By Greg Drevenstedt, PhD

3D Printing Trends:
Findings from NADL's Dental Technology Surveys

After increasing steadily from 2014 to 2023, the percentage of dental laboratories that report using 3D printers declined from 72 percent in 2023 to 68 percent in 2024, according to new survey results from NADL (**Fig. 1**). This reversal of a decade-long trend could be due to several factors, including a slight contraction after pent-up demand was met following the COVID-19 pandemic. Furthermore, some labs may have experimented with 3D printers but found that they did not meet their needs in terms of staffing, workflow, or costs of ownership.

Although overall use of 3D printers declined, among dental labs surveyed in 2024 that do not currently use 3D printers, 32 percent plan to buy or lease a 3D printer within the next three years, up from 29 percent in 2023.

NADL Survey Program

Trends in 3D printer use have been measured in nationwide surveys conducted by NADL and Valmont Research, including the Materials and Equipment Survey (2014-2019) and the Dental Technology Survey (2019-2024). Invitations to complete online surveys are sent out via email. Data for the 2024 Dental Technology Survey was collected during a six-week period in July and August. A total of 344 responses were received, and the response rate was 8.2 percent. Over the past six years, 2,508 responses to NADL's Dental Technology Survey have been analyzed.

Digital vs. Analog

According to one lab that responded to the 2024 Dental Technology Survey, "Digital dentistry has streamlined our lab in so many ways that we can't wait to be totally digital." While most lab owners and managers believe that there will always be a place for traditional manufacturing techniques, over the past six years (2019-2024) an average of 93 percent of dental labs that use 3D printers reported that their digital manufacturing will "increase substantially" or "increase moderately" over the next three to five years. Furthermore, labs that report that more than 50 percent of their cases originate from intraoral scans have increased from 12 percent in 2019 to 39 percent in 2024.

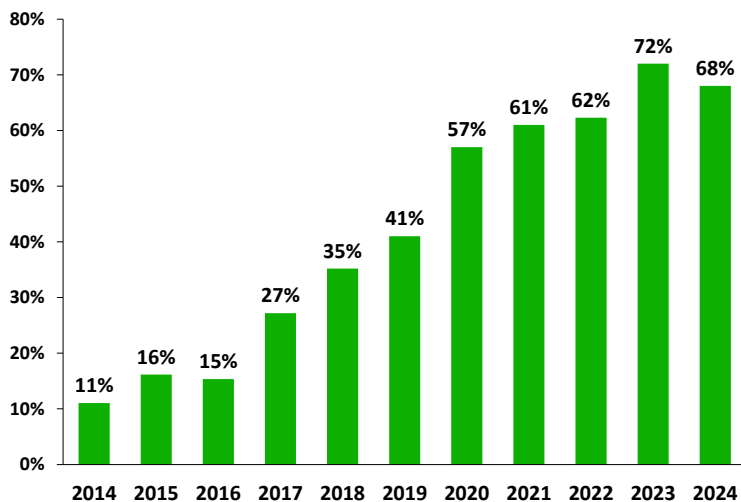**Figure 1**

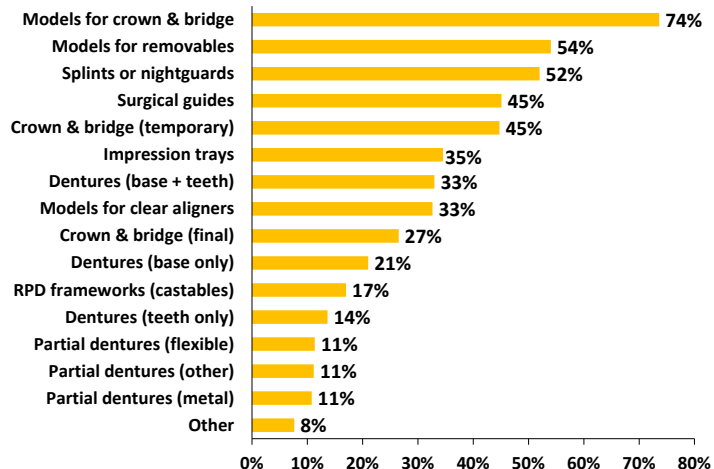3D Printer Use/Adoption, 2014-2024 (annual)

