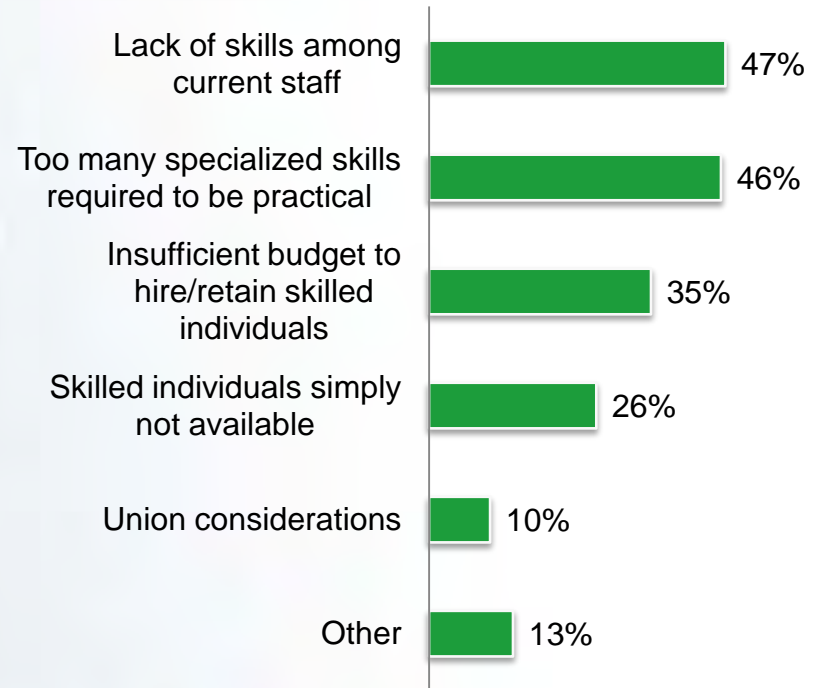
Outsourcing maintenance

Almost three-quarters of respondents indicated that less than 25% of their maintenance operations are outsourced, and the top reasons for outsourcing are the lack of skills among current staff (47%) and the impractical amount of skills necessary (46%).

Outsourced maintenance



Reasons for outsourcing

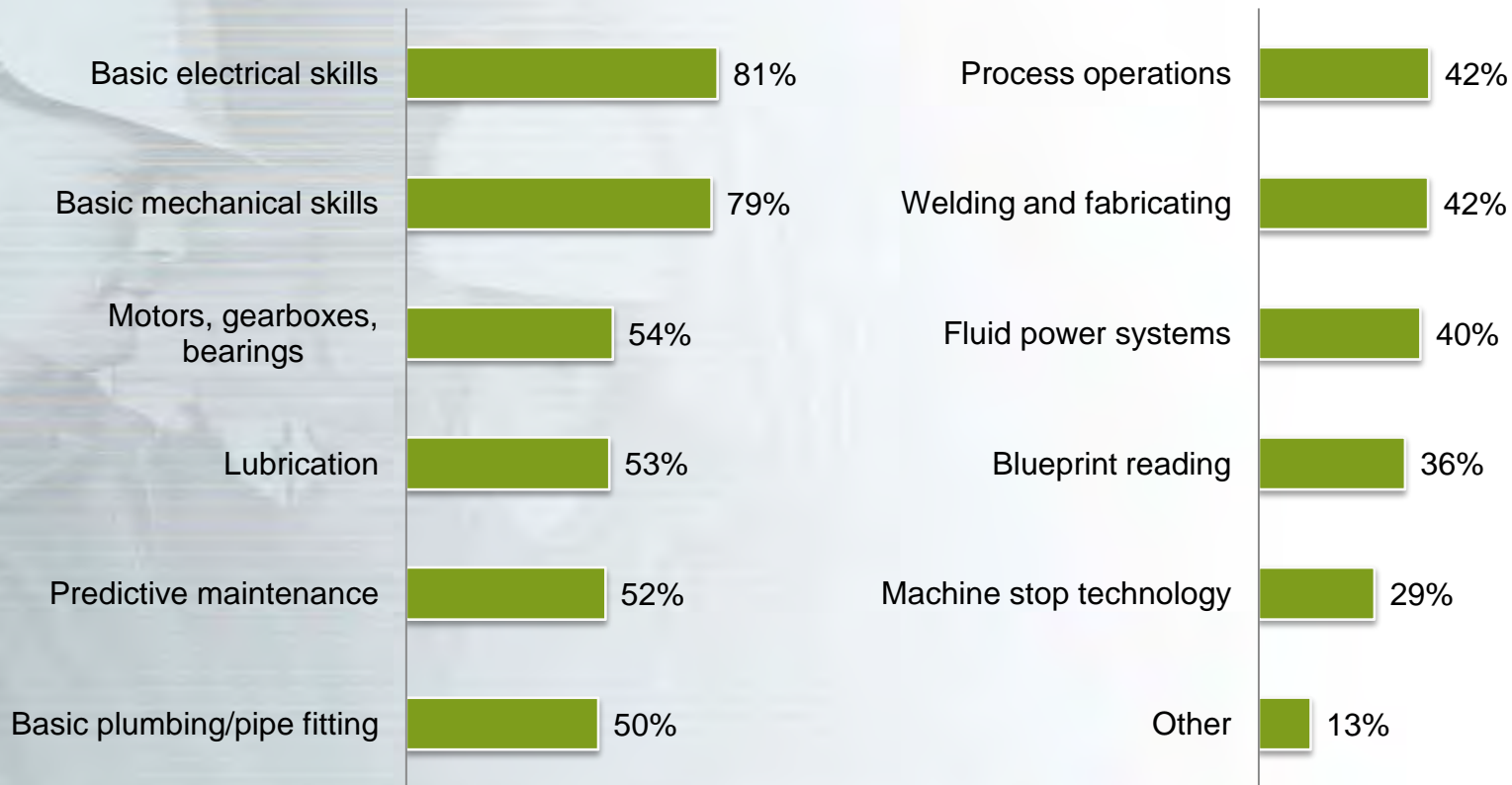


Q: How much of your plant's maintenance operation is outsourced? (n=317)

Q: What factors led to the outsourcing of maintenance operation at your plant? (n=281)

