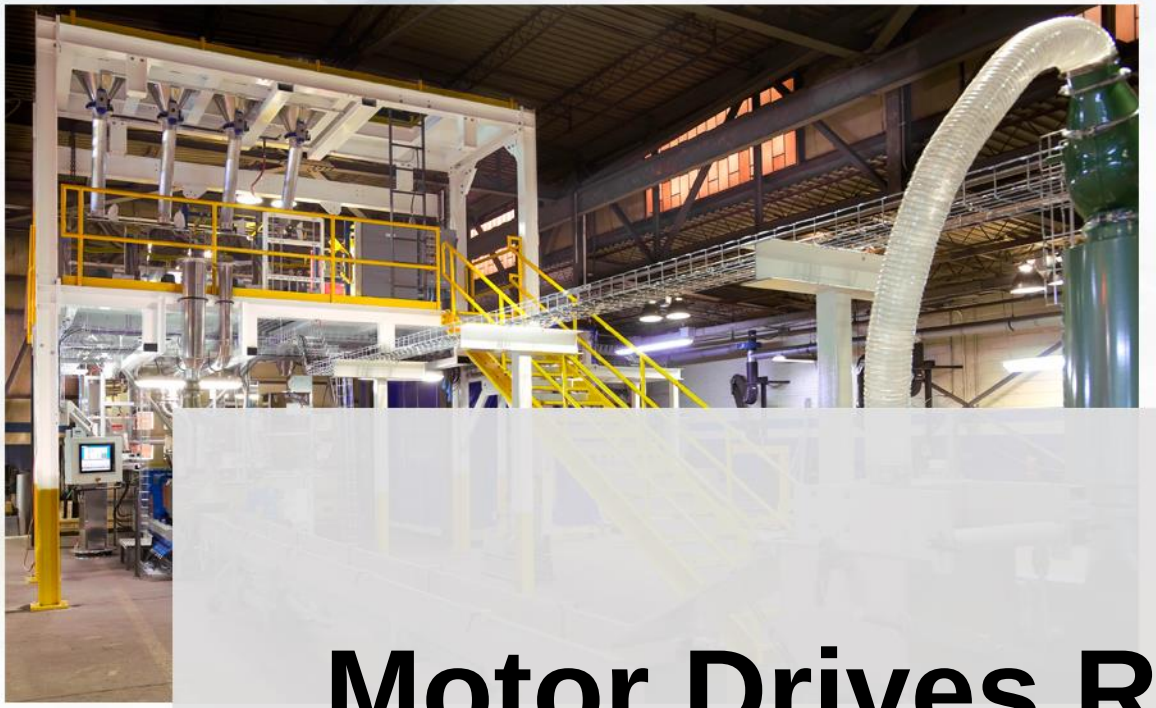

CONTROL ENGINEERING

Motor Drives Report

September 2019

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Introduction and methodology

Objective
The study was conducted by *Control Engineering* to identify trending information as it relates to the buying and specifying habits of automation engineering professional for motor drives (servo/stepper drives, variable-speed drives and medium-voltage drives).

Sample
The sample was selected from qualified subscribers of *Control Engineering* products with valid email addresses who purchase, specify or use motor drives—either currently or in the next 12 months.

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

- **Data collected:** June 25, 2019, through July 11, 2019
- **Number of respondents:** 248
  - *Margin of error: +/- 6.2% at a 95% confidence level*
- **Incentive:** Survey participants were offered the opportunity to enter a drawing for a chance to receive one $100 Amazon.com gift card.

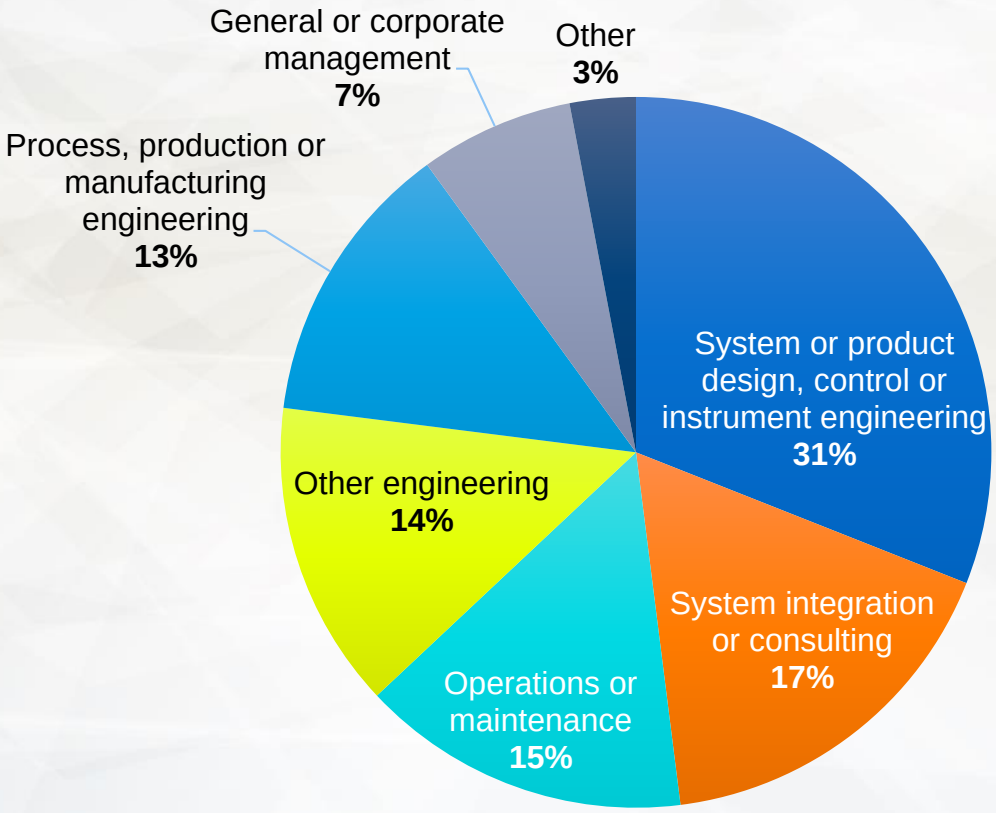
Key findings

- **Usage:** Eighty-eight percent of respondents use or expect to use variable-speed drives (VSDs) within the next 12 months; 46% use/plan to use servo and/or stepper drives and 17% use/plan to use medium-voltage (MV) drives.
- **Evaluation:** When evaluating any type of motor drive, automation professionals first look at reliability, followed by price, ease of setup/controls, programmability, customer service and support and the manufacturer's reputation.
- **Applications** (check all that apply): When specifying VSDs, 89% of applications are new, 74% are retrofit and 71% are replacement. The breakdown for servo/stepper drives is 87% new, 67% retrofit and 64% replacement. For MV drives: 89% new, 81% retrofit and 78% replacement.
- **Purchasing:** Thirty-six percent of respondents prefer to buy motors and related VSDs separately; 22% prefer matched units. Regarding servo/stepper drives, only 12% prefer separate, and 60% look for matched units. For MV drives and Above NEMA motors: 30% prefer separate, and 19% favor matched units.
- **Expenditures:** Over the past 12 months, respondents estimated an average of $139,000 having been spent on VSDs. For the same time frame, respondents also estimated average values of $94,000 for servo/stepper drives and $620,000 for MV drives.
- **Important factors:** The most critical qualities respondents look for when choosing a motor drive are frequent start/stop tolerance for VSDs (83%), accurate positioning for servo/stepper drives (97%) and frequent start/stop tolerance for MV drives (83%).

Respondent Profile

Primary job function

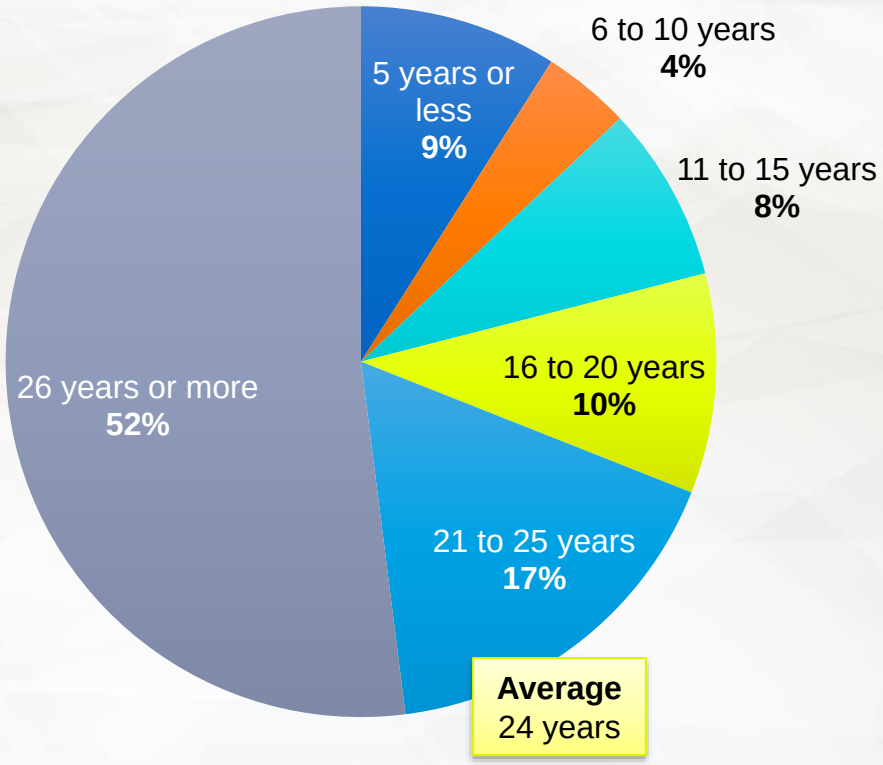
Thirty-one percent of survey respondents are primarily responsible for system or product design and/or control or instrument engineering at their companies; 17% are mainly involved in system integration or consulting.



Q: What is your primary job function? (n=173)

Engineering experience

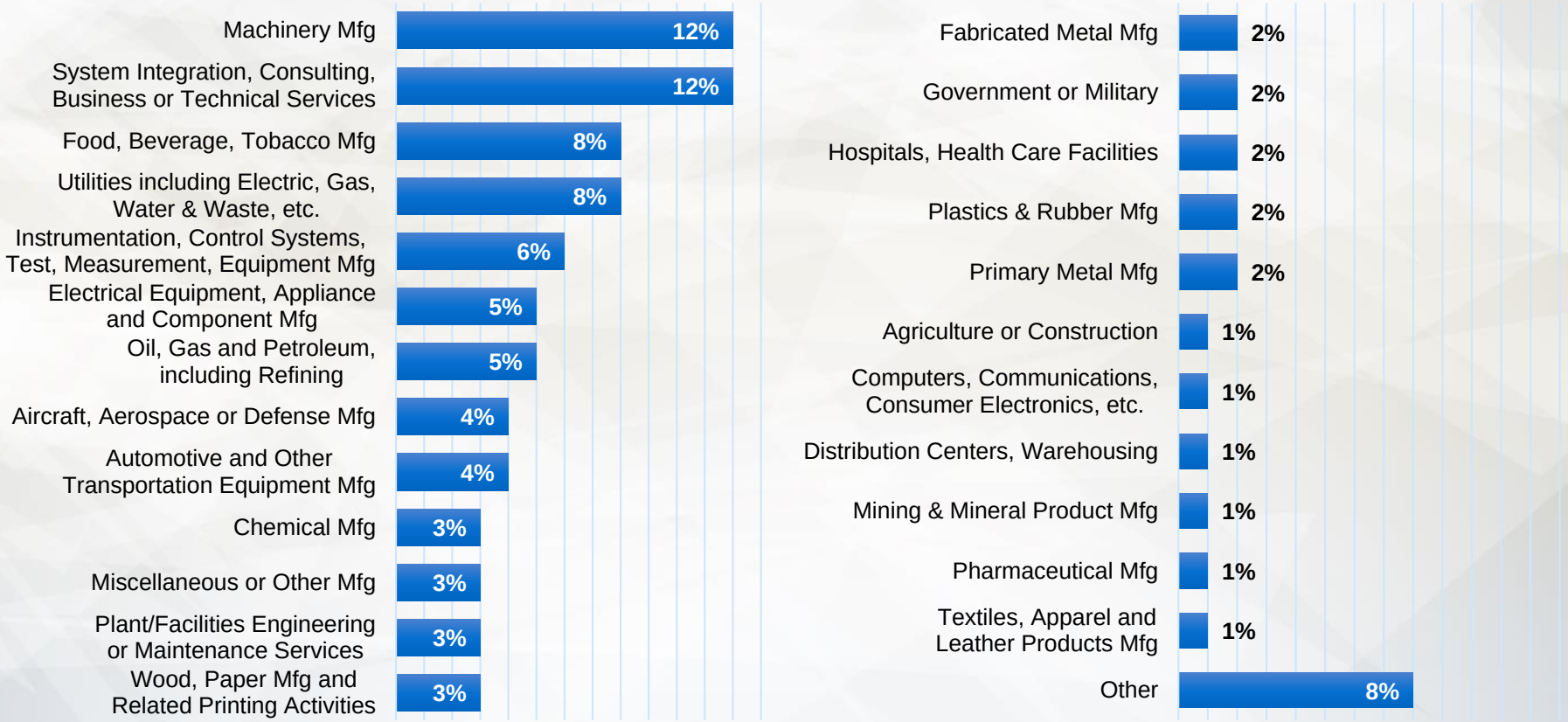
The average respondent has been working in an engineering-related position for 24 years, with 52% having more than 25 years of engineering experience and 13% 10 years or less.



