TRENDS IN CAD/CAM FOR O&P

A Survey of Orthotics and Prosthetics Professionals

May
2020

dimensional research

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Introduction

The earliest use of orthotics and prosthetics (O&P) can be traced all the way back to ancient periods. While these devices were rudimentary, it was not until the early 19th century that practitioners were able to produce more intricate devices, using materials such as leather, metals, and textiles. Fortunately for the patients requiring these assistive devices, there have been significant technological developments in O&P in the past few decades. For instance, plaster casting was an important step forward to enable the delivery of custom solutions. More recently, digital options have been made available that include the use of computer-aided design/computer-aided manufacturing (CAD/CAM) and 3D printing technology. When used correctly, these modern innovations can capture detailed measurements for a greater patient fit, which can result in increased efficiencies, better patient experiences, and reduced long-term costs.

Although the O&P industry is typically one that is open to new technologies, after years of innovation and influence in the field, CAD/CAM is still not widely adopted around the world despite the potential benefits. While many factors may have contributed to this result, the main contributor appears to be a lack of understanding of its usage for orthotics and prosthetics.

This research examines the current reality of CAD/CAM use for orthotics and prosthetics. It seeks to respond to the following key questions:

- How have recent innovations affected patient care?
- What are the most common setups in O&P facilities?
- What do CAD/CAM users think of their systems?
- What value do organizations get from their investments?

The following report, sponsored by Vorum, is based on an online survey of over 250 orthotics and prosthetics professionals from around the world. The goal of this research was to understand current trends in CAD/CAM adoption and use for orthotics and prosthetics.

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Key Findings

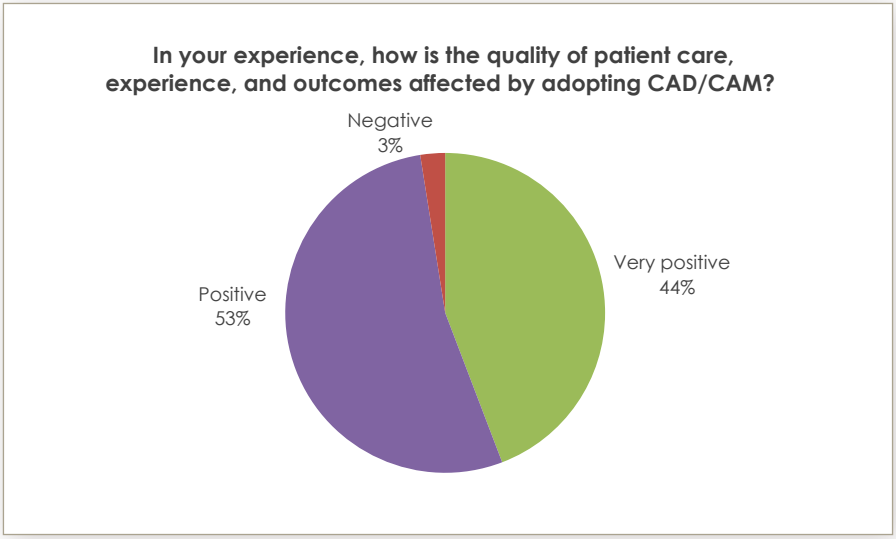
- **CAD/CAM technology has a positive impact on patient care**
  - 97% report quality of patient care and outcomes are positively affected by adopting CAD/CAM
  - CAD/CAM has particularly positive results for TLSO, cranial molding helmets, TT/TF, and AFO/KAFO
  - 98% say O&P professionals do not fully understand CAD/CAM usage
- **Many O&P practitioners have brought CAD/CAM solutions on-site**
  - 79% have CAD/CAM systems on-site at the location where they work
  - 74% brought CAD/CAM in-house to increase efficiencies
  - 60% were motivated to bring CAD/CAM in-house to improve patient experiences and care
- **O&P professionals report CAD/CAM investments deliver value**
  - 90% are satisfied with their CAD/CAM systems
  - 80% can achieve what they need with minimal effort
  - 92% report their CAD/CAM technology investments deliver good value
  - Facilities that have been using CAD/CAM longer report higher levels of value and satisfaction

Detailed Findings: CAD/CAM technology has a positive impact on patient care

O&P professionals overwhelmingly agree with the positive experience of CAD/CAM technology

For many years, the custom fitting of orthotic and prosthetic (O&P) devices involved a manual plaster casting process that was often slow, messy, and uncomfortable for the patient. Modern Computer-Aided Design and Manufacturing (CAD/CAM) strives to replace plasterwork with a digital solution that is faster and more accurate. The intention was to deliver a more pleasant experience for both the patient and clinician.

This research demonstrates that O&P practitioners agree that CAD/CAM has delivered on these intentions. The vast majority (97%) of O&P practitioners report that adopting CAD/CAM had a positive impact on the quality of patient care. This includes almost half (44%) that characterize the difference as "very positive."