Maintenance training

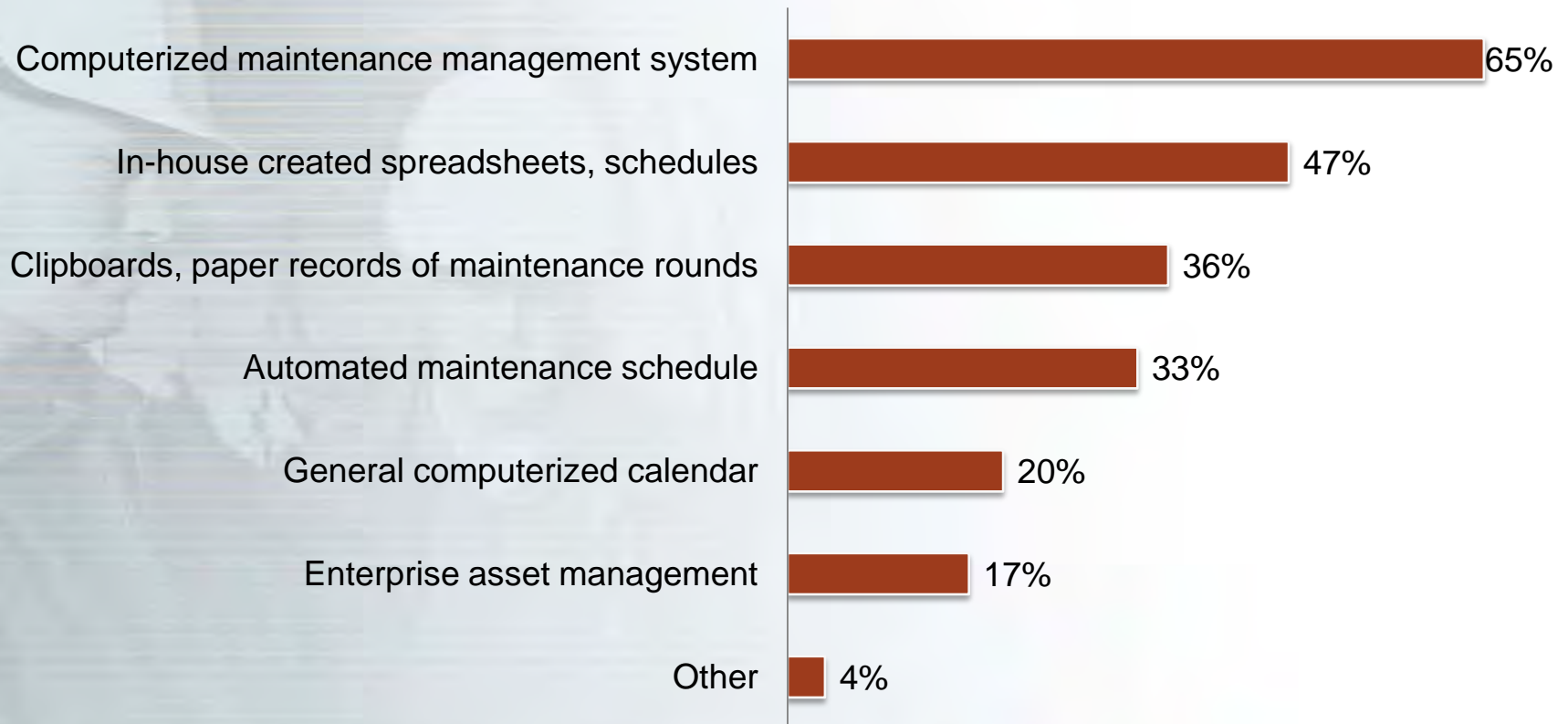
More than half of respondents' maintenance personnel receive training in basic electrical and mechanical skills; motor, gearboxes, and bearings; lubrication; and predictive maintenance.



Q: What kind of training does your maintenance personnel receive? (n=317)

Maintenance technologies

Nearly two-thirds of respondents' facilities use a computerized maintenance management system to monitor or manage maintenance, while only 33% use a standard automated maintenance schedule.

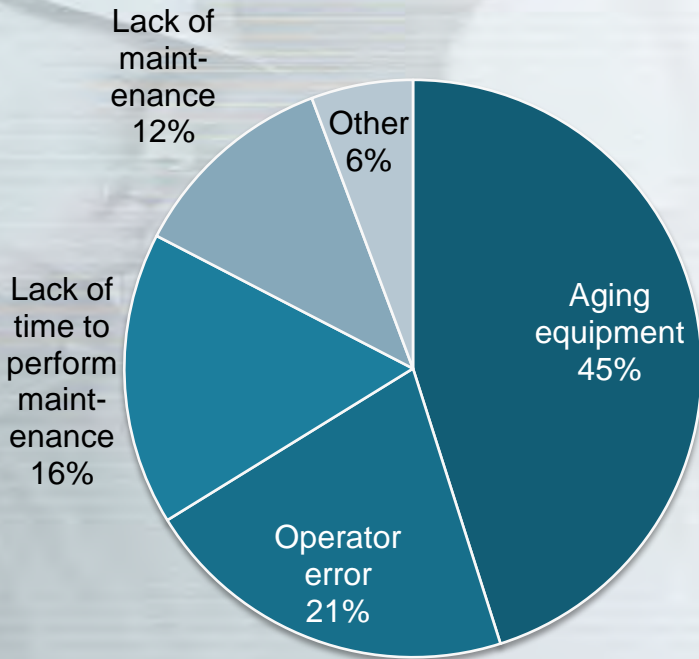


Q: What technologies are used to monitor or manage maintenance within your plant? (n=317)

Unscheduled downtime

Aging equipment (45%) and operator errors (21%) are the leading causes of unscheduled downtime, according to respondents. Thirty-one percent of respondents mentioned implementing better preventive maintenance in order to decrease future unscheduled downtime.