Q: How many years have you been working in engineering? (n=173)

Primary business

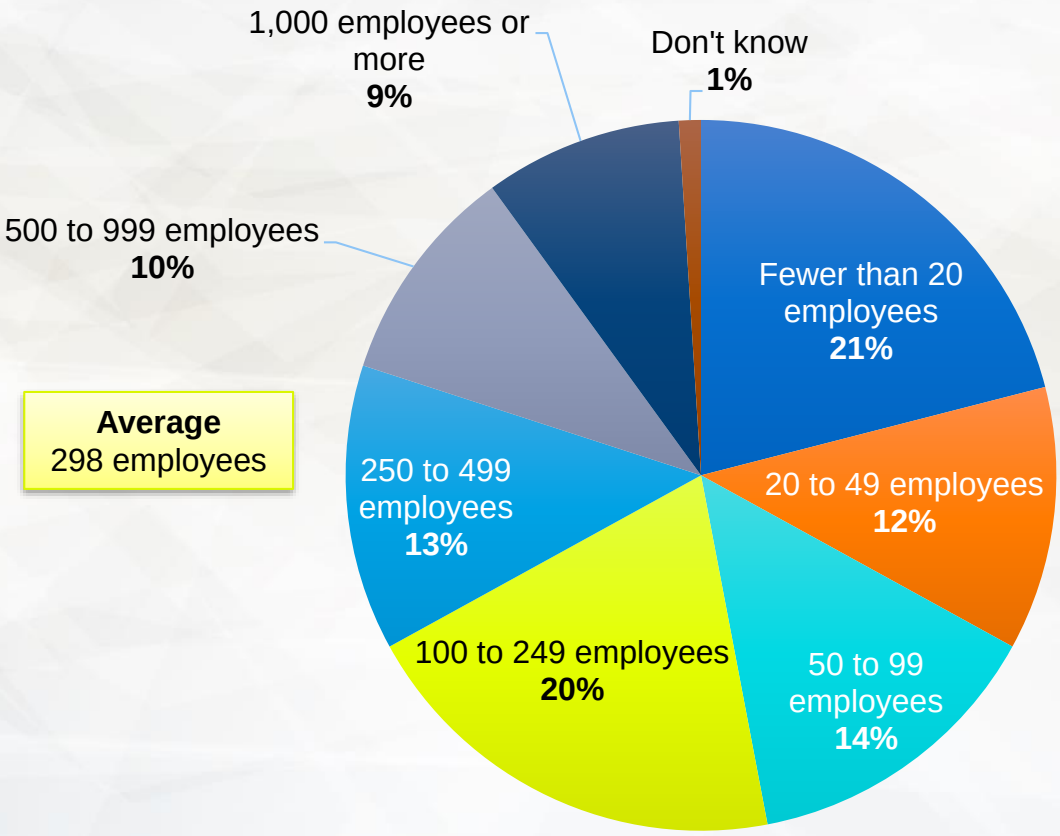
Twelve percent of respondents' companies primarily manufacture machinery or provide system integration, consulting, business or technical services.



Q: What is the primary business at your location? (n=173)

Facility size

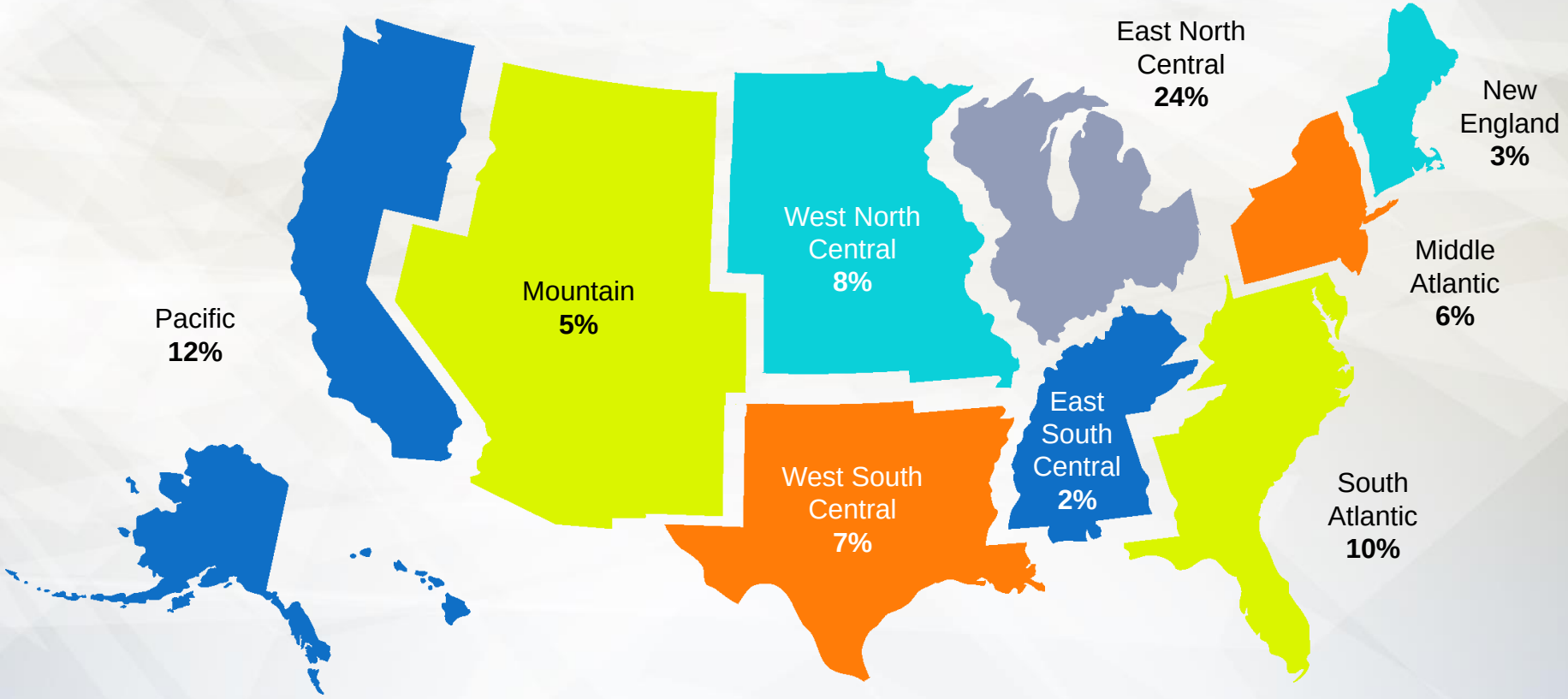
Fifty-seven percent of respondents' facilities employ fewer than 250 people, and 19% employ more than 500; the average facility has 298 employees.



Q: How many people work at your location? (n=173)

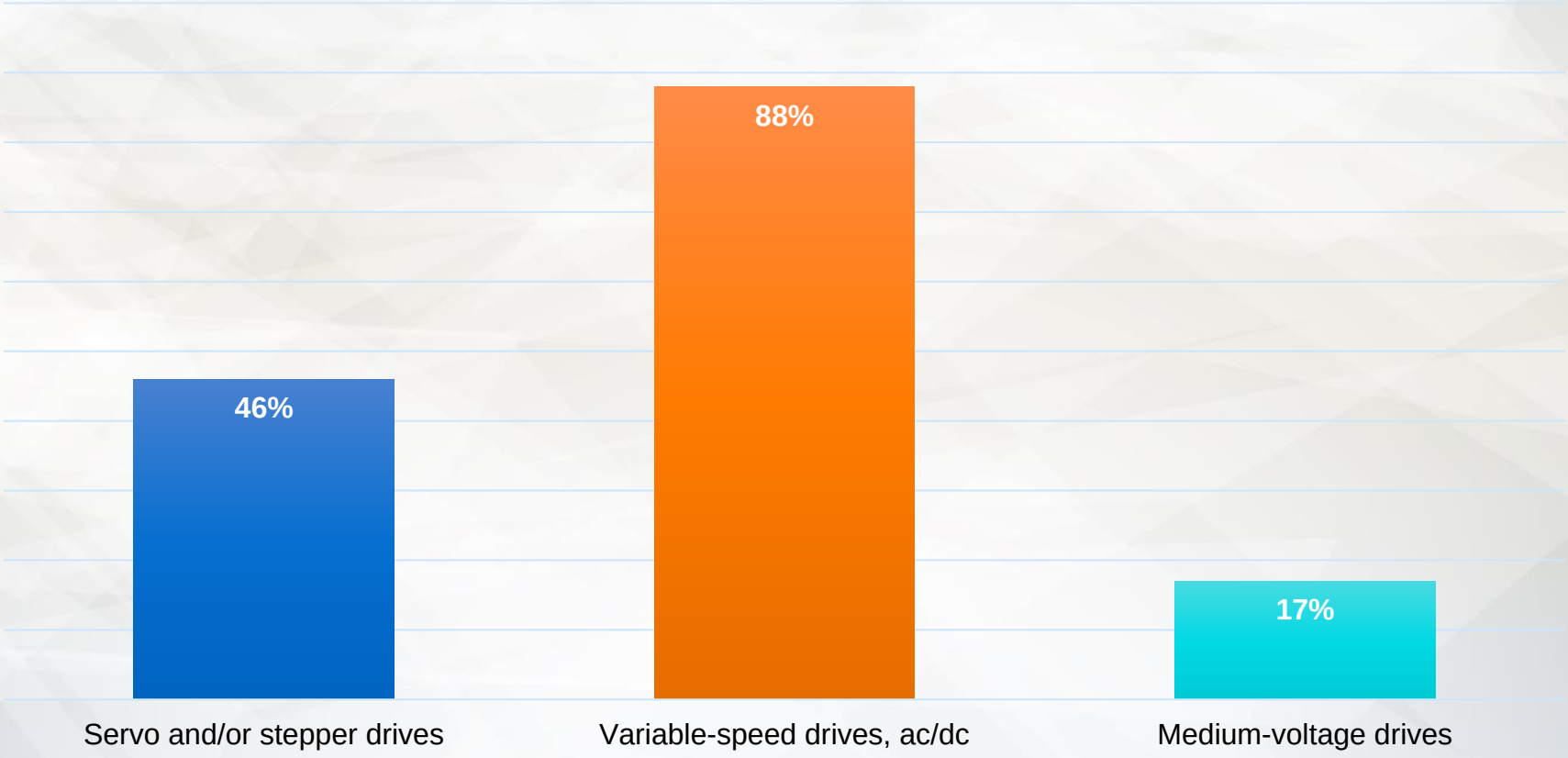
Location

Nineteen percent of respondents are based along the East Coast of the United States; the four central regions account for 41%; Mountain and Pacific are just 17%. Twenty-three percent of respondents are outside of the U.S., including respondents from Canada, India and Malaysia.