Year	Percentage
2014	11%
2015	16%
2016	15%
2017	27%
2018	35%
2019	41%
2020	57%
2021	61%
2022	62%
2023	72%
2024	68%

Figure 2 3D Printed Applications/Parts, 2020-2024 (average)

Application/Part	Percent
Models for crown & bridge	74%
Models for removables	54%
Splints or nightguards	52%
Surgical guides	45%
Crown & bridge (temporary)	45%
Impression trays	35%
Dentures (base + teeth)	33%
Models for clear aligners	33%
Crown & bridge (final)	27%
Dentures (base only)	21%
RPD frameworks (castables)	17%
Dentures (teeth only)	14%
Partial dentures (flexible)	11%
Partial dentures (other)	11%
Partial dentures (metal)	11%
Other	8%

Figure 3 3D Printer Brands in Use: Labs <10 Employees, 2019-2024 (avg.)

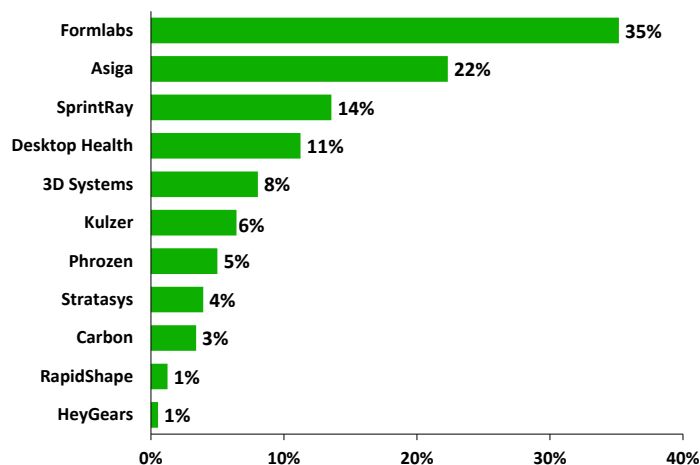| Brand	Percent
Formlabs	35%
Asiga	22%
SprintRay	14%
Desktop Health	11%
3D Systems	8%
Kulzer	6%
Phrozen	5%
Stratasys	4%
Carbon	3%
RapidShape	1%
HeyGears	1%

Just as overall use of 3D printing has increased over the past decade, so has the average number of cases produced per day using 3D printers. In 2019, labs were almost evenly split between those that produced fewer than 10 cases per day (48 percent) and those that produced 10 or more cases per day (52 percent). By 2024, the proportion of labs using their 3D printers to produce one to nine cases per day had decreased to 34 percent and those using their printers to produce 10 or more cases per day had increased to 66 percent.

Among labs that do not currently use 3D printers, a substantial portion would consider adopting the technology but some face challenges in doing so. As one respondent wrote, "I need to spend more time educating myself on if and how [3D] printing could improve my business. I keep busy doing things the way I have been, [but I] am open to change." While a strong case can be made for the return on investment (ROI) with 3D printing, there remains the challenge of training staff. "Highly recommend an authorized apprenticeship program be developed," suggested one respondent.

3D Printed Parts

By far the most widely produced 3D printed applications or parts are models for crown and bridge (**Fig. 2**). Between 2020 and 2024, an average of 74 percent of labs reported using 3D printers to produce C&B models (the 2019 survey's list of 3D printed applications is not directly comparable with later surveys). Other applications commonly produced using 3D printers include models for removables (54 percent average), splints or nightguards (52 percent), surgical guides (45 percent), temporary crown and bridge (45 percent), impression trays (35 percent), base and teeth for dentures (33 percent), and models for clear aligners (33 percent).