Causes



Plans to decrease downtime

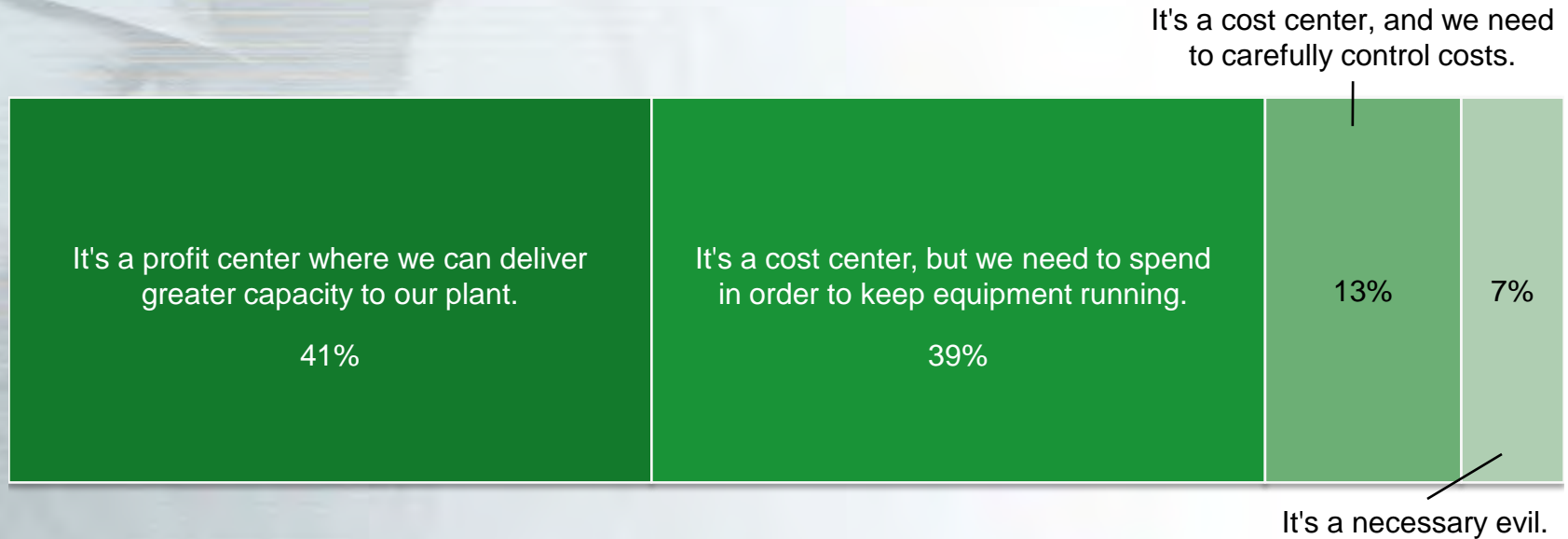
Preventive maintenance	31%
Equipment upgrades	20%
Better/more training	14%
Better/more monitoring	8%

Q: What is the leading cause of unscheduled downtime in your plant? (n=317)

Q: How do you plan to decrease unscheduled downtime in your plant? (n=278)

Attitude towards maintenance

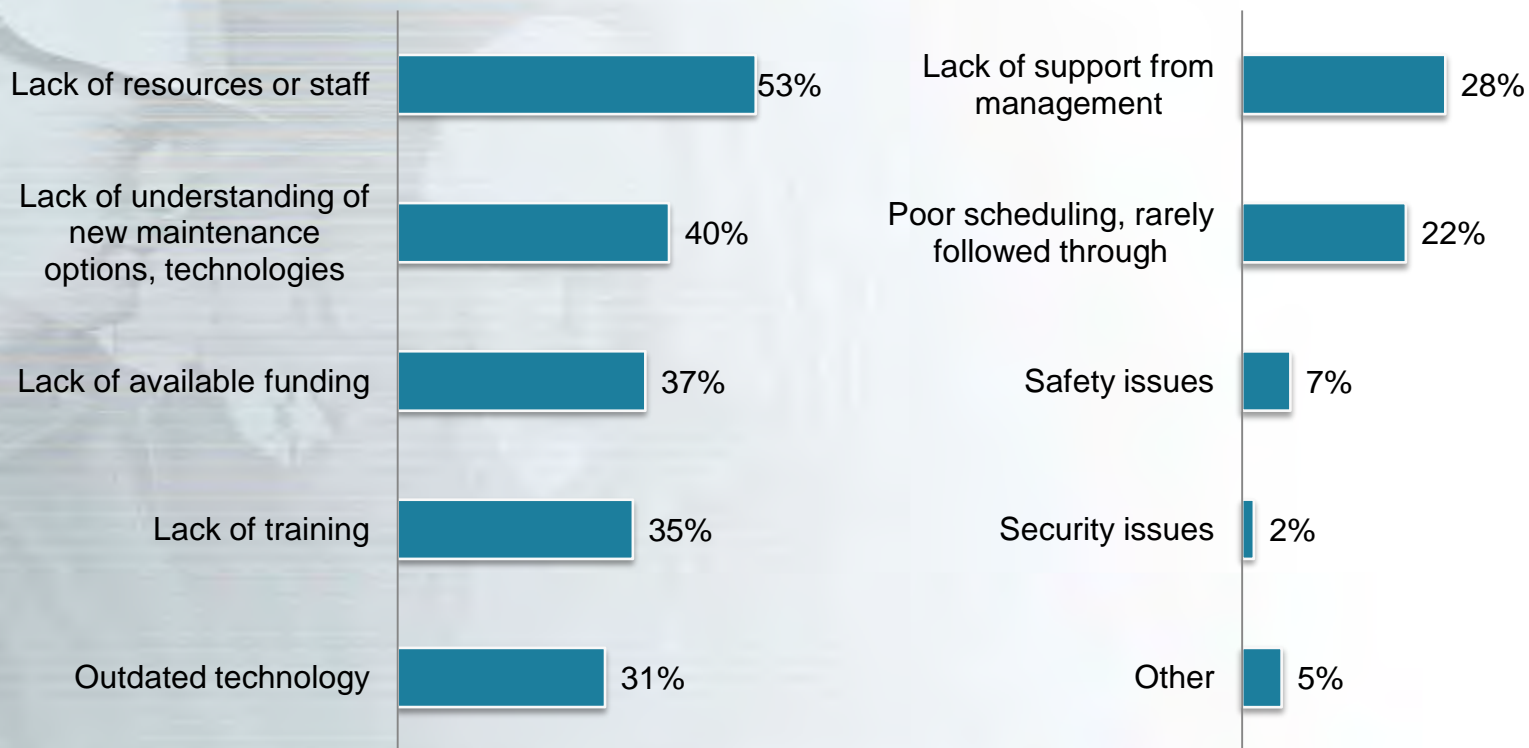
More than half of respondents see maintenance as a cost center, but 41% see it as a profit center because they are improving production within their plants.