Motor drives in use

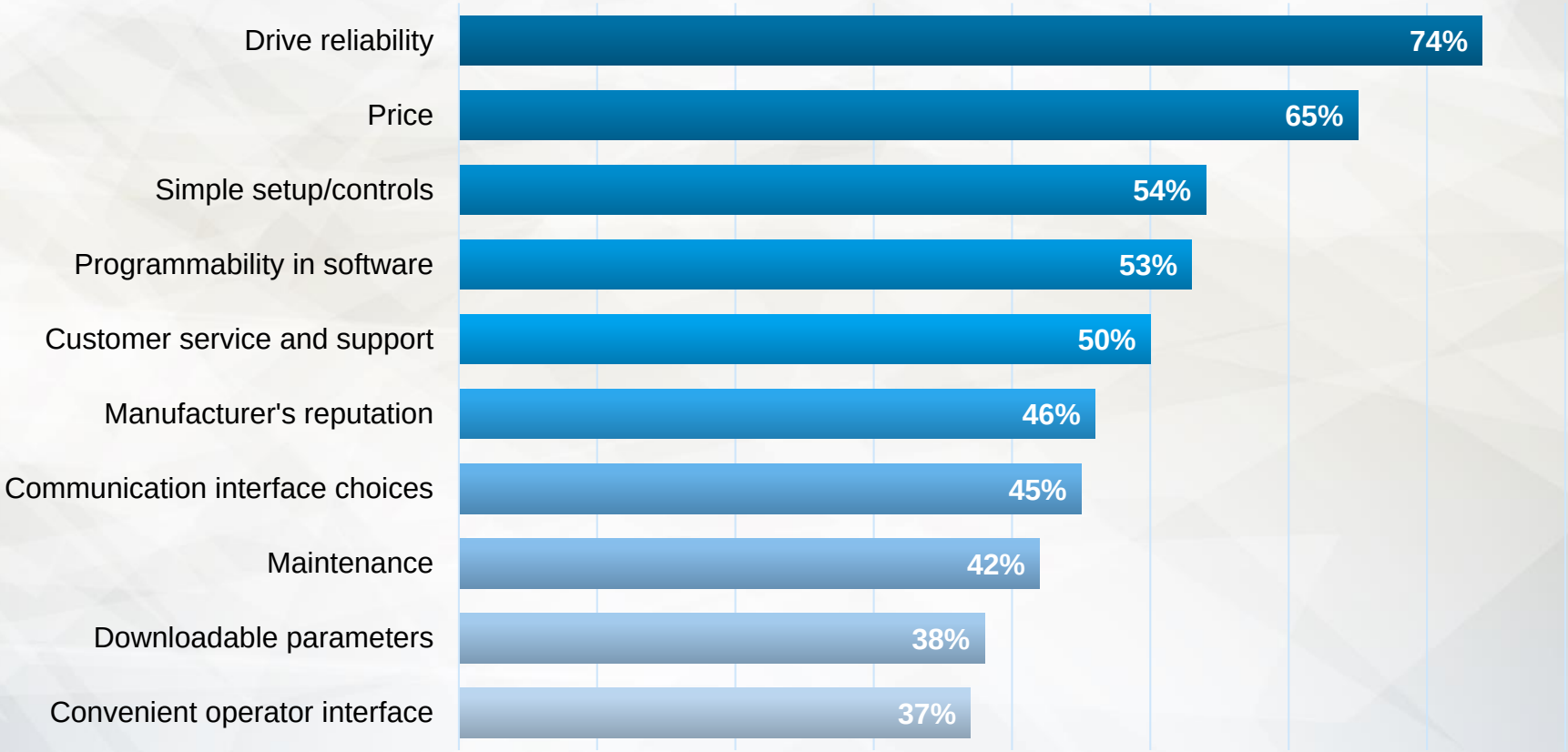
The majority of respondents currently or expect to buy, specify or use variable-speed drives, while 46% use servo and/or stepper drives, and 17% use medium-voltage drives.



Q: Do you buy, specify or use motor drives—or expect to in the next 12 months—in any of the following categories? Check all that apply. (n=248)

Top 10 motor drive evaluation criteria

When evaluating motor drives, more than half of respondents look at drive reliability, price, simplicity of setup/controls and programmability in the software. Other important criteria include customer service and support, and the manufacturer's reputation.



Q: What criteria do you look for when evaluating motor drives? Check all that apply. (n=247)

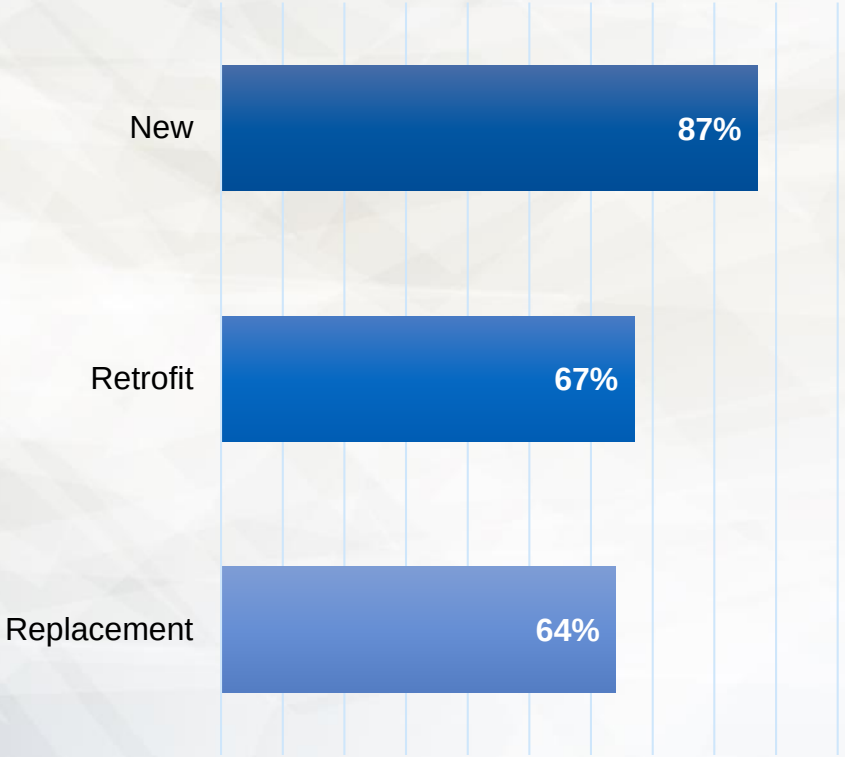
Servo and Stepper Drives

Only survey respondents who use, expect to use or indicated having buy/specify responsibility for servo and/or stepper drives were asked the questions reflected in this section of the report.

Applications, purchasing preference

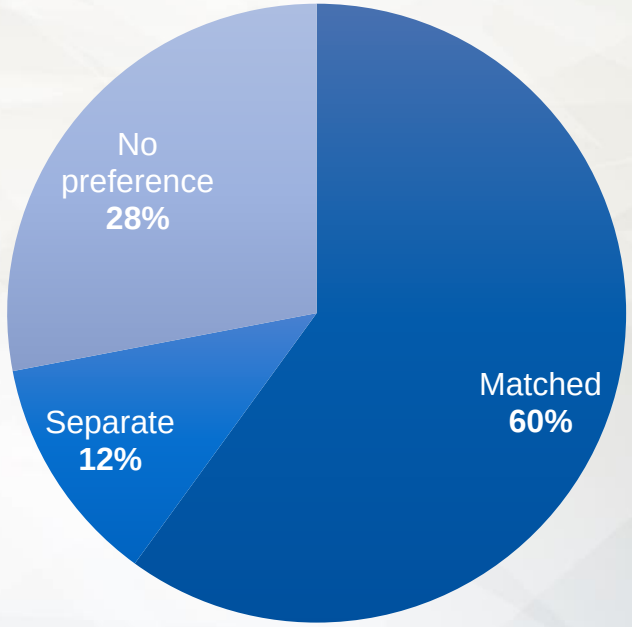
The majority of respondents specify servo/stepper drives for new applications, and 60% prefer to purchase servo/stepper drive controller products as matched units.

Applications



Purchasing

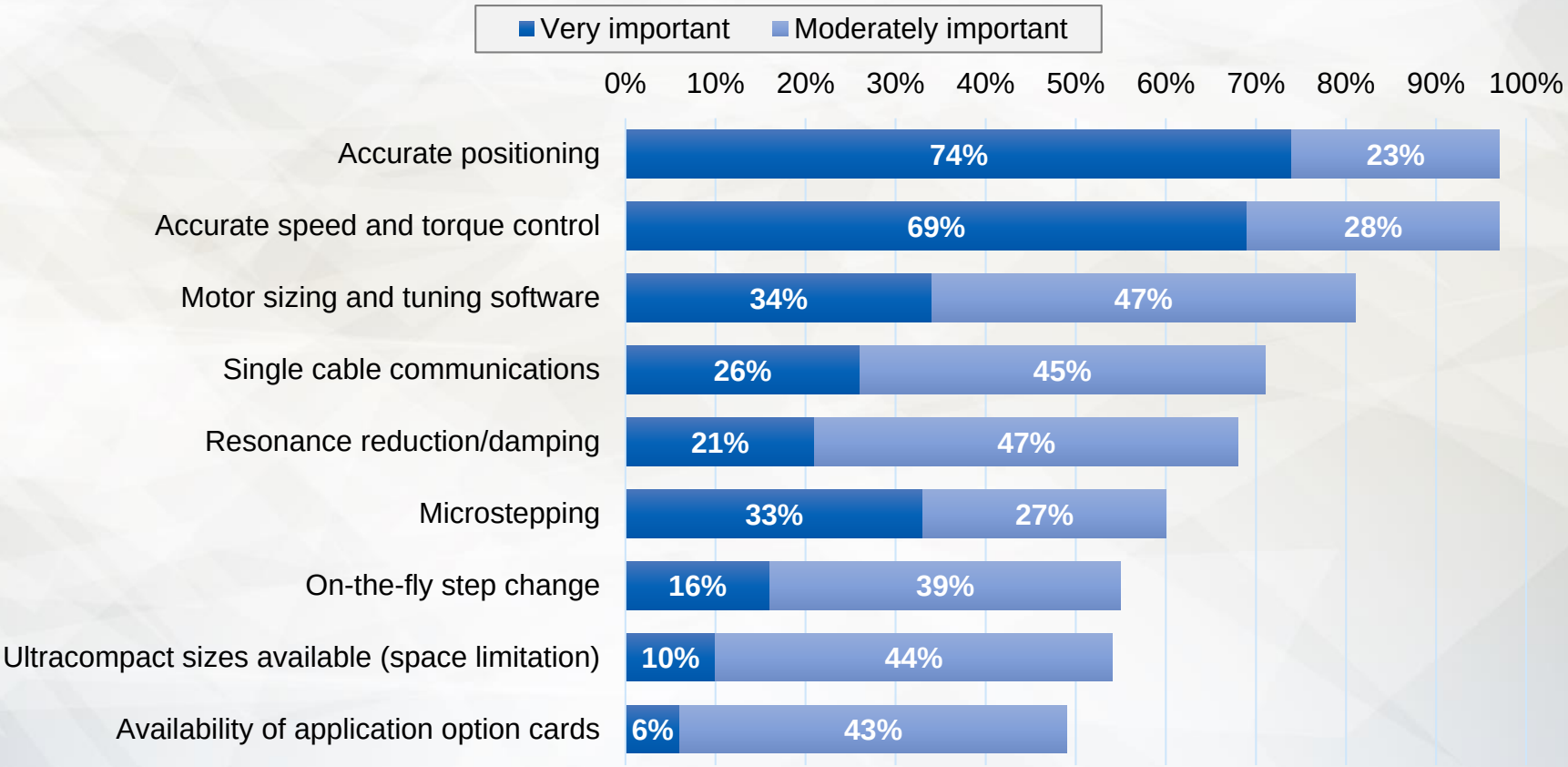
Matched vs. separate units



Q: For what types of applications do you specify servo and/or stepper drives? Check all that apply. (n=102);
Q: Do you prefer to purchase servo and/or stepper drive controller products as matched units or separately? (n=102)

Important evaluation factors

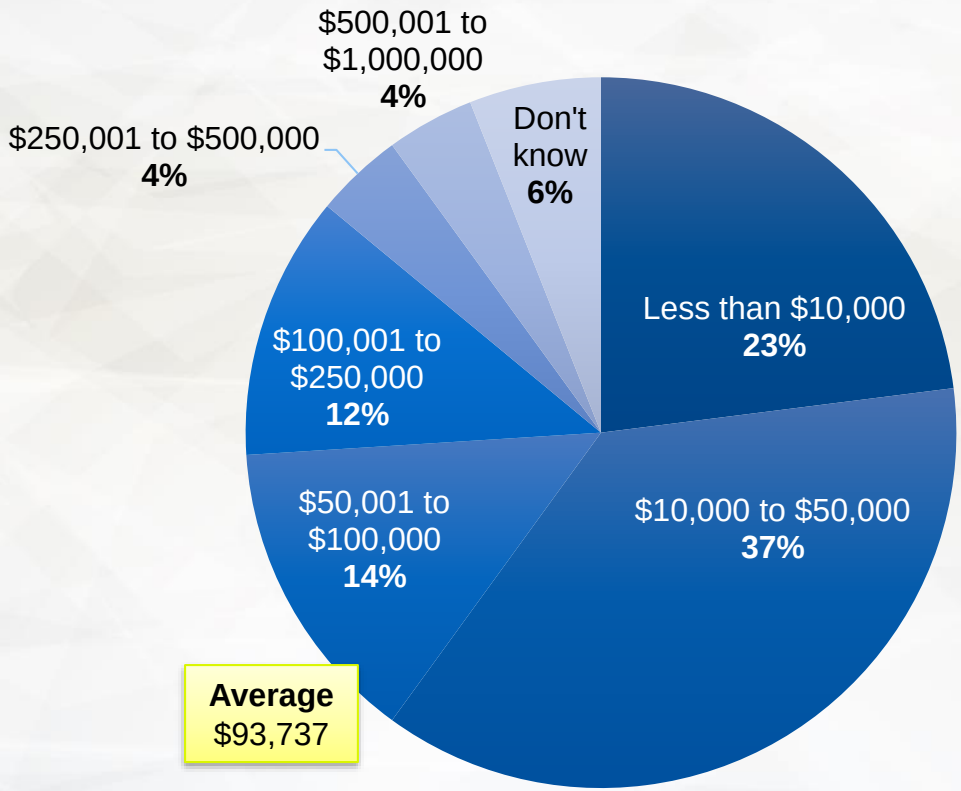
Ninety-seven percent of respondents find accurate positioning, speed and torque control are the most important factors when evaluating servo/stepper drives.