3D Printer Brands

Each annual survey asked respondents to report which 3D printers are used in their labs, and they could select multiple brands. With responses pooled for the 2019-2024 six-year period, among small labs with less than 10 employees the leading 3D printer brands are: Formlabs (35 percent), Asiga (22 percent), SprintRay (14 percent), Desktop Health (11 percent), 3D Systems (8 percent), Kulzer (6 percent), Phrozen (5 percent), Stratasys (4 percent), Carbon (3 percent), RapidShape (1 percent), and HeyGears (1 percent) (**Fig. 3**).

Among larger labs with 10 or more employees, the ranking of most widely used brands over the past six years is somewhat different. Carbon is the most common brand (42 percent), followed

Figure 4

3D Printer Brands in Use: Labs 10+ Employees, 2019-2024 (avg.)

Brand	Percentage
Carbon	42%
Formlabs	34%
Asiga	25%
3D Systems	16%
Desktop Health	14%
Stratasys	14%
Kulzer	10%
SprintRay	8%
HeyGears	8%
RapidShape	3%

Figure 5

Most Preferred/Reliable 3D Printer Brands, 2020-2024 (average)

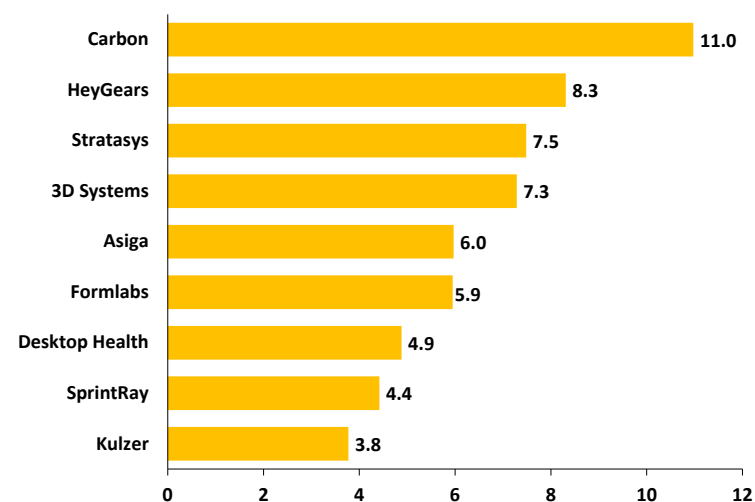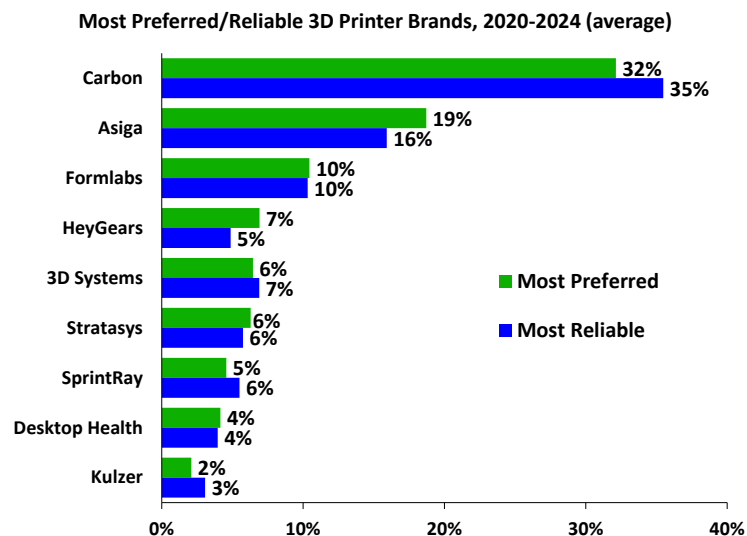| Brand	Most Preferred	Most Reliable
Carbon	32%	35%
Asiga	19%	16%
Formlabs	10%	10%
HeyGears	7%	5%
3D Systems	6%	7%
Stratasys	6%	6%
SprintRay	5%	6%
Desktop Health	4%	4%
Kulzer	2%	3%
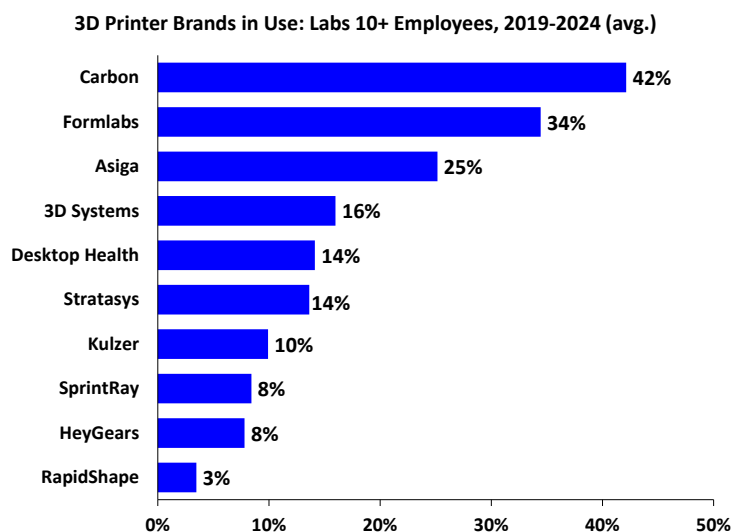
by Formlabs (34 percent), Asiga (25 percent), 3D Systems (16 percent), Desktop Health (14 percent), Stratasys (14 percent), Kulzer (10 percent), SprintRay (8 percent), HeyGears (8 percent), and RapidShape (3 percent) (**Fig. 4**).