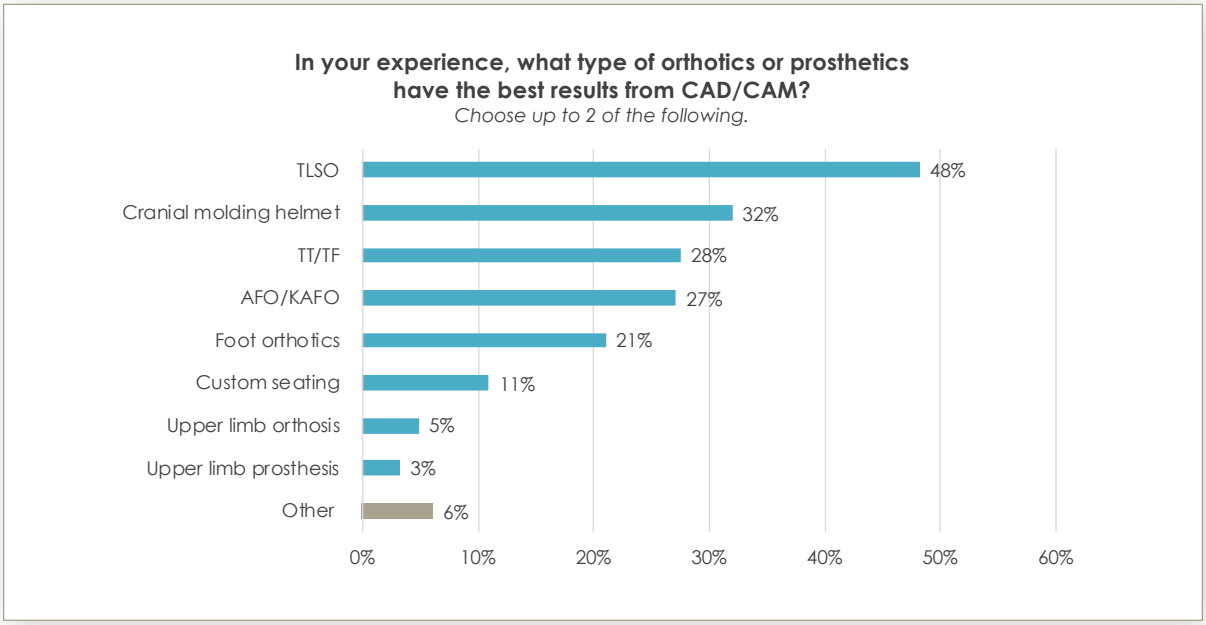


CAD/CAM is useful across a wide variety of types of orthotics and prosthetics

Customization plays an important role in creating a brace or prosthesis for a patient. People come in all shapes and sizes, so the ability to provide patients with a comfortable and custom fitting device is particularly important. The CAD/CAM process allows users to scan, design, and carve out the molds used to fabricate different types of orthoses and prostheses. We asked participants where they see the best use cases for CAD/CAM among the variety of possible O&P devices available - limiting them to only two answers in order to ensure they prioritized their responses.

The most frequent response was O&P stakeholders (48%) who report that the TSLO (Thoracic Lumbar Sacral Orthosis) sees some of the best results from CAD/CAM usage. The digital process involved can allow clinicians to quickly scan patient torsos, modify and design the brace in the CAD software, and carve out the large mold with relative ease as compared to traditional plaster methods. Respondents may believe the technology outperforms traditional plasterwork where patients are often uncomfortable, plaster casts are large, heavy, and take up a lot of space.

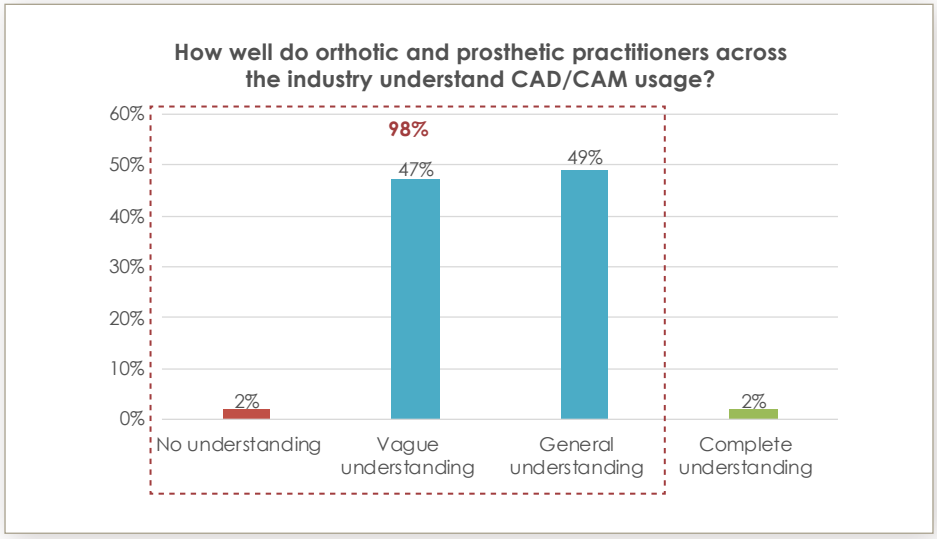
Cranial remolding helmets (32%) are also reported as having great results. Like TLSOs, casting pediatric heads can be very uncomfortable for the child, thus making the scanning process an ideal solution here. The versatility of CAD/CAM is demonstrated by the many O&P professionals who cite good results for TT/TF (Transtibial/ Transfemoral) (28%), AFO/KAFO (Ankle Foot Orthosis/Knee Ankle Foot Orthosis) (27%), and foot orthotics (21%). Custom seating (11%) and upper limb orthosis (5%) and prosthesis (3%) also see good results. Several participants took the time to report "other" ways CAD/CAM is used with strong outcomes including KO (Knee Orthosis), diagnostic sockets, and custom footwear.