Q: Which of the following statements best describes your attitude toward maintenance? (n=317)

Challenges for improving maintenance

The key challenges respondents indicated for improving maintenance in their facilities are the lack of resources or staff (53%), the lack of understanding of new maintenance options and technologies (40%), and the lack of available funding (37%).

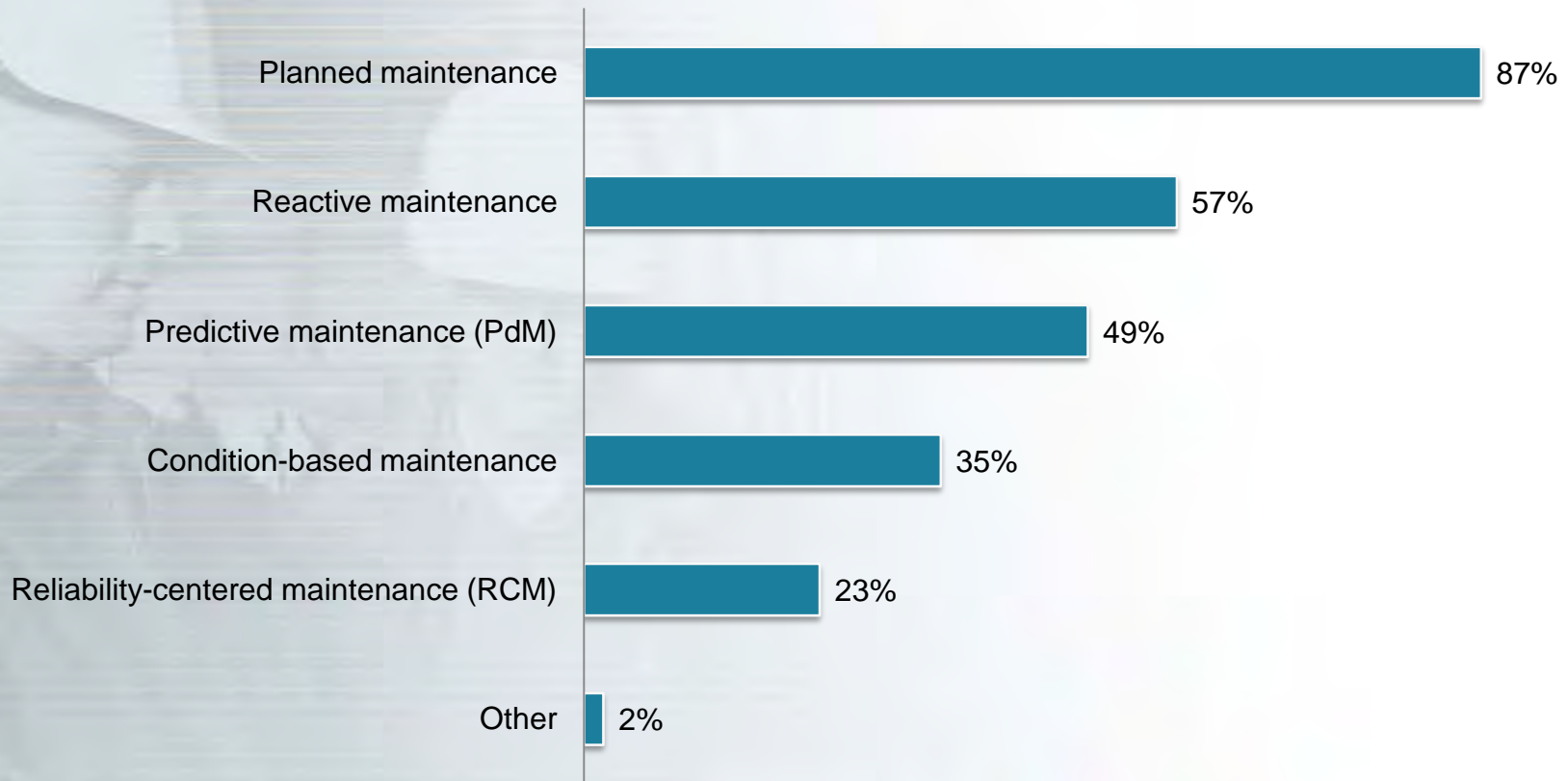


Q: What are the key challenges for improving maintenance at your facility? (n=317)