Q: How important are the following factors to you when evaluating servo and/or stepper drives? (n=101;102;102;102;102;102;102;102;102)

Estimated expenditures

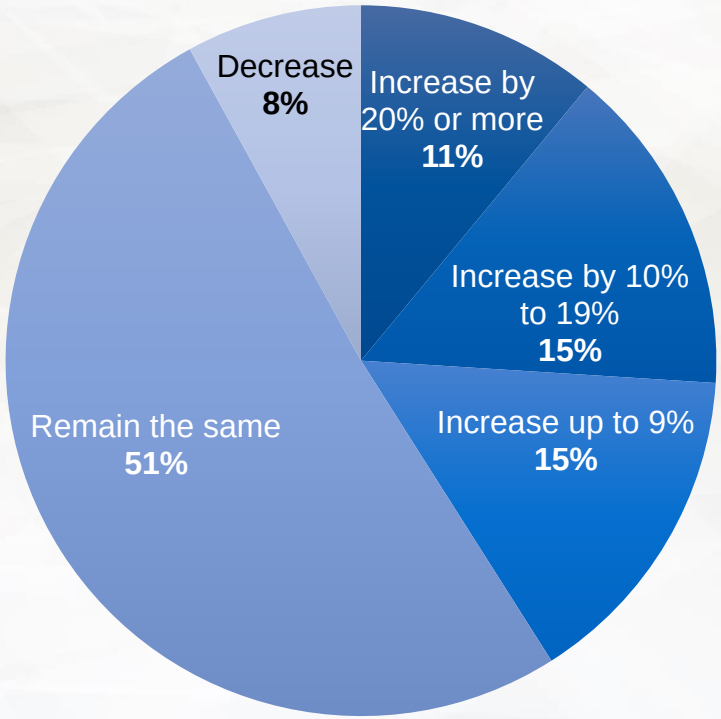
Respondents estimated $93,737 on average to have been spent on servo/stepper drives over the past 12 months, with 20% reporting more than $100,000 was allocated to these products.



Q: Which of the following ranges best reflects your estimated expenditures for servo and/or stepper drive products over the past 12 months? (n=102)

Future expenditures

Half of respondents don't expect servo/stepper drive expenditures to change in the next 12 months, but 41% do expect an increase; only 8% expect a decrease in this area.

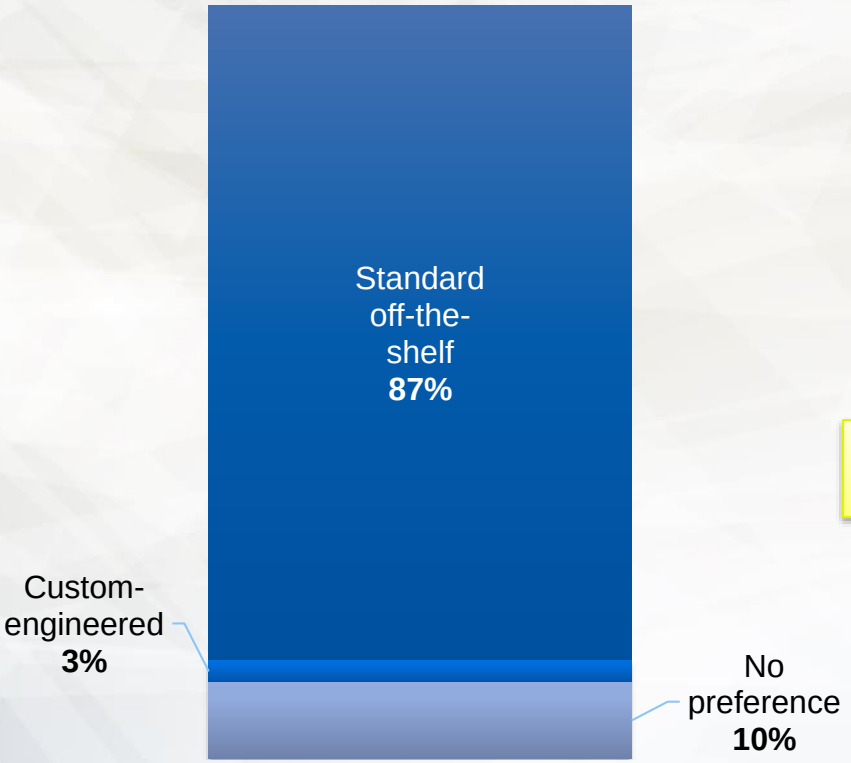


Q: How do you expect the expenditures for servo and/or stepper drive products to change in the next 12 months? (n=102)

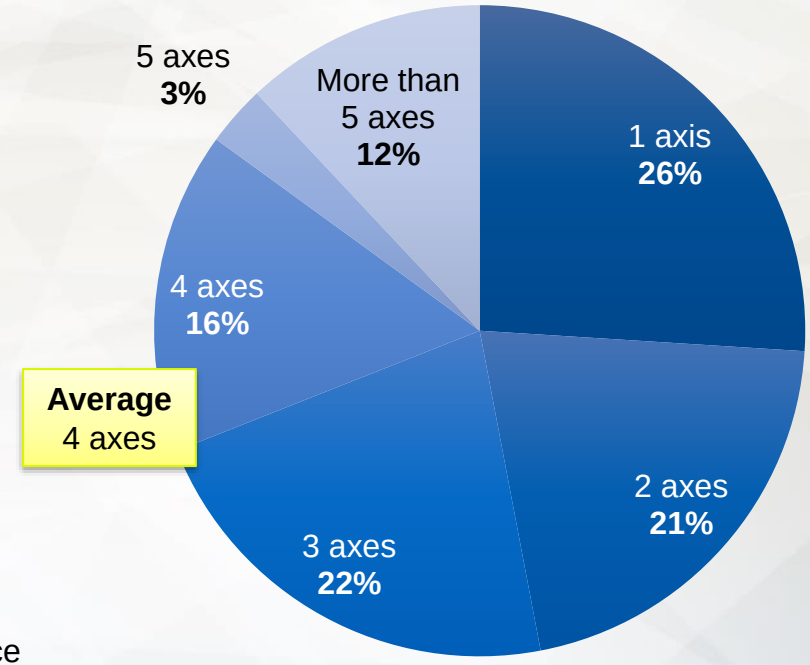
Ordering preference, number of axes

Eighty-seven percent of respondents prefer to order a standard off-the-shelf servo/stepper drive as opposed to custom-engineered. Servo drives currently used by respondents control an average of 4 axes.

Custom-engineered vs. off-the-shelf



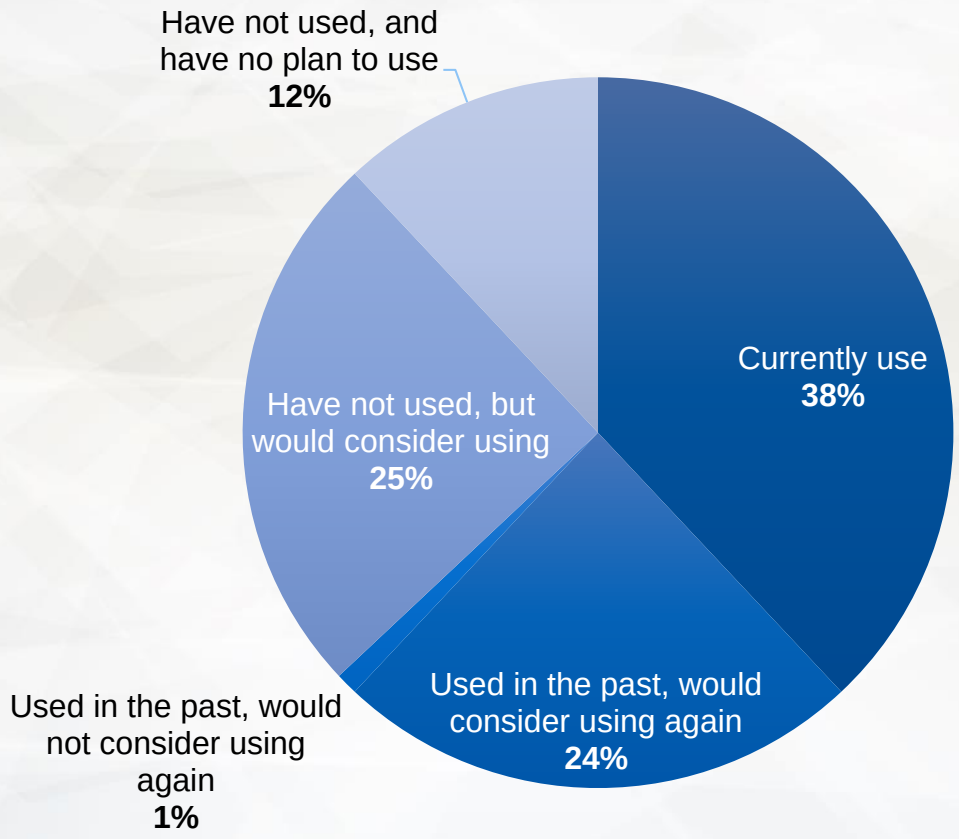
Average number of axes



Q: Do you prefer to order a custom-engineered servo and/or stepper drive or a standard off-the-shelf drive? (n=102);
Q: What is the average number of axes for the servo drives (ac/dc) that you currently use? (n=102)

Universal drive usage

Sixty-three percent of respondents use or have previously used a universal servo/stepper drive that handles several types of motors; 25% have not used such a drive but would be open to considering future use.

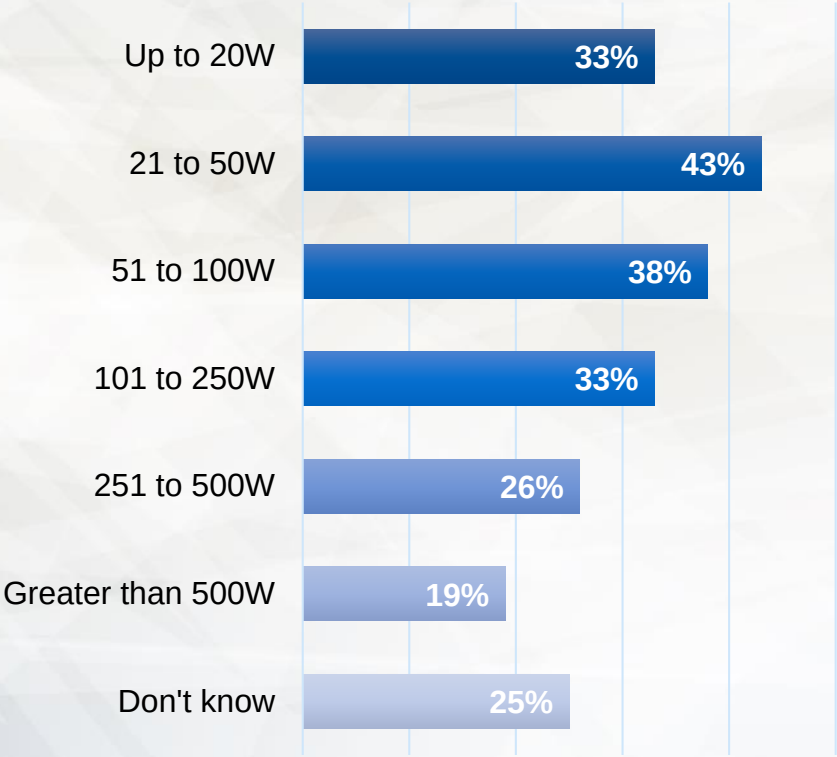


Q: Do you use a universal servo and/or stepper drive that handles several types of motors? (n=102)

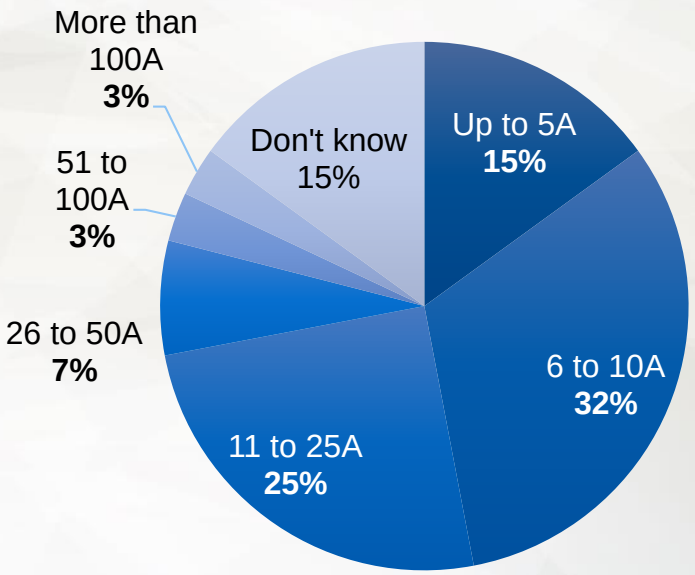
Drive size, amplifier output

Forty-three percent of respondents buy or specify 21 to 50W stepper drives. Forty-seven percent of respondents currently use servo drives with an amplifier output of up to 10A.