Most use CAD/CAM with some understanding, although there is significant room for improvement

CAD/CAM technology is usually only beneficial when key stakeholders have proper education, training, and experience. Only a tiny number (2%) of O&P practitioners are of the opinion that their peers across the industry completely understand CAD/CAM usage. The vast majority (98%) agree that there is room to know more. This includes almost half (49%) characterizing the industry as having a "general understanding." A similar number (47%) rates the understanding of most practitioners as "vague." A small percentage (2%) are particularly negative and said that there is "no understanding" across the industry.

The data clearly shows that there is an opportunity for organizations to encourage additional education and training for their staff to get the most value out of their CAD/CAM systems.

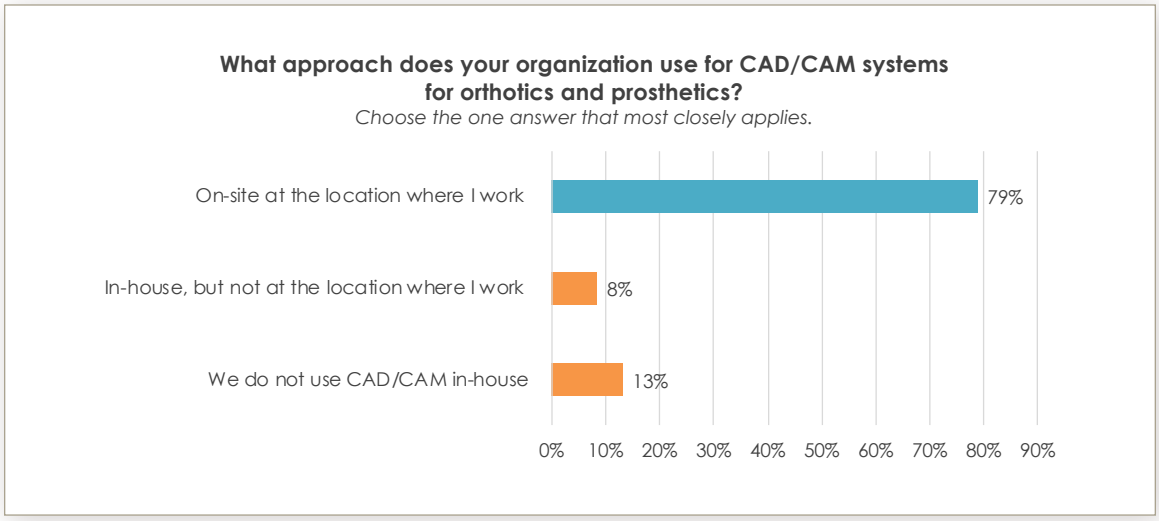


Detailed Findings: Many O&P practitioners have brought CAD/CAM on-site

The majority of organizations have in-house CAD/CAM systems

There are a number of different models for using CAD/CAM in an O&P facility. Traditionally, the cost and expertise to run CAD/CAM resulted in most organizations working with an off-site partner. This can result in delays caused by the need for additional communication and ultimately affecting turnaround times for devices. As CAD/CAM became more accessible and cost-effective in the field, many organizations saw advantages to bringing CAD/CAM systems in-house.

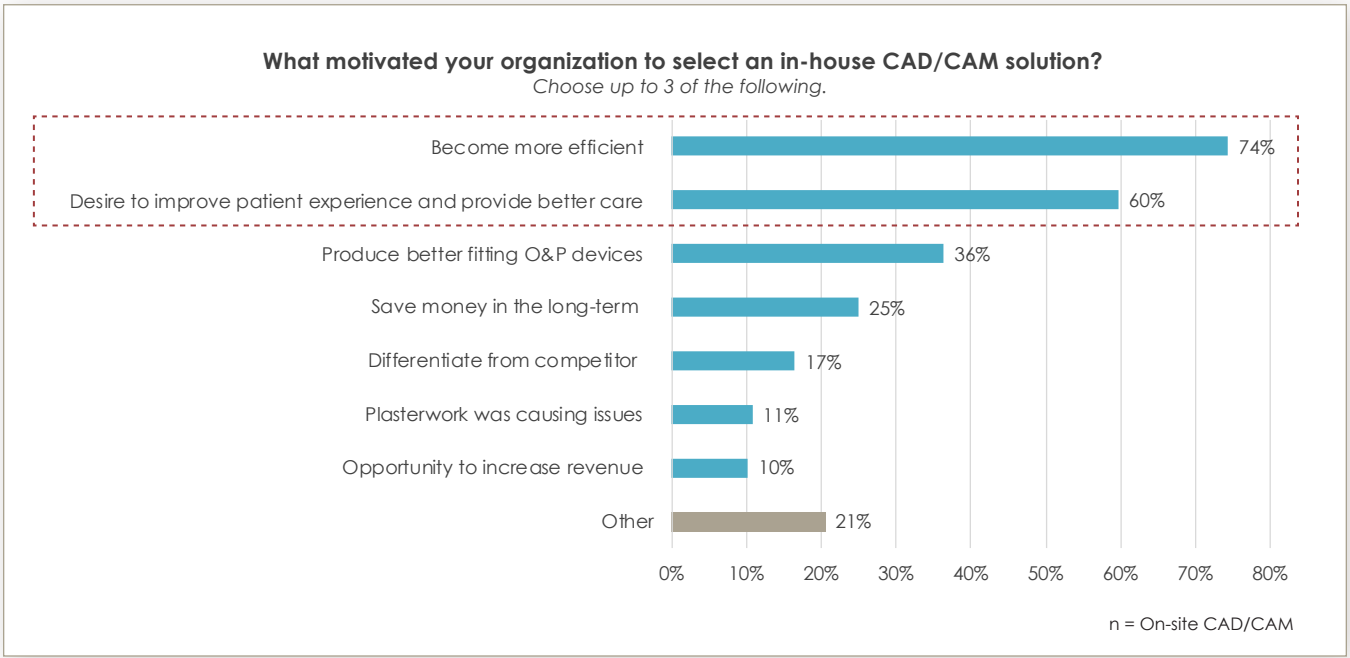
This research demonstrates that the in-house approach is now the norm, with most (79%) organizations reporting they have a CAD/CAM system at the location where they work. A small number (8%) work for an organization that has CAD/CAM in-house, but not at their location. Only a small percentage (13%) do not have any kind of in-house CAD/CAM system.