Maintenance strategies

Maintenance strategies

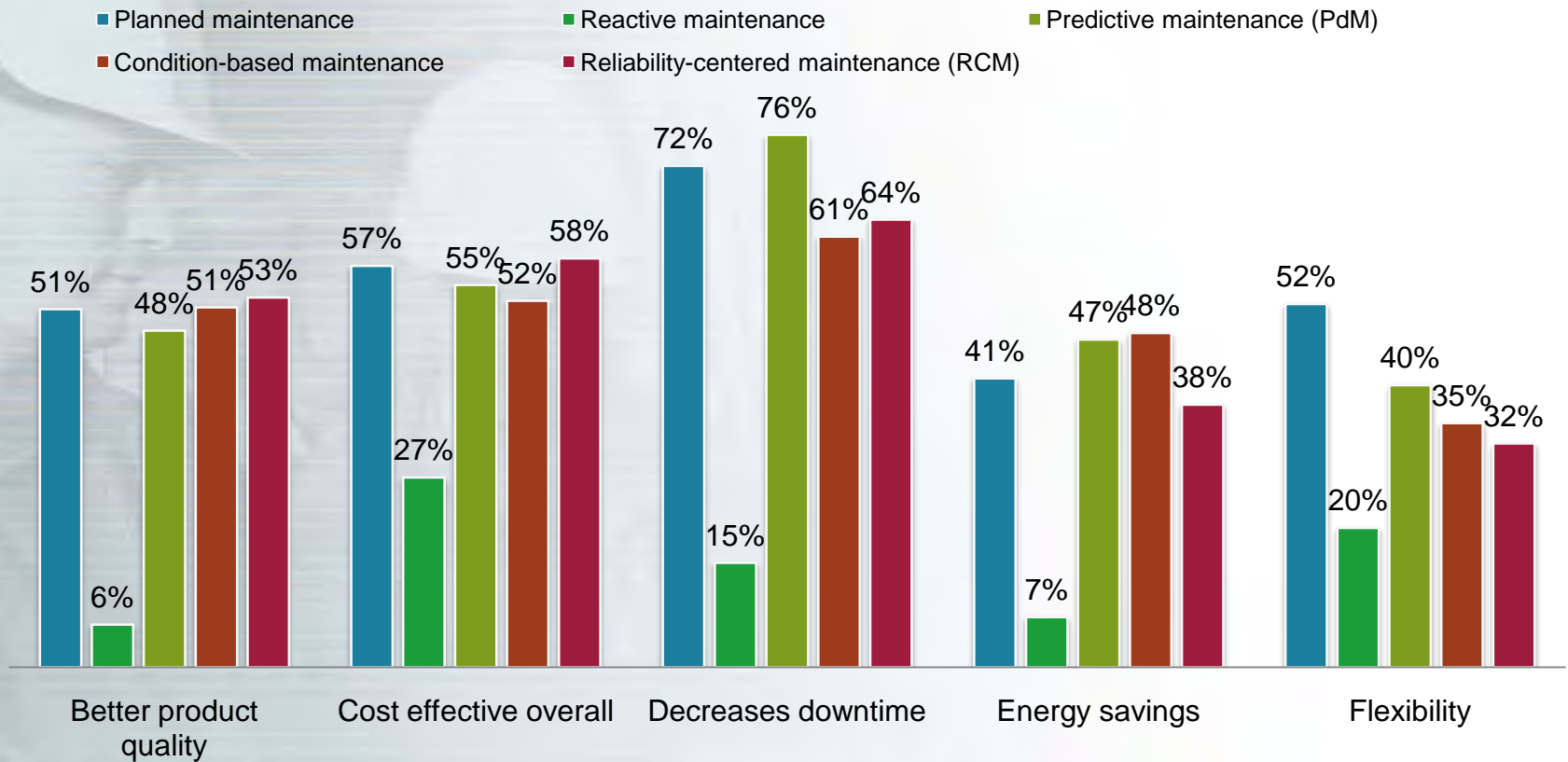
Most respondents indicated that their facilities use a planned maintenance strategy, while over half follow reactive maintenance, and 49% use predictive maintenance.



Q: Which of the following maintenance strategies are used in your plant? (n=316)

Advantages of maintenance strategies (Part 1 of 2)

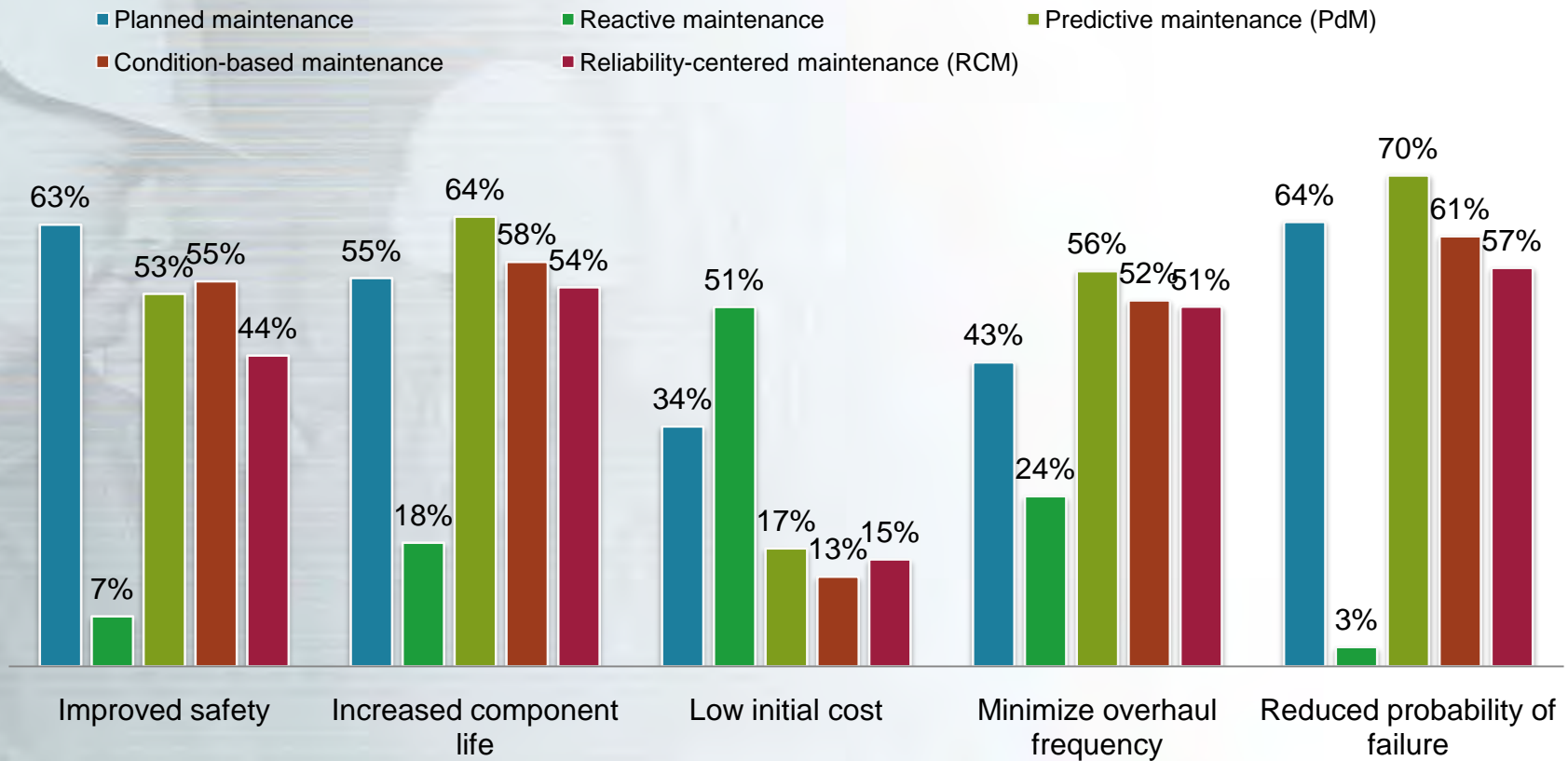
PdM (76%) and planned maintenance (72%) both excel at decreasing downtime, while RCM and planned maintenance are cost effective overall, according to more than half of respondents.