Stepper drive sizes



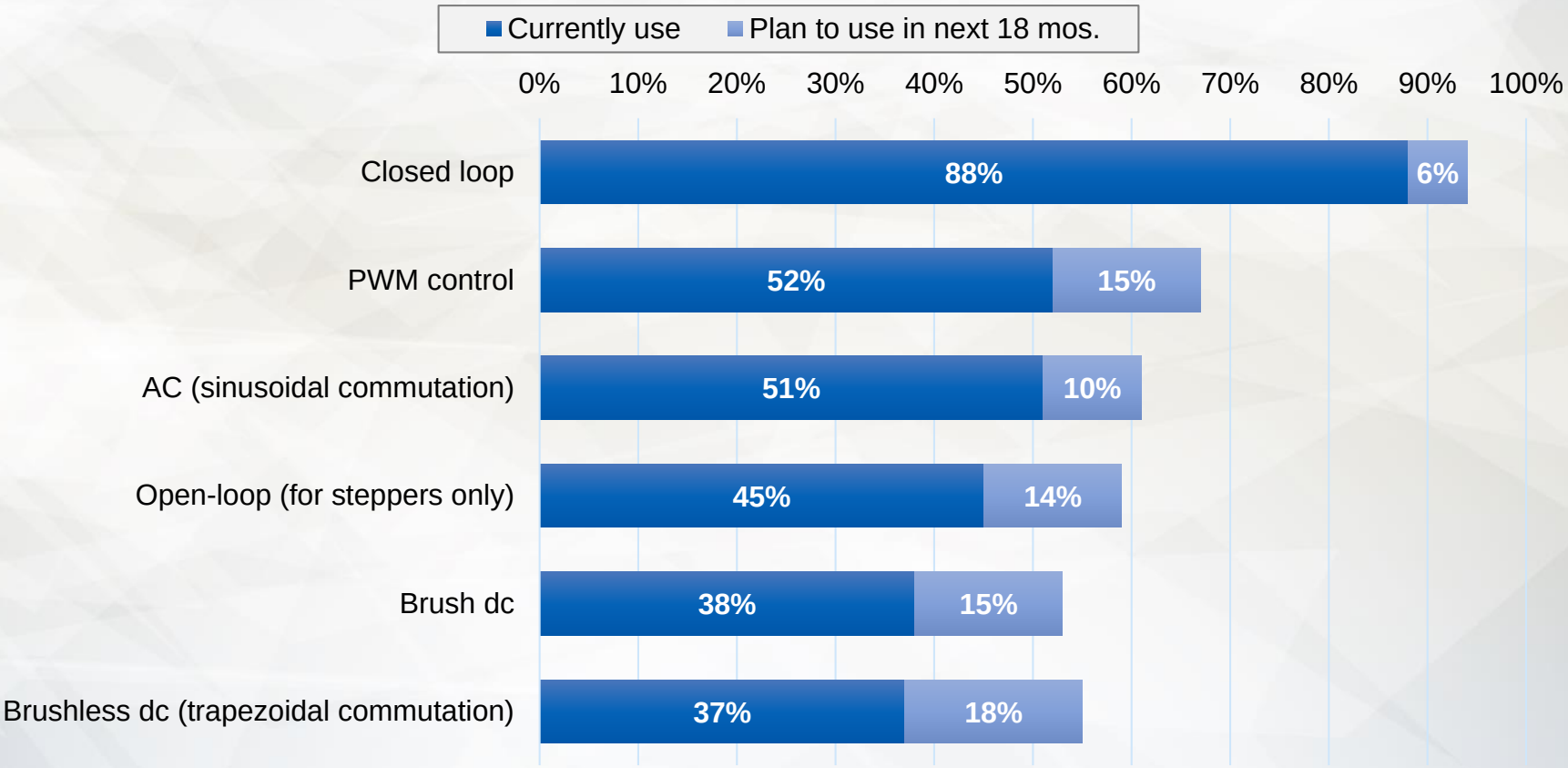
Amplifier output



Q: For which sizes of stepper drives do you have buy/specify responsibilities? (n=101); Q: What is the amplifier output for the servo drives (ac/dc) that you currently use? (n=102)

Drive control types

Closed loop drive controls for servo/stepper drives are most popularly used by respondents, followed by pulse width modulation (PWM), ac (sinusoidal commutation) and open-loop (for steppers only) controls.



Q: For servo and stepper drives, select the type of drive control being used: (n=102;100;99;101;100;99)

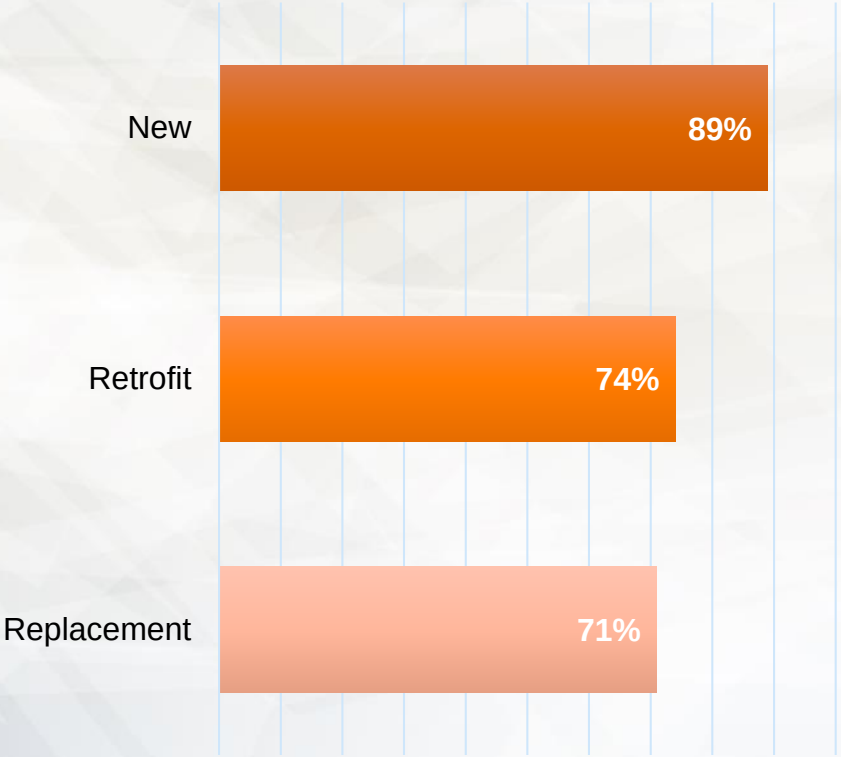
Variable-Speed Drives

Only survey respondents who use, expect to use or indicated having buy/specify responsibility for variable-speed drives were asked the questions reflected in this section of the report.

Applications, purchasing preference

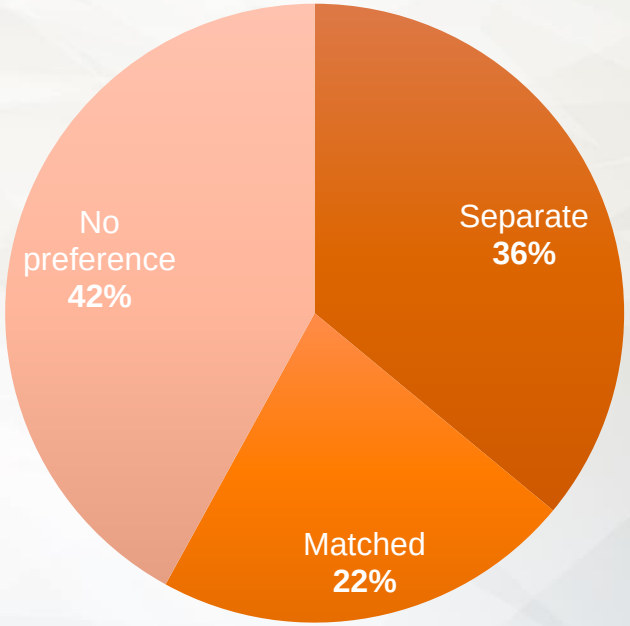
Nine in 10 respondents specify variable-speed drives for new applications, and 42% have no preference when purchasing motors and related variable-speed drive controller products as matched or separate units.

Applications



Purchasing

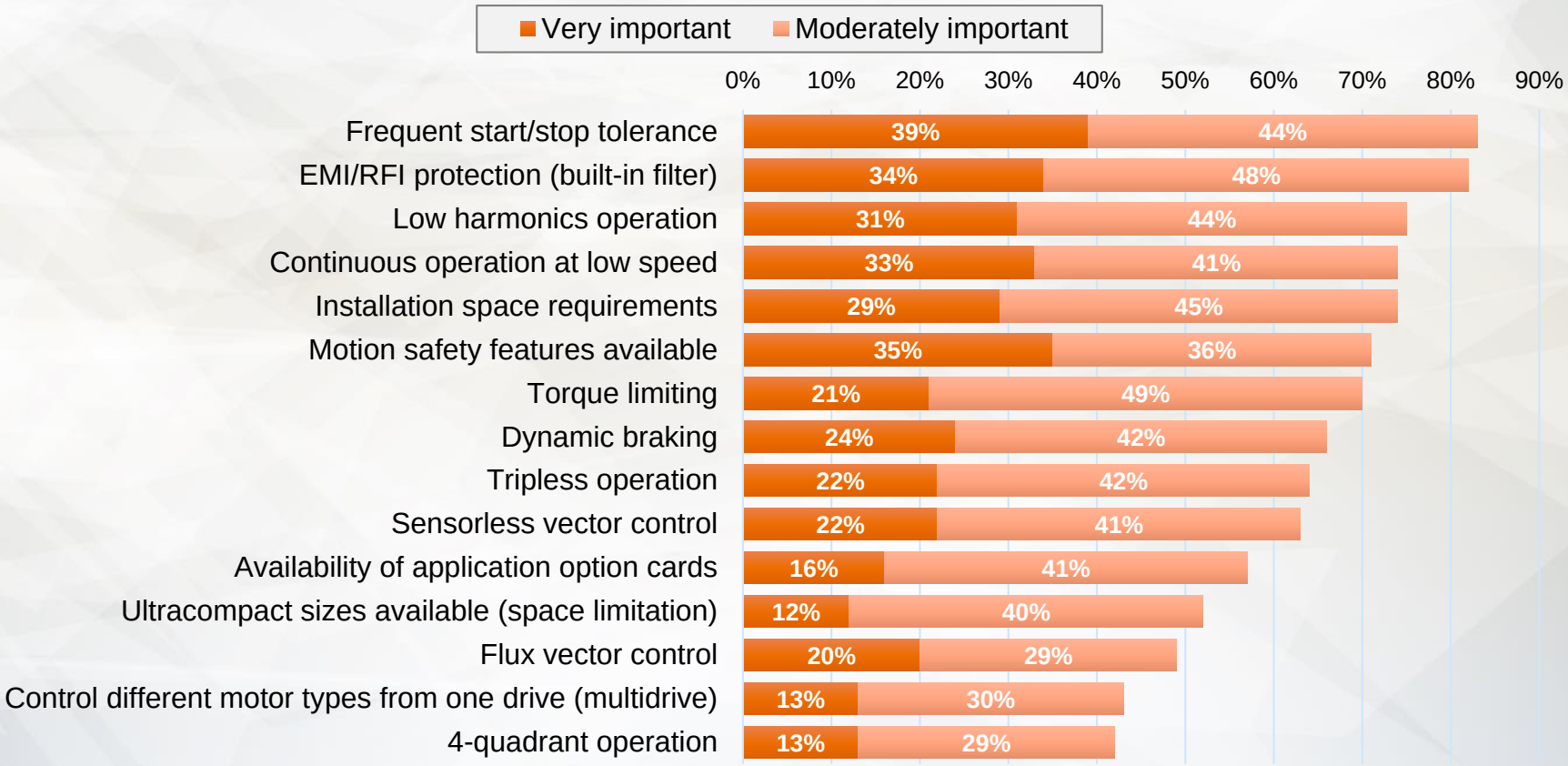
Matched vs. separate units



Q: For what types of applications do you specify variable-speed drives, ac/dc? Check all that apply. (n=175);
Q: Do you prefer to purchase motors and related variable-speed drives, ac/dc controller products as matched units or separately? (n=175)