In-house CAD/CAM chosen for a wide range of reasons

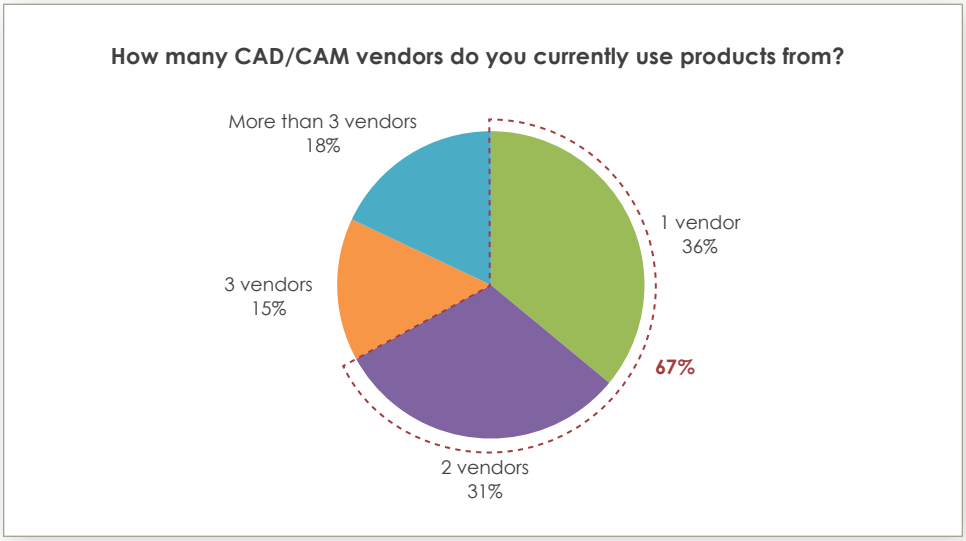
There is no single reason for the decision to use an in-house CAD/CAM system. Efficiency is the primary driver reported for organizations to have an in-house CAD/CAM system (74%). The desire to improve the patient experience and provide better care is also a factor for many (60%). Over a third (36%) were motivated by the ability to produce better fitting O&P devices.

Several other motivators were reported including saving money in the long-term (25%), differentiating from competitors (17%), issues caused by plasterwork (11%), and the opportunity to increase revenue (10%). Additionally, several survey participants reported "other" drivers for their on-site CAD/CAM solution, including benefits of digital documentation, the opportunity for education, and better communication.



Many O&P organizations have chosen to work with one or two CAD/CAM vendors

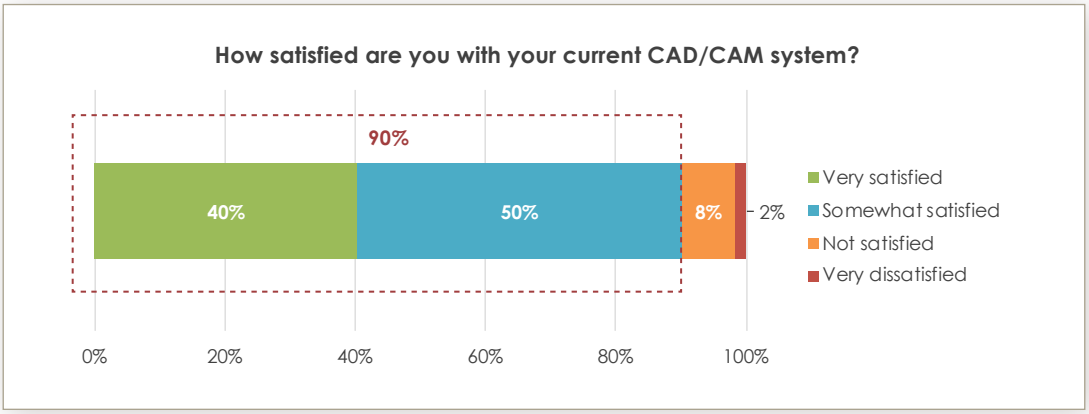
There are many CAD/CAM system providers in the world, each offering tools and services for certain industries where they specialize. That being the case, not many companies can offer a complete turnkey solution for O&P, so clinicians often have to consider multiple vendors. Each individual CAD/CAM system requires a learning curve and a unique process for support. When multiple solutions are used together, the workflow can become complicated and may lead to compatibility issues in achieving a successful outcome. Committing to one or two vendors can help avoid these problems. The survey results seem to agree, with most O&P professionals (67%) having CAD/CAM products from one or two vendors. Slightly more than a third (36%) work with a single solution provider. Only some (15%) use three vendors, or work with three or more (18%).