Surveys also asked respondents about their experience with 3D printer brands used in their lab (**Fig. 5**). With responses pooled over the 2020-2024 period, the most preferred brands are Carbon (32 percent), Asiga (19 percent), and Formlabs (10 percent), while all other brands were most preferred by less than 10 percent of labs. The most reliable brands are Carbon (35 percent), Asiga (16 percent), and Formlabs (10 percent).

Starting in 2020, the annual surveys asked respondents to provide the average daily print hours for each brand of 3D printer used in their lab. With responses pooled over the 2020-2024 five-year period, the average daily print hours are as follows: Carbon (11.0), HeyGears (8.3), Stratasys (7.5), 3D Systems (7.3), Asiga (6.0), Formlabs (5.9), Desktop Health (4.9), SprintRay (4.4), and Kulzer (3.8) (**Fig. 6**).

Digital Future

All technologies mature over time. They prove their worth, they improve in terms of efficiency and efficacy, and they become more integrated into the lives of users. That is certainly the case with 3D printers, which have become more reliable, more widely capable, and able to produce applications and parts of increasingly high quality. As one respondent wrote in their survey, the "growth of the lab has been a factor in our printers being updated with better and more user-friendly printers over time."

While the evolution of 3D printing has been impressive, there is still room for improvement, as suggested by comments by some survey respondents. "The technology cannot replicate [what] can be done by hand and the denture resins aren't as durable as traditional acrylic," and "So far no brand has had the best resins available in all areas of our use."

Many respondents believe 3D printing has increased their lab's production efficiency and capabilities, while others voice concerns about the high costs to adopt 3D printing when there is downward pressure on pricing for finished restorations. Clinicians demand lower prices for applications, but new technology may make them more expensive to produce, which may further limit the uptake of 3D printers by labs that do not already use them. **JDT**

About the Author

Greg Drevenstedt, PhD, is principal and project director at Valmont Research, a market research and consulting firm that has conducted surveys for NADL since 2005. He received his PhD in Demography from the University of Pennsylvania. When not crunching numbers, he's exploring backroads on a motorcycle.

Figure 6   Average Daily Print Hours by Brand, 2020-2024 (avg.)

Brand	Hours
Carbon	11.0
HeyGears	8.3
Stratasys	7.5
3D Systems	7.3
Asiga	6.0
Formlabs	5.9
Desktop Health	4.9
SprintRay	4.4
Kulzer	3.8