Important evaluation factors

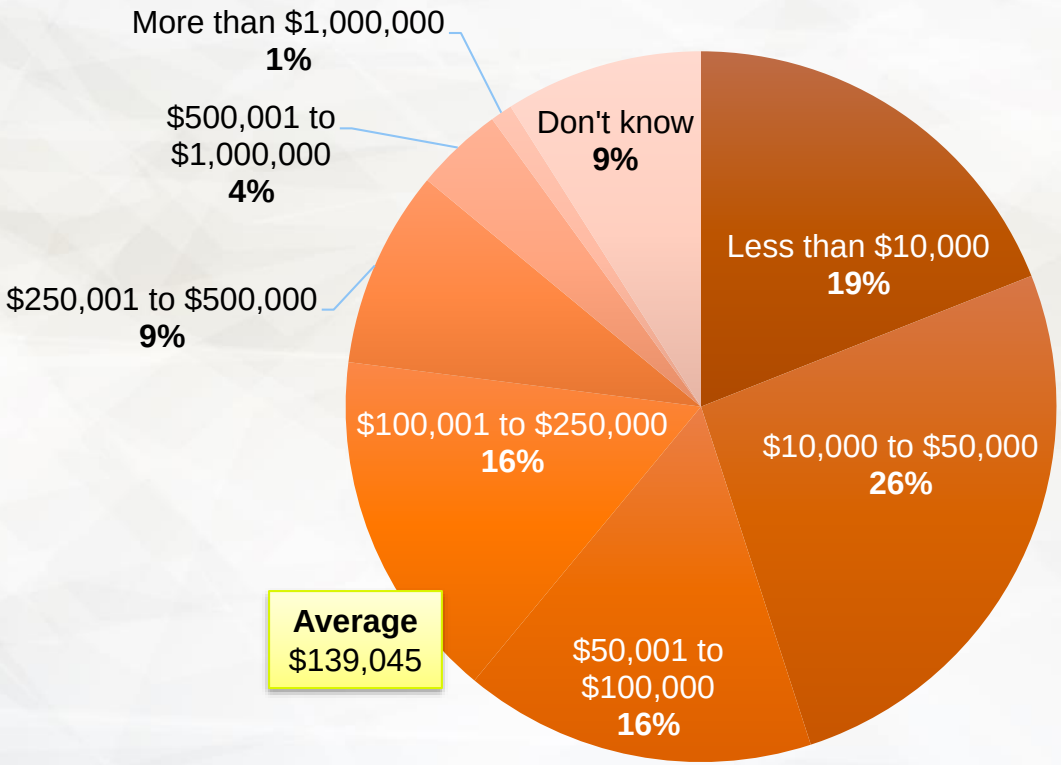
Frequent start/stop tolerance and electromagnetic interference (EMI)/radio frequency interference (RFI) protection are the two most important factors considered when respondents evaluate variable-speed drives.



Q: How important are the following factors to you when evaluating variable-speed drives, ac/dc? (n=172;172;171;172;172;172;172;172;172;172;171;173;172;172;172)

Estimated expenditures

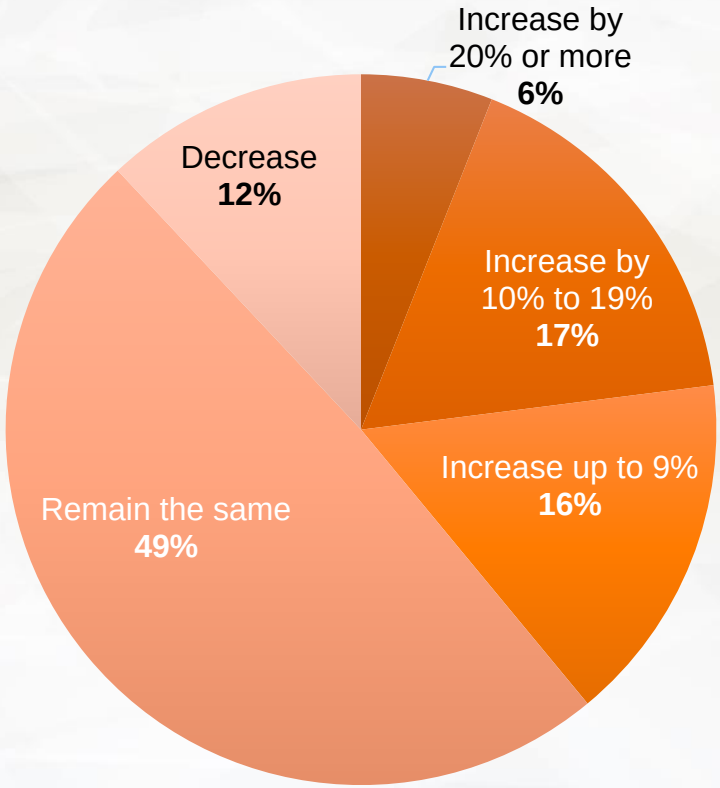
Respondents estimated an average expenditure of $139,045 for variable-speed drives over the past 12 months, with 45% reporting $50,000 or less and 14% spending more than $250,000.



Q: Which of the following ranges best reflects your estimated expenditures for variable-speed drives, ac/dc, over the past 12 months? (n=173)

Future expenditures

Forty-nine percent of respondents don't expect their variable-speed drive expenditures to change in the next 12 months; 39% do expect an increase, and 12% expect a decrease.

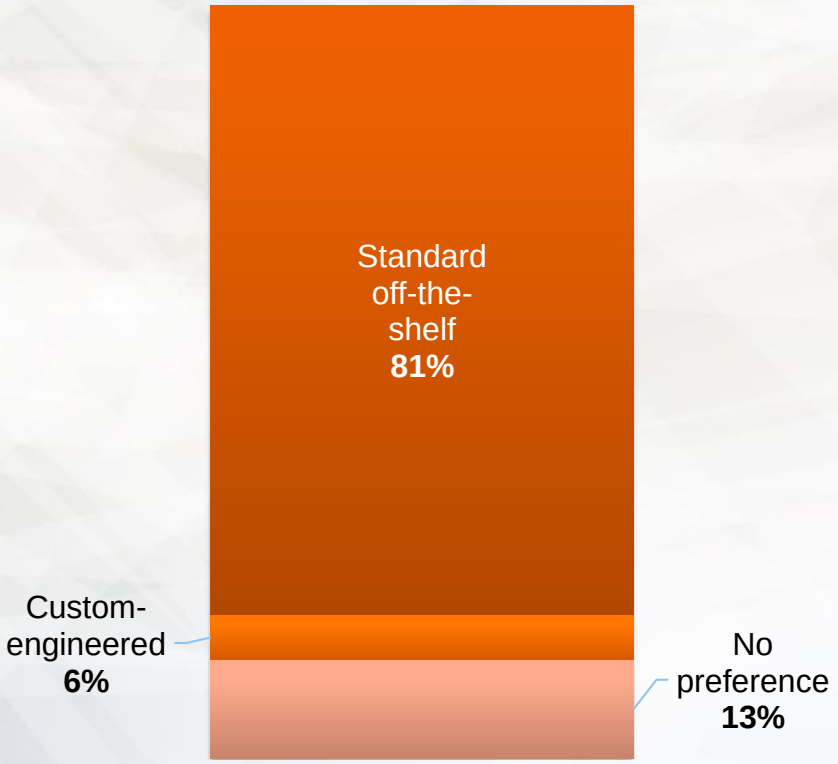


Q: How do you expect the expenditures for variable-speed drives, ac/dc products to change in the next 12 months? (n=173)

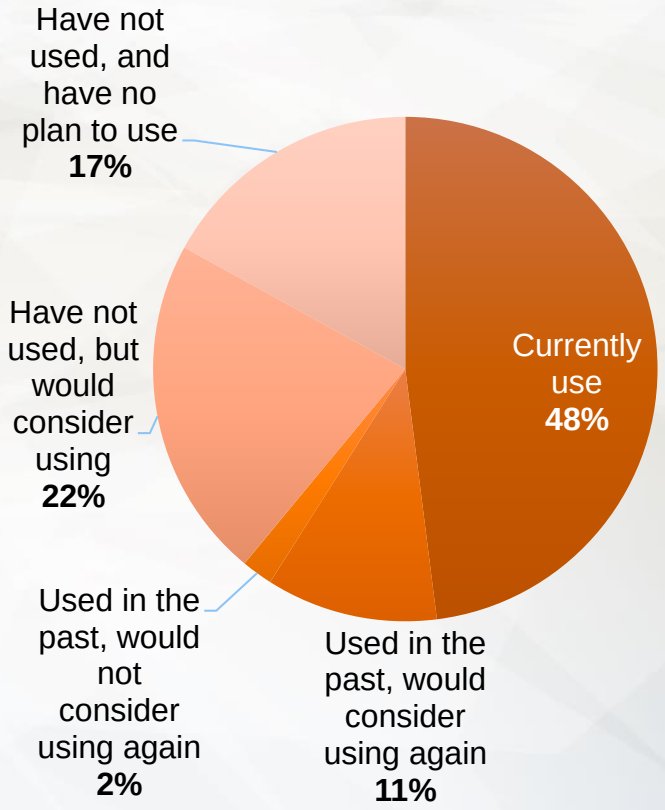
Ordering preference, universal drive usage

Eight in 10 respondents prefer to order standard off-the-shelf variable-speed drives over custom-engineered units. Forty-eight percent of respondents currently use a universal variable-speed drive that handles several types of motors.

Custom-engineered vs. off-the-shelf



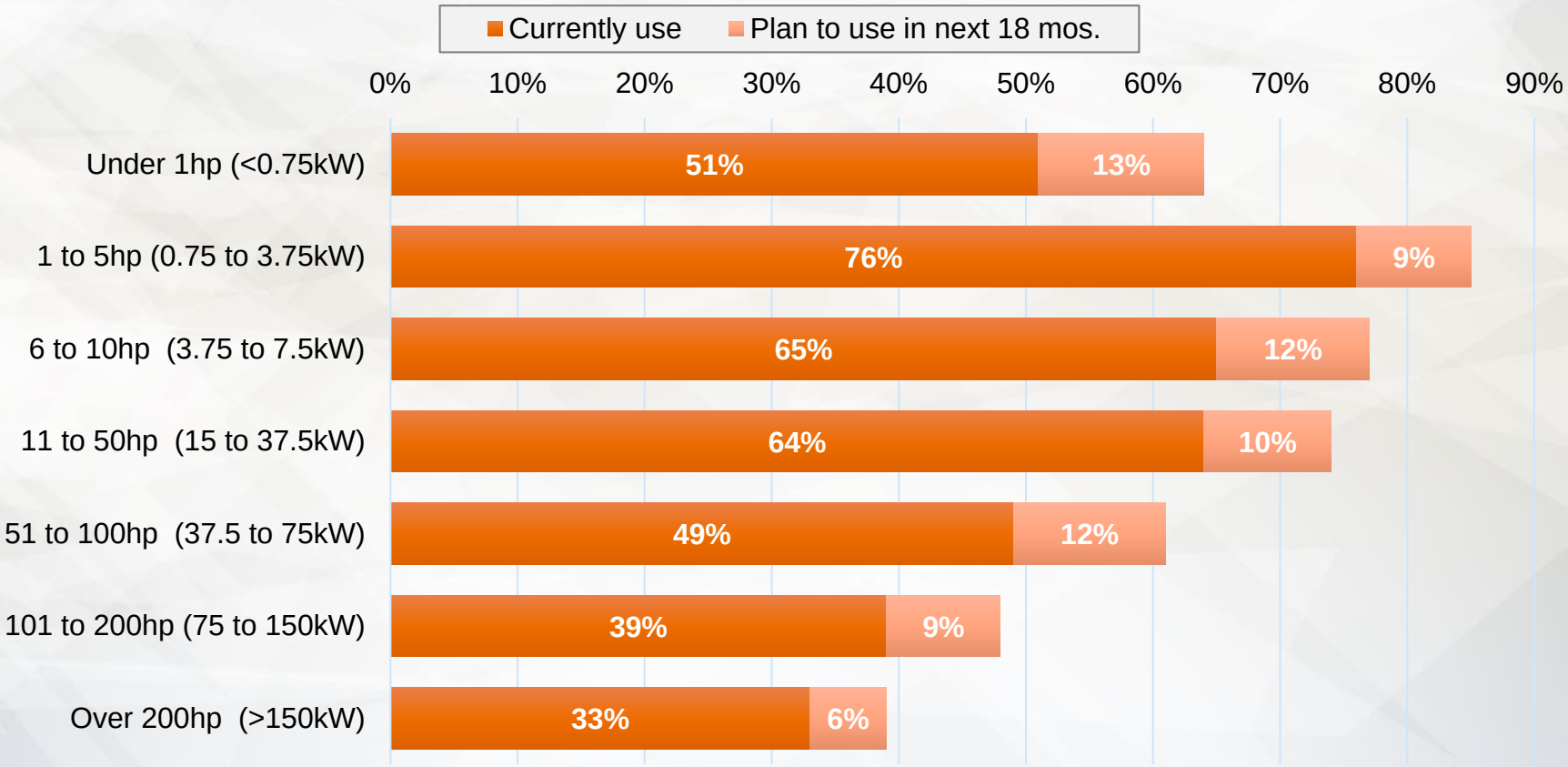
Universal drive usage



Q: Do you prefer to order a custom-engineered variable-speed drive or a standard off-the-shelf drive? (n=173); Do you use a universal variable-speed drive that handles several types of motors? (n=173)