Detailed Findings: O&P professionals report CAD/CAM investments deliver value

CAD/CAM users are typically pleased with their CAD/CAM system

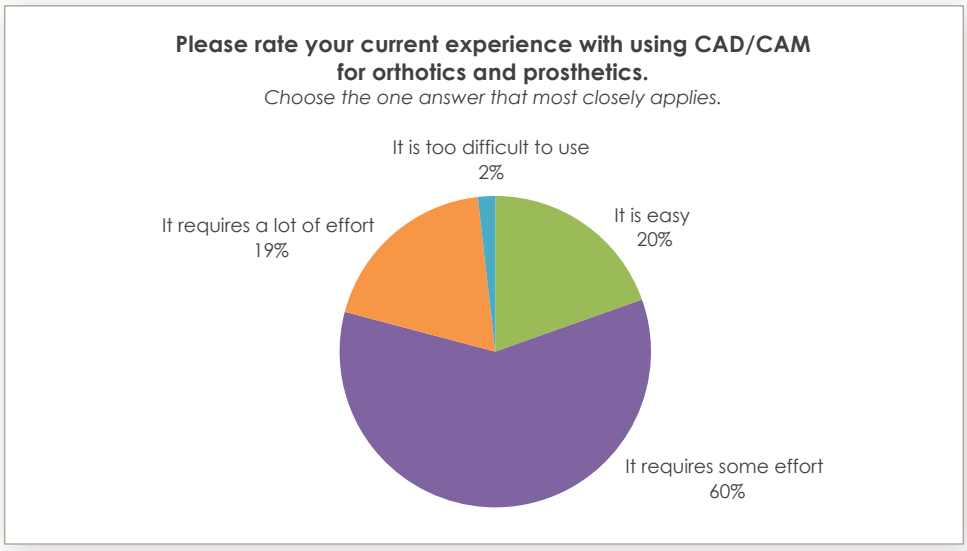
As technology advances in the world, so does CAD/CAM efficacy for orthotics and prosthetics. With new tools, features, and solutions available to improve clinical workflow, satisfaction with digital technology is high. The vast majority (90%) are satisfied with their CAD/CAM systems, including 40% who characterize themselves as "very" satisfied.



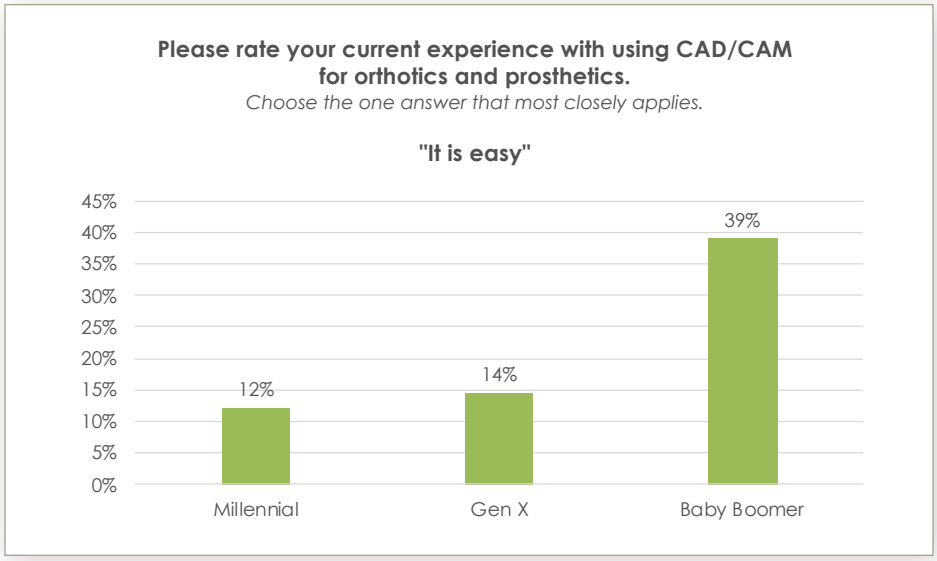
Most users report a smooth CAD/CAM experience

A large majority of O&P professionals (80%) report that they can use CAD/CAM effectively for O&P, saying that it takes little effort to achieve what they want. Fewer than 1 in 5 O&P professionals (19%) report that CAD/CAM requires a lot of effort to use, and only a small number of respondents (2%) think it is too difficult.