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=283)

Advantages of maintenance strategies *(Part 2 of 2)*

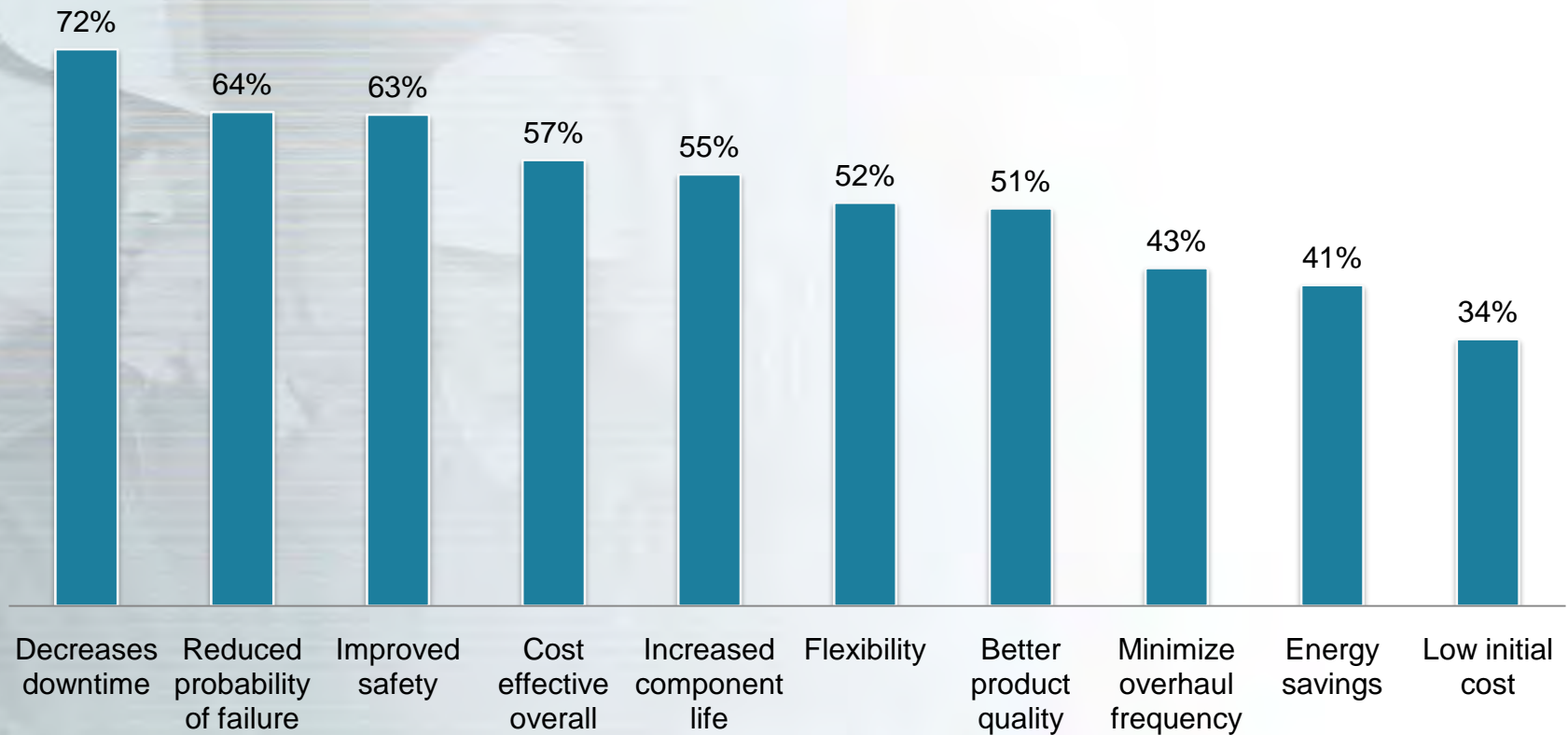
Reactive maintenance was rated very low, except when evaluating initial cost. Compared to the other four maintenance strategies, this is reactive maintenance's best advantage, according to 51% of respondents.



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=283)

Advantages of planned maintenance

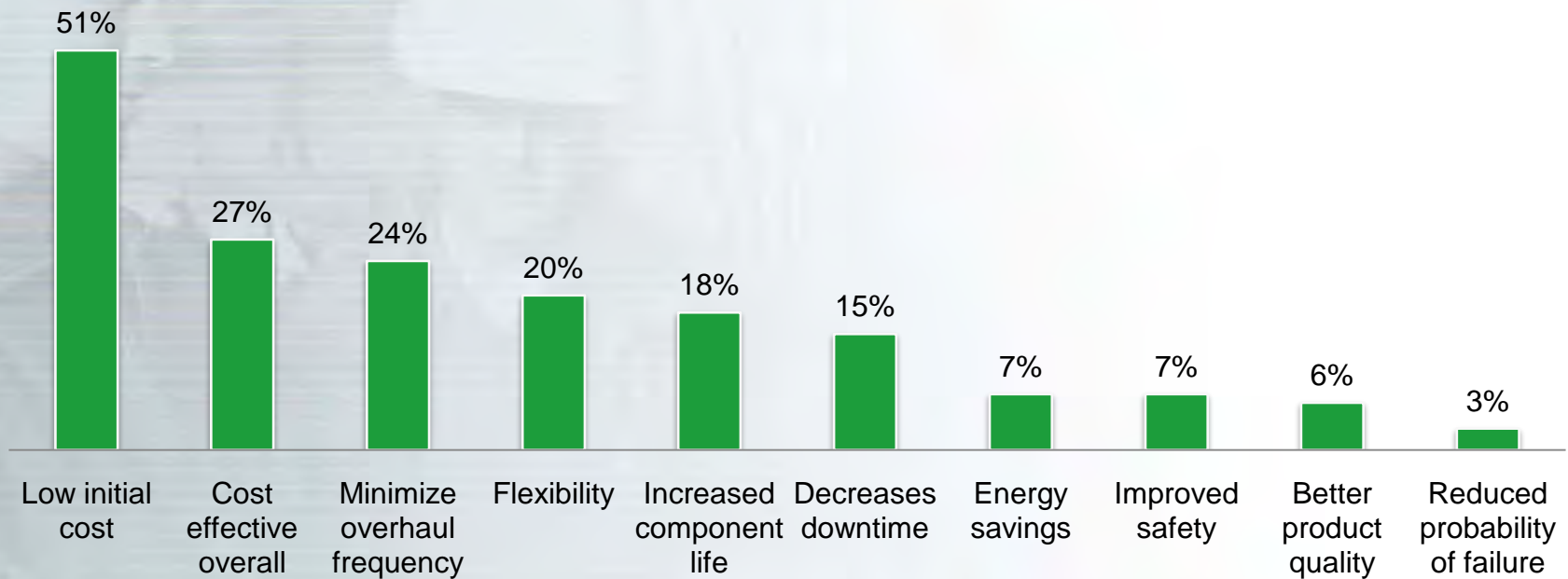
The top advantages of a planned maintenance strategy, according to respondents are decreased downtime (72%), reduced probability of failure (64%), and improved safety (63%).