Variable-speed drive sizes

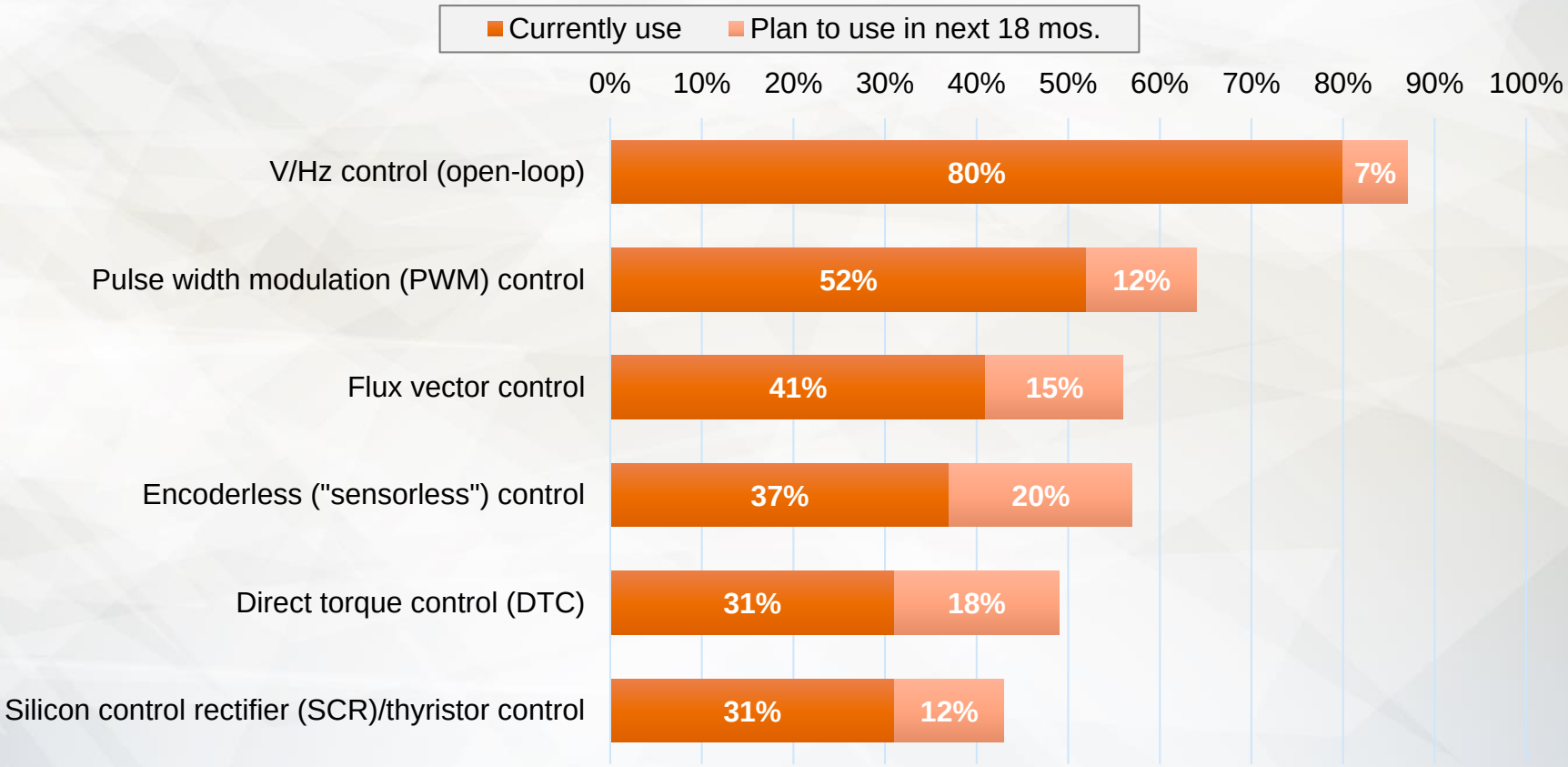
The majority of respondents are currently using 1- to 5-hp (0.75- to 3.75-kW) variable-speed drives; 39% are using or plan to use drives with over 200-hp (150-kW) capacity.



Q: Which sizes of variable-speed drives, ac/dc do you currently use or plan on using in the next 18 months? (n=170;170;170;168;168;169;167)

Drive control types

Eighty percent of respondents are using a V/Hz control (open-loop) for their variable-speed drives. One-fifth of respondents are planning to use encoderless (“sensorless”) controls in the near future.



Q: For variable-speed drives, ac/dc, select the type of drive control being used: (n=172;170;170;169;169;169)

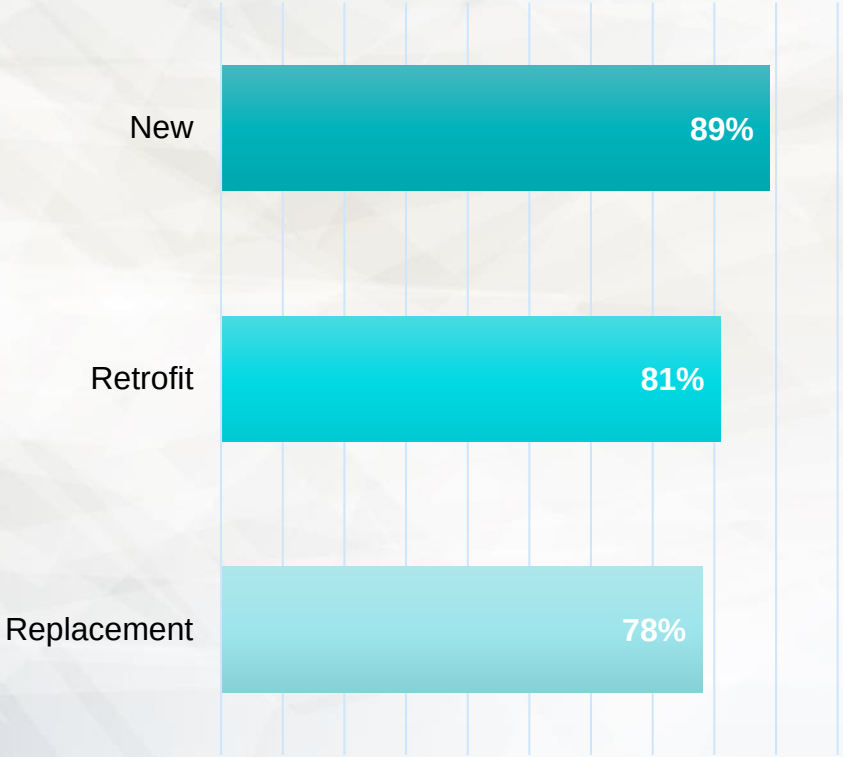
Medium-Voltage Drives

Only survey respondents who use, expect to use or indicated having buy/specify responsibility for medium-voltage drives were asked the questions reflected in this section of the report.

Applications, purchasing preference

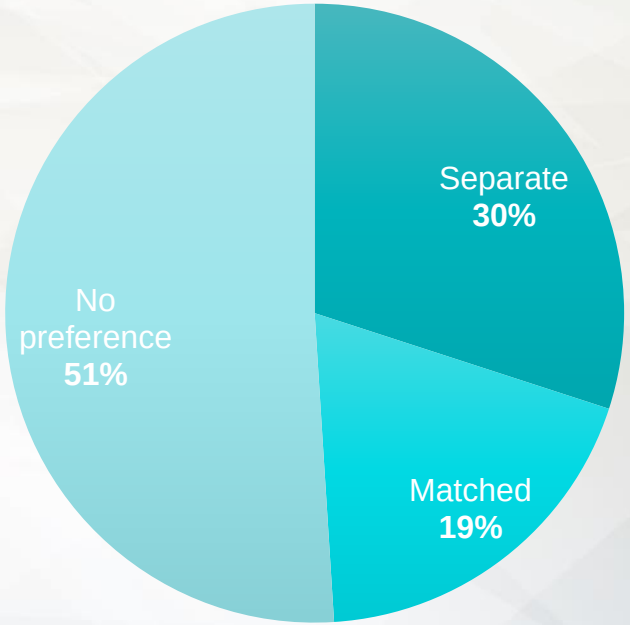
Eighty-nine percent of respondents specify medium-voltage drives for new applications, and 51% have no preference when purchasing matched or separate units of medium-voltage drives and Above NEMA motors.

Applications



Purchasing

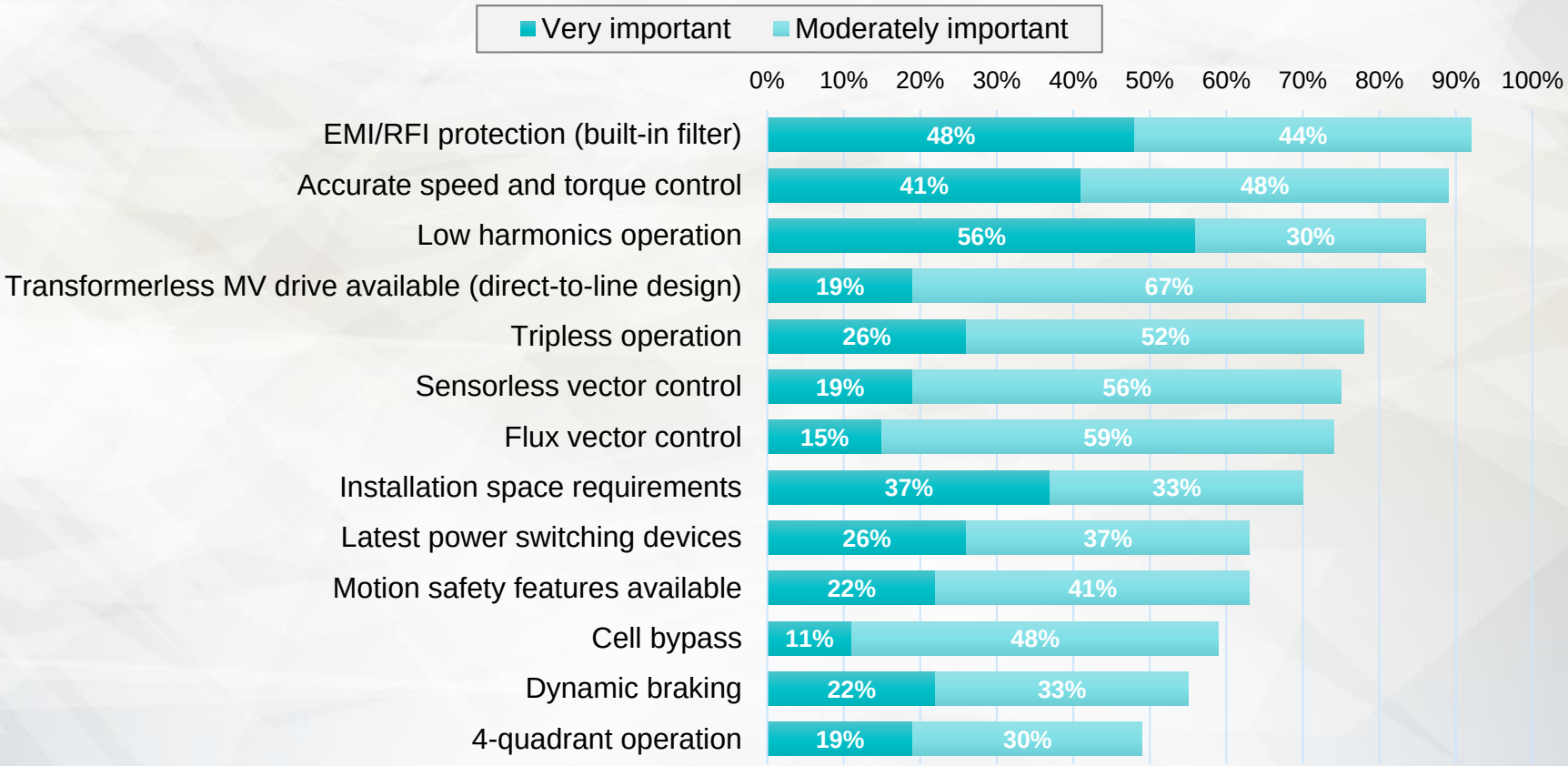
Matched vs. separate units



Q: For what types of applications do you specify medium-voltage drives? Check all that apply. (n=27);
Q: Do you prefer to purchase medium-voltage drives and Above NEMA motors as matched units or separately? (n=27)

Important evaluation factors

Electromagnetic interference (EMI)/radio frequency interference (RFI) protection and accurate speed and torque control are the top important factors considered when respondents evaluate medium-voltage drives; low harmonics operations is also very important, according to 56% of respondents.