That said, there is clearly room for CAD/CAM systems to improve in usability or offer better training and support as only 1 in 5 (20%) report that the systems are easy to use.

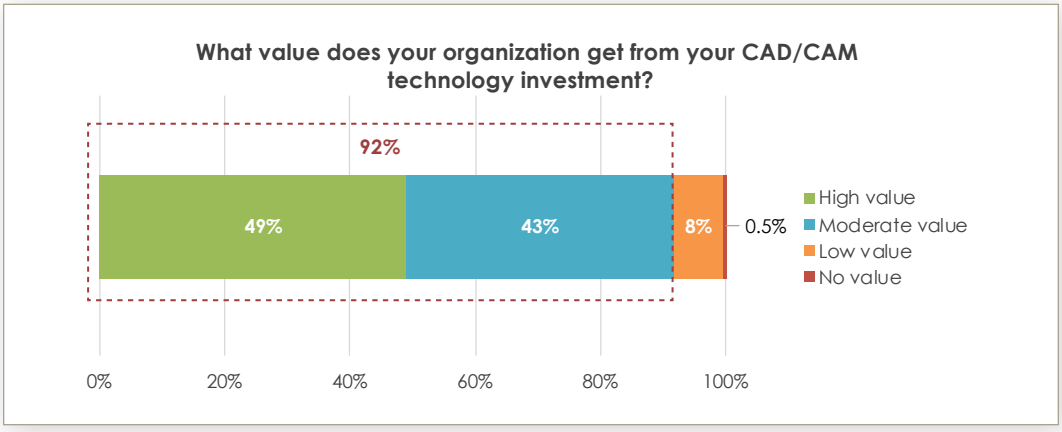


It is interesting to note that Baby Boomers are much more likely to report that CAD/CAM is easy to use (39%) than either Gen X (14%) or Millennials (12%). While this research cannot say with certainty why that is the case, one possibility may be that Baby Boomers have more experience delivering orthotics and prosthetics without the benefits of modern technology. It is possible that CAD/CAM feels less complex when compared to the plaster molding approaches that were the norm a few decades back.



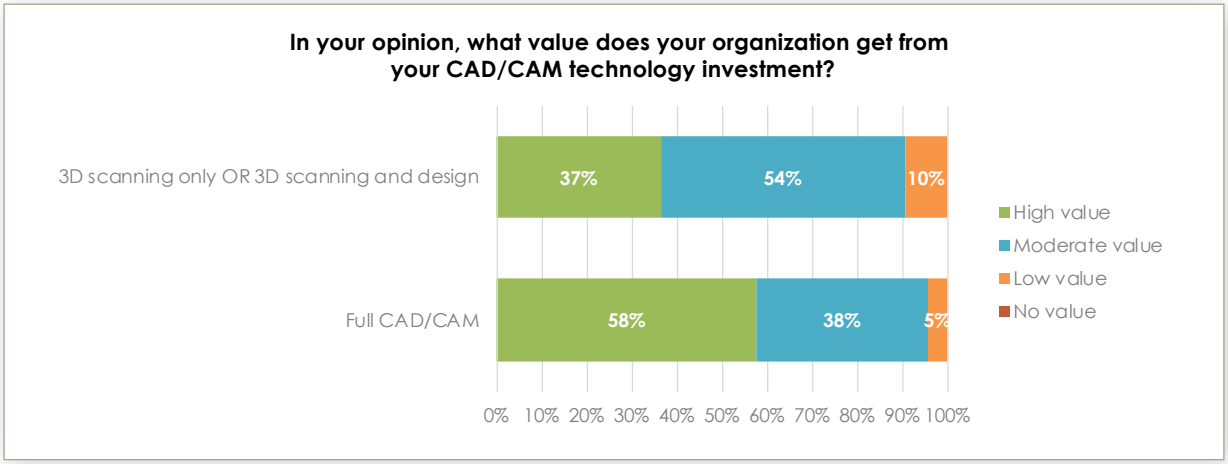
Almost all organizations report good value for the investment in CAD/CAM technology

The integration of a CAD/CAM system can be a significant investment for many organizations. The good news is that the value received is high. The vast majority (92%) of O&P professionals report moderate or high value for their organization's investment and only a small number (less than 1%) felt they received no value. This suggests that from an administrative perspective, a CAD/CAM solution can be perceived as a low-risk investment.



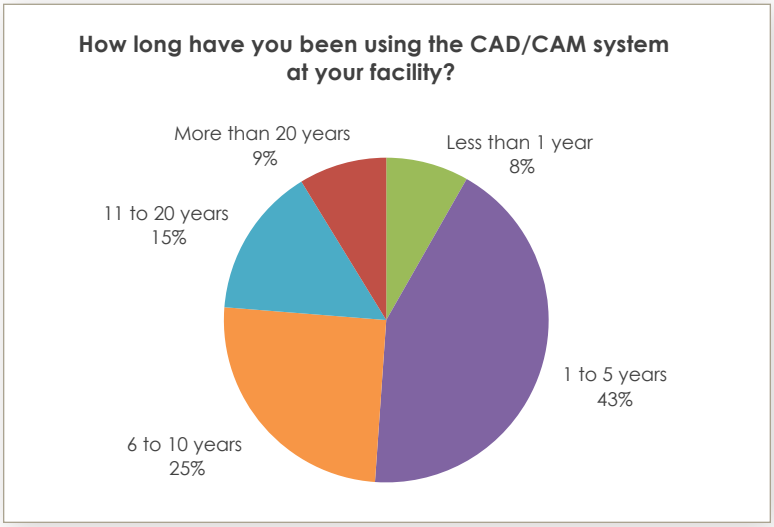
Organizations that use full CAD/CAM systems get more value