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=274)

Advantages of reactive maintenance

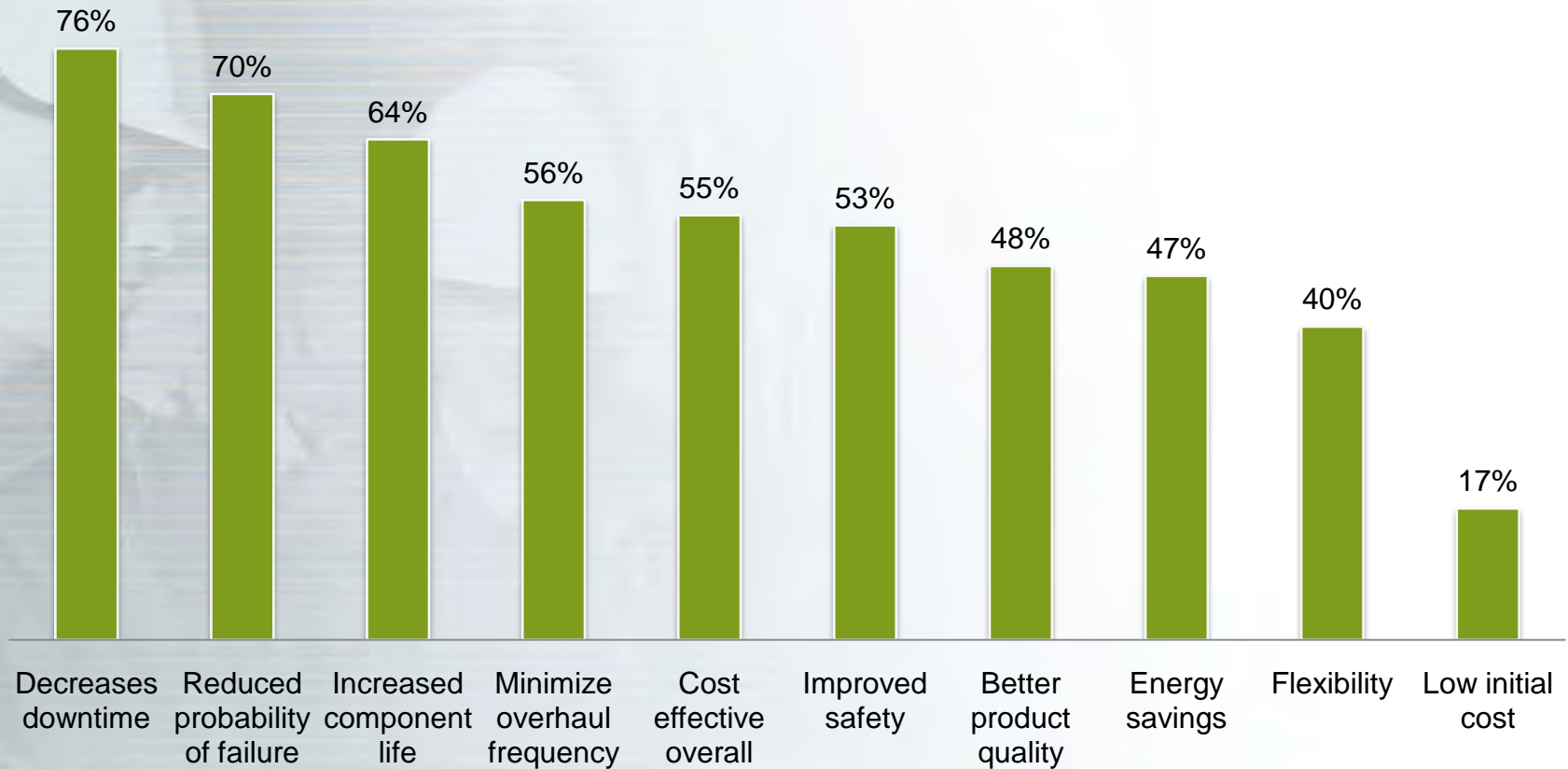
Despite having a low initial cost, only 27% of respondents said that reactive maintenance is cost effective overall, and very few said it actually improves safety (7%) and product quality (6%).



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=181)