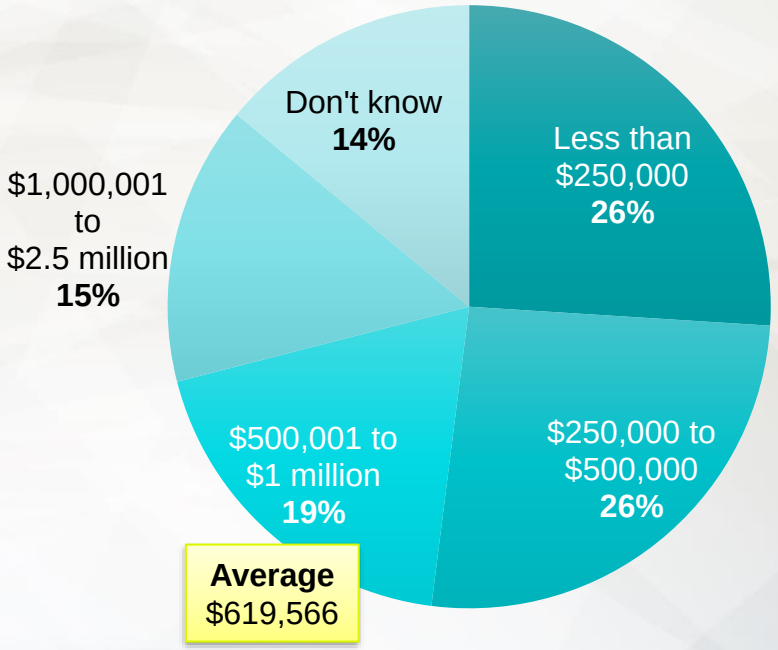
Q: How important are the following factors to you when evaluating medium-voltage drives? (n=27)

Estimated expenditures

One-third of respondents budget for medium-voltage drives during Q4, and 26% said their estimated expenditures for these products in the past 12 months were less than $250,000, while 15% estimated spending more than $1 million.

Evaluation/purchasing period

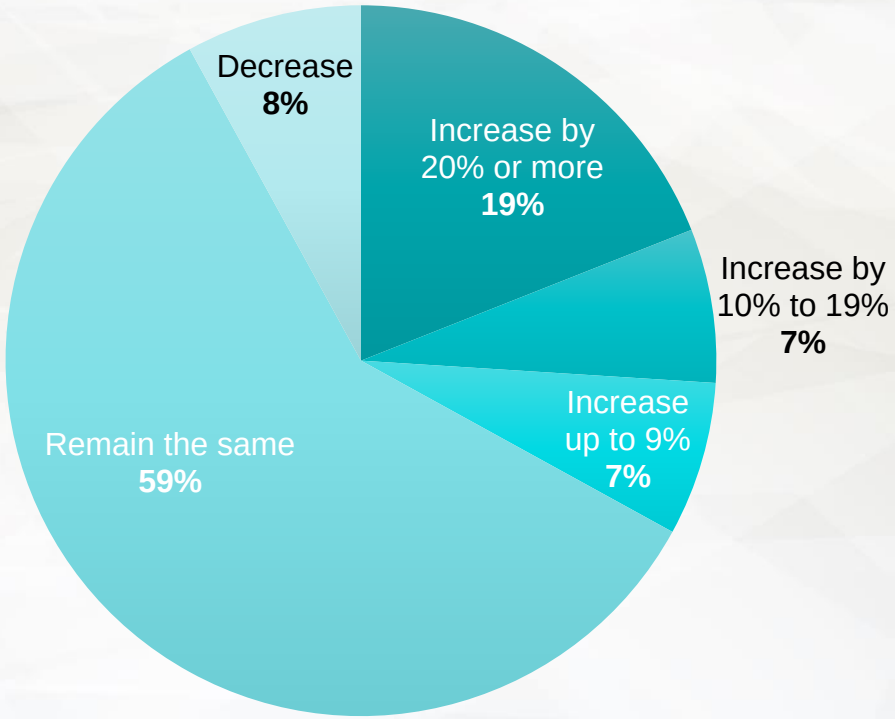
Estimated expenditures



Q: What time of year do you budget for medium-voltage drives? (n=27);
Q: Which of the following ranges best reflects your estimated expenditures for medium-voltage drive products over the past 12 months? (n=27)

Future expenditures

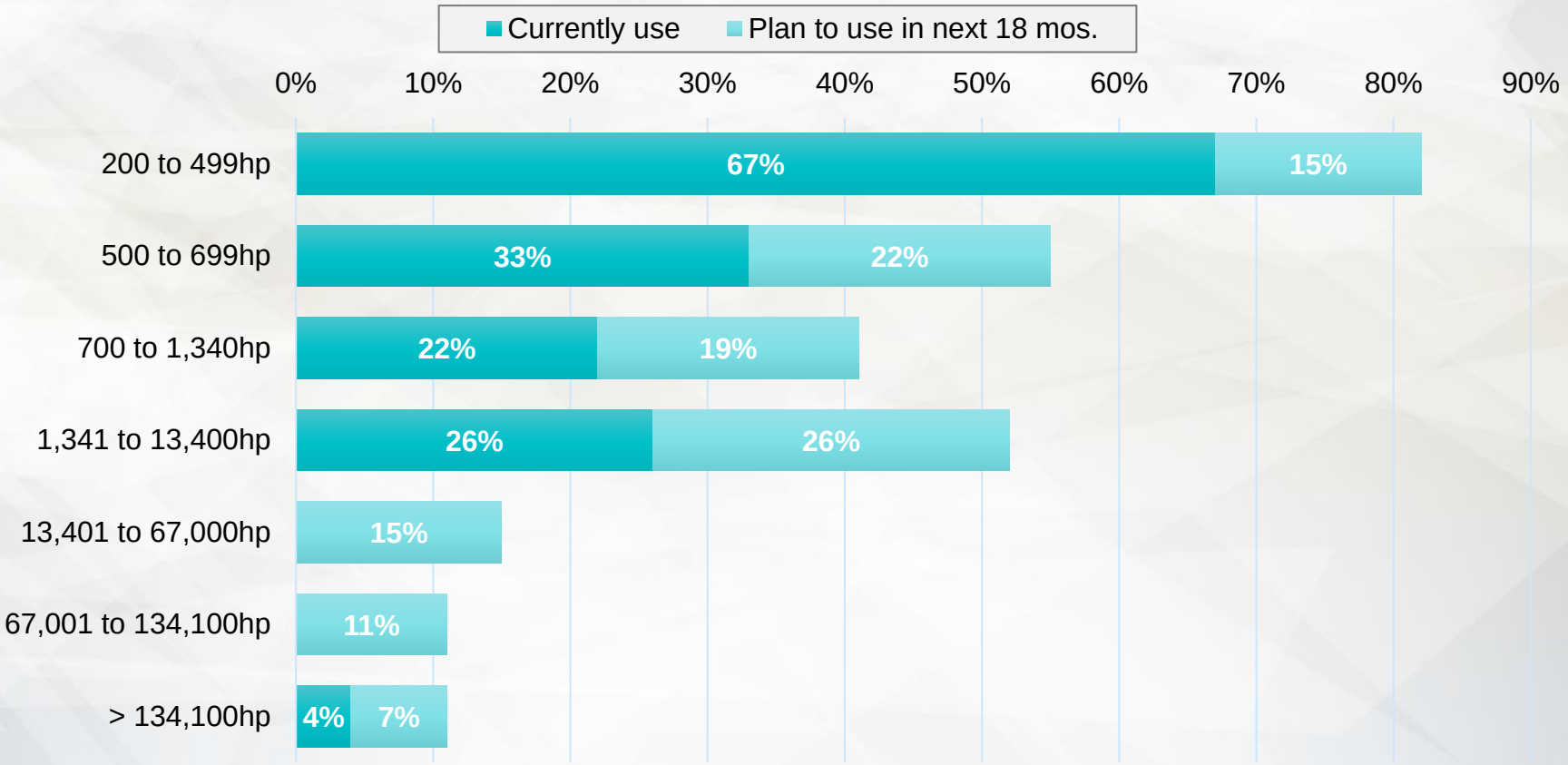
Six in 10 respondents do not expect medium-voltage drive expenditures to change in the next 12 months; 33% do expect an increase in spending on MV drives; 8% anticipate a decrease.



Q: How do you expect the expenditures for medium-voltage drives to change in the next 12 months? (n=27)

Medium-voltage drive size

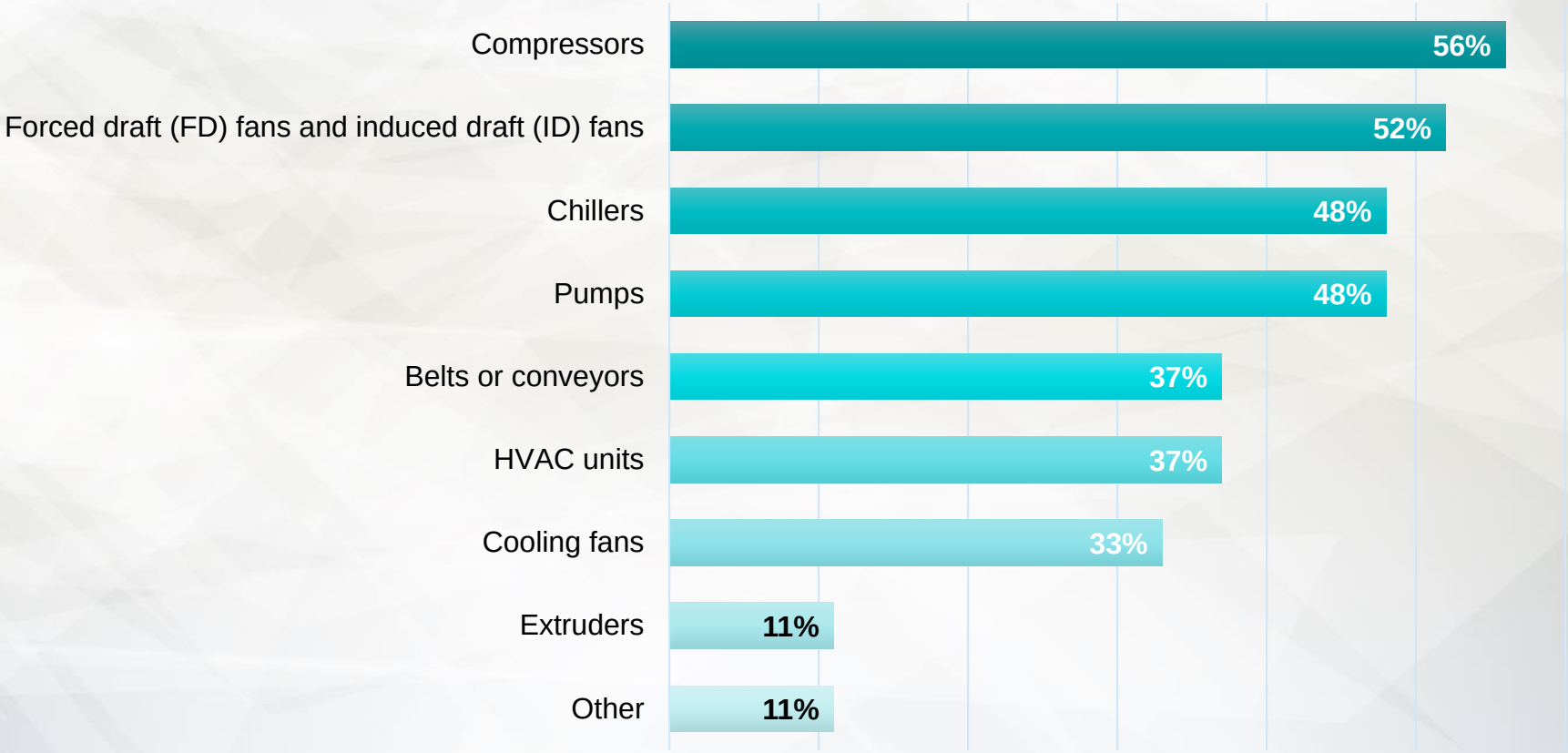
Two-thirds of respondents currently use 200 to 499hp medium-voltage drives, 33% use 500 to 699hp MV drives and 26% use 1,341 to 13,400hp MV drives.



Q: Which sizes of medium-voltage drives do you currently use or plan to use in the next 18 months? (n=27)

Current, future applications

The top applications for which respondents are using or anticipate using medium-voltage drives in the near future are compressors (56%), FD and ID fans (52%), chillers (48%) and pumps (48%).



Q: Select applications for medium-voltage drives for which you are currently using them or anticipate using them in the future. Check all that apply. (n=27)

Additional resources

Thank you for downloading the *Control Engineering* 2019 Motor Drives Report! Use the links below to access additional information on related news, products and research.

News, articles, products

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