Owning a full CAD/CAM system allows users to scan, design, carve, and/or 3D print – all in-house. The ability to do everything with one solution can simplify workflows, reduce training needs, and save time. By investing in a complete CAD/CAM solution, organizations are far more likely to report that their technological investment delivers "high" value (58%) than those that have only invested in a partial system (37%).



Although CAD/CAM is not new technology, many O&P facilities have adopted it recently

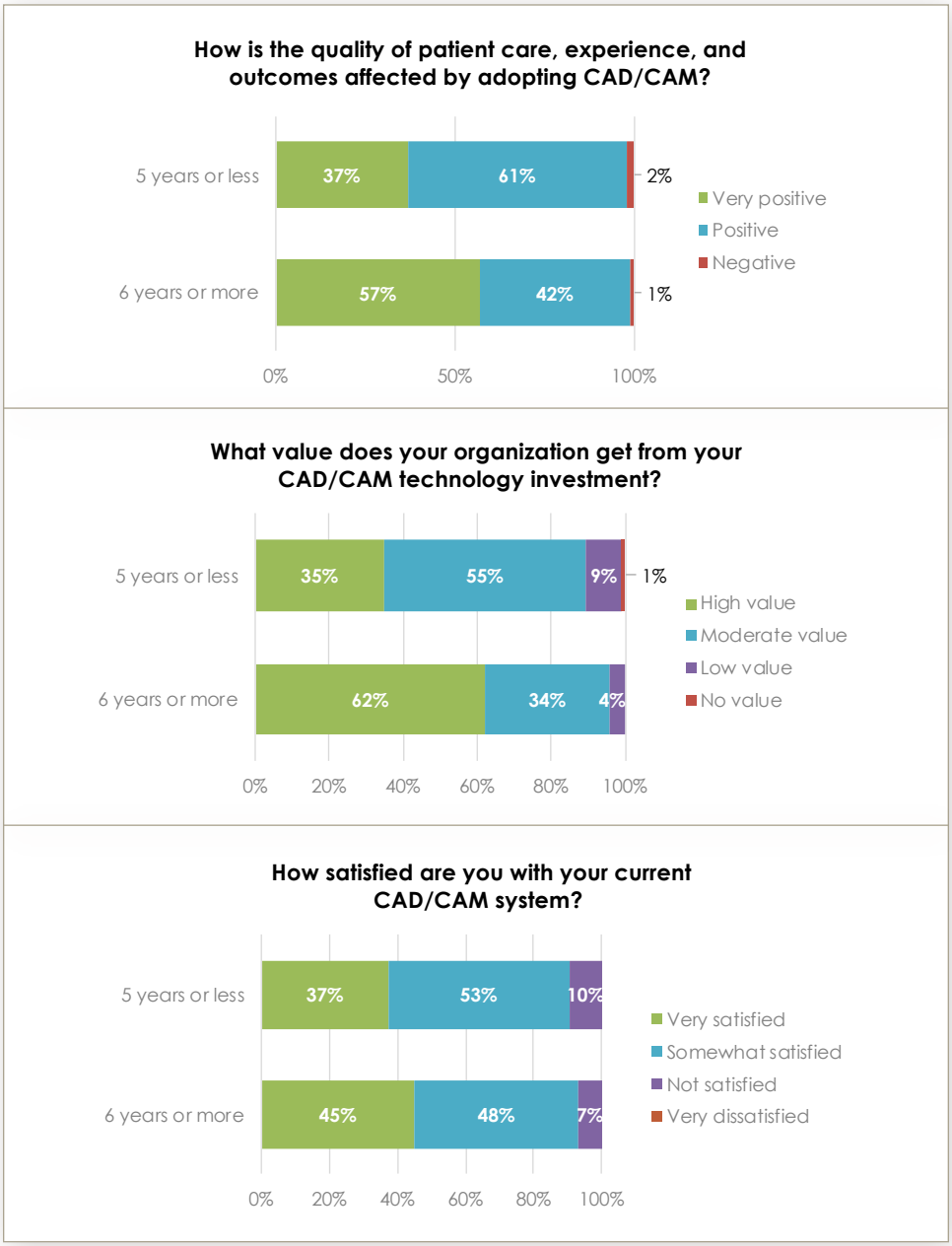
CAD/CAM technology for O&P has been available for over thirty years, but many companies have only recently made the investment to join the digital age. Around half (51%) of those surveyed have used CAD/CAM at their facility for 5 years or less. This suggests that there has been an increased interest in digital technology in the O&P field and also suggests that perhaps this technology is no longer seen as reserved for early adopters.