Advantages of predictive maintenance

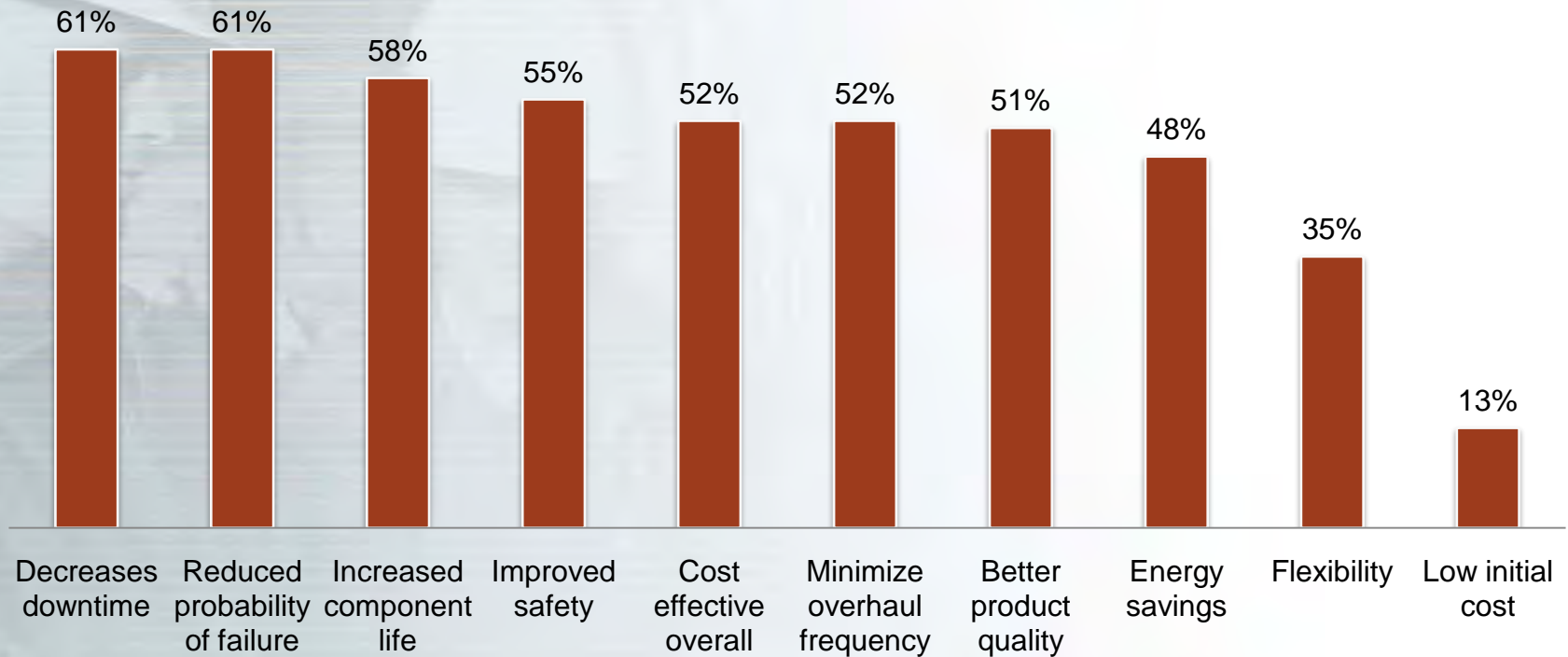
Decreased downtime (76%) and reduced probability of failure (70%) are the top two advantages of predictive maintenance, according to respondents.



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=154)

Advantages of condition-based maintenance

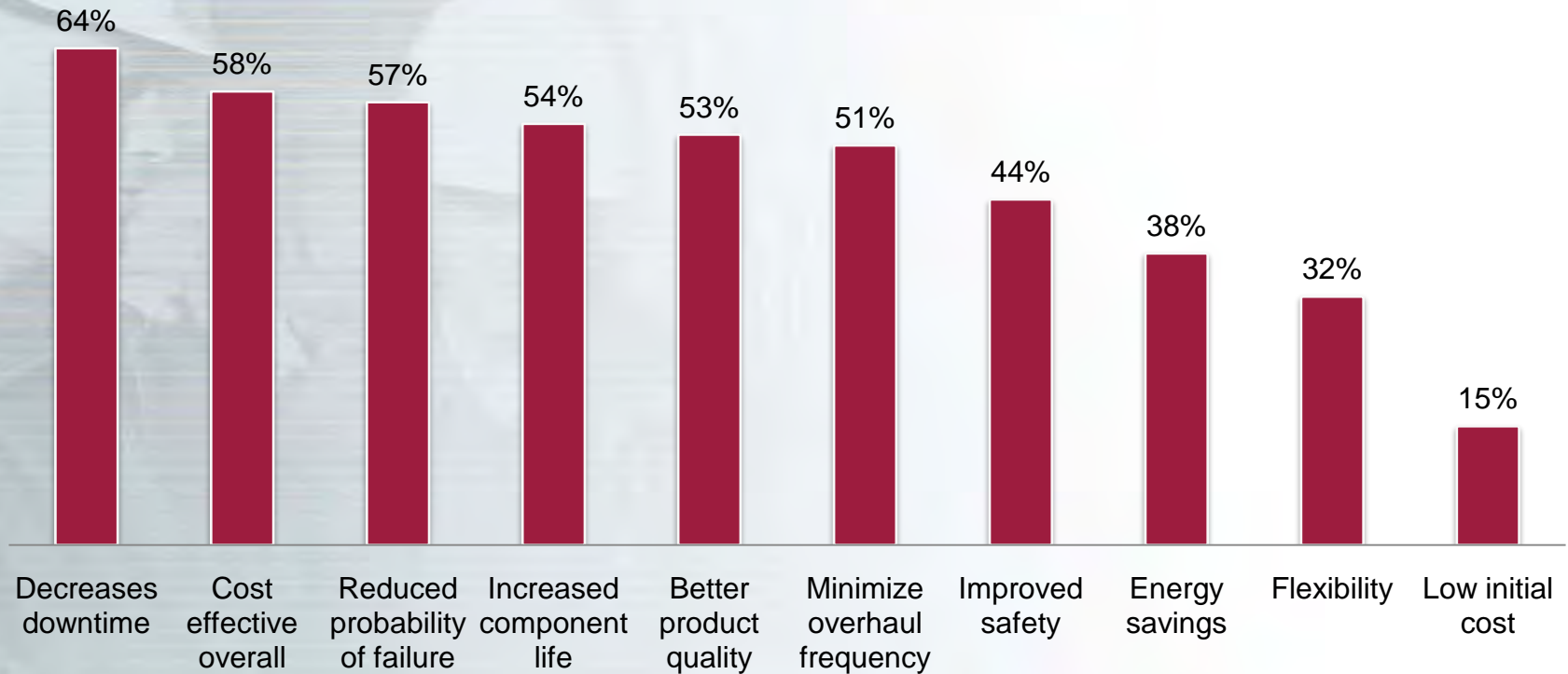
A major advantage to condition-based maintenance over the other strategies mentioned is energy savings, according to 48% of respondents.



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=109)

Advantages of reliability-centered maintenance

Respondents cited reliability-centered maintenance as the most cost effective overall, compared to the other maintenance strategies mentioned.



Q: What are the advantages to the maintenance strategy/strategies in place at your plant? (n=72)