CAD/CAM outcomes are notably higher among experienced users

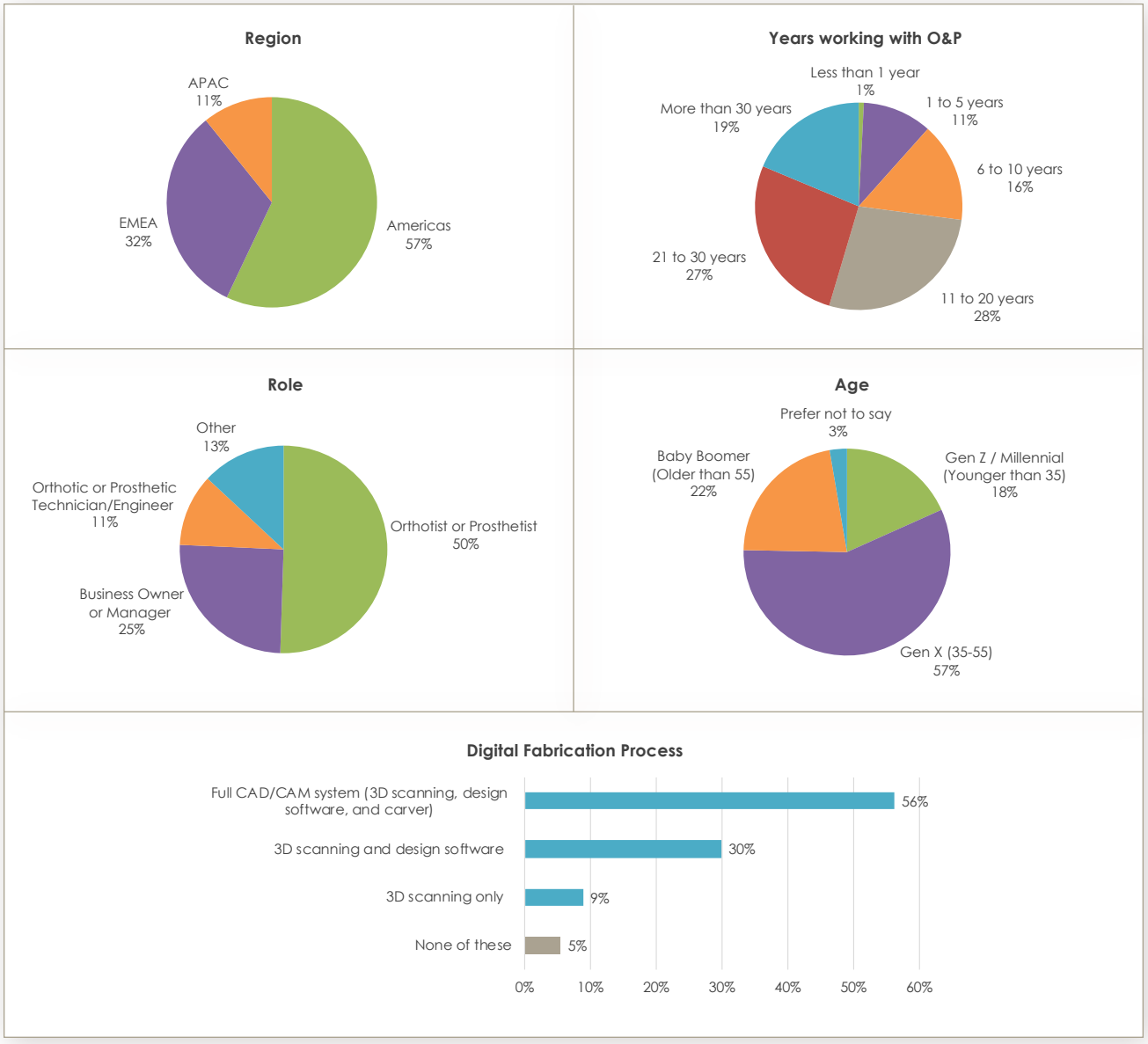
There is a clear correlation between years of experience and CAD/CAM outcomes, indicating that investment in training as well as increased utilization pays off.

O&P practitioners working at organizations that have been using CAD/CAM for six years or more are much more likely to say that CAD/CAM has a "very positive" impact on patient care (57% vs. 37%), get "high value" from their CAD/CAD technology investment (62% vs. 35%), and are "very satisfied" with their CAD/CAM systems (45% vs. 37%).



Survey Methodology and Participant Demographics

In April 2020, a database of O&P stakeholders were invited to participate in an online survey. A total of 251 qualified individuals participated in the survey. The incentive provided for participating in the survey was that participants would receive a copy of this research report. All participants were professionals involved in the orthotics and prosthetics industry who have experience with CAD/CAM systems and represented a number of different regions around the world.



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About Vorum

Over 30 years ago, Vorum became the first company dedicated to the development of computer-aided design and manufacturing (CAD/CAM) solutions for the design and fabrication of custom orthotic and prosthetic (O&P) devices.

Since that time, we have made valuable contributions to the technological advancement of the field. Today, thousands of prosthetists and orthotists at over 800 facilities in over 45 countries have supplanted messy plaster-casting methods with a digital approach that uses our non-contact optical shape scanners, 3D design software, automated mold carvers, and 3D printing solutions.