Orthotic & Prosthetic Technology Programs

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Inside This Issue

Editor-In-Chief

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CUSTOM BIVALVE TLSO FABRICATION

Introduction

A rigid custom-fabricated bivalve thoracolumbosacral orthosis (TLSO) is used when maximum triplanar control is indicated to restrict gross flexion, extension, lateral bending, and axial rotation of the trunk. The primary objectives of this brace are to limit motion, and unload affected vertebral spinal structures to limit pain, and stabilize weak or otherwise affected spinal structures.[1] A body jacket can be fabricated to have a single anterior opening or as a bivalve. A bivalve design is optimal for patients that fluctuate in volume, as the anterior and posterior shells can be adjusted to maintain appropriate intracavitary pressure and stabilization. This article provides an introductory overview of the University of Michigan Orthotic and Prosthetic Center (UMOPC) fabrication guidelines for custom bivalve TLSOs. At UMOPC the clinical team does the scanning and modifying of the digital mold. The fabrication team carves and then fabricates the TLSO according to the following standards.

Foam

Figure 1

Prepare the foam mold by pulling two layers of appropriately sized stockinette around the mold. Pull out any bridging the stockinette creates in the waist grooves (see figures 2&3). Measure and cut aliplast to cover the anterior aspect of the mold. The aliplast should wrap around the anterior aspect to the posterior aspect of the mold. Aliplast will compress when pulled under vacuum with polyethylene, so increase the thickness of the aliplast to accommodate for the expected compression of the foam. Example: If 3/16" thickness foam is required, increase the thickness of the aliplast used to 1/4". Heat the aliplast in a 350-degree oven until it is self-adherent.

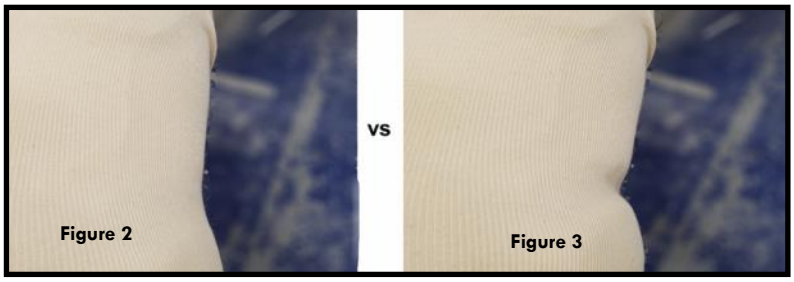


Figure 2 Figure 3

Figure 4

Drape mold aliplast over the anterior aspect of the mold and pull vacuum (this can be achieved internally or externally). Once the foam has cooled, trim any excess aliplast from the proximal and distal aspects of the mold. Ensure the aliplast is left long enough to allow adequate finished brace trimlines. The anterior and posterior aspects of the bivalve TLSO need to overlap by ~3" on the left and right sides of the mold.

Perforate the aliplast using a perforating tool (figure 5). This allows for adequate vacuum to be distributed throughout the mold. Without the perforations, the vacuum will "choke off" when the plastic is pulled. Create waist groove padding for left and right waist grooves by skiving aliplast strips to fit in these divots. The size and shape of the waist grooves pads are determined by the width and depth of the waist grooves on the mold (typically 1/8" to 5/32"). Perforate the skived waist groove pads as well. Spray glue can be used to adhere the perforated waist grooves to the anterior aliplast shell (figure 6).

See Custom, page 2

Custom, Cont'd


Figure 5

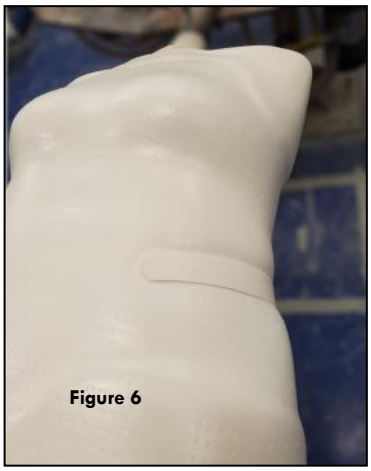


Figure 6

Cap proximal, posterior, and distal aspects of the mold using one continuous sheet of 1/8" aliplast (figure 7). Do not perforate the aliplast cap, this is what the plastic will seal to under vacuum. The aliplast cap can be secured to the mold using nails placed outside the trimlines and taped to the vacuum stand.

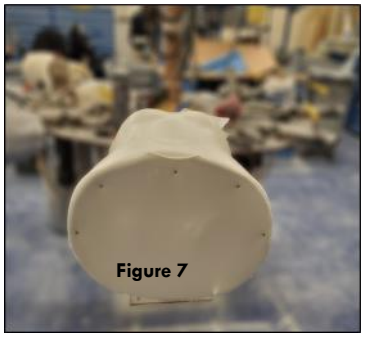


Figure 7

Plastic

Polyethylene plastic provides the appropriate amount of rigidity to the TLSO while also giving the brace flexibility to don and doff easily. The polyethylene needs to be increased/expanded in thickness due to the thinning of the plastic during the pull. Example: If 5/32" finished plastic thickness is required, increase the thickness of the polyethylene to 3/16".

Measure from the proximal to distal aspect of the mold, adding two inches to allow the plastic to adhere to the aliplast cap. This is the height of your plastic. Then measure the width of the mold from aliplast cap on the left to the right side. Again, add two inches to allow room for the plastic to adhere to the aliplast cap.

Polyethylene should be heated, per manufacturer instructions, until it reaches glass transition temperature. If a single-person method of vacuuming forming plastic is necessitated, add 8" to the width of your plastic to allow 4" on either side of the width of the plastic to fold plastic over wooden dowels (more on this in the single-person method).

Vacuum Forming Plastic Two-person Method

This is the preferred method, as it results in a consistently uniform final thickness of polyethylene. One person will hold onto either side of the polyethylene and quickly move appropriately heated polyethylene from the oven to the mold (see figure 8). Quickly adhere the plastic to the aliplast cap and turn on the vacuum (see figure 9). Cut off any excess plastic.

Figure 8

Figure 9

Vacuum Forming Plastic Single-person Method

For this method, you will need two 1/2" dowels approximately 40" in length (exact length of the dowel will depend on the width of the oven). Spray the dowels generously with a release agent to prevent the plastic from sticking to the wood. Place the rods approximately 2" from the lateral edges of the plastic. Fold the polyethylene plastic loosely over the dowels, adhering it back onto itself (see figure 10). Holding the center of the dowels, lift the rods in a swift motion to release the plastic from the oven table with as little thinning as possible.

Drape the plastic over the top of the mold, slide out the dowels from the plastic (this is why it is important to fold the plastic loosely), and tack the plastic down to the aliplast cap to allow for adequate vacuum (see figure 11). Once the plastic is adhered to the aliplast cap on all ends, turn on the vacuum. Drape molding the polyethylene as soon as it reaches glass transition temperature will ensure the plastic does not thin when using this method.

See Custom, page 3

Custom, cont'd

Repeat the process of vacuum molding aliplast, perforating the aliplast, capping the mold, and drape molding polyethylene on the posterior aspect of the mold. Again, ensure enough material remains on the left and right side of the posterior shell to allow proper overlapping of anterior and posterior shells.

Figure 10

Figure 11

Buffing/Strapping

The plastic can be cut-off the mold once the polyethylene has cooled to room temperature. The anterior and posterior shells can now be trimmed and buffed. The anterior shell should overlap the posterior shell approximately 3". Skive the aliplast on the anterior shell approximately 3/4" on the right and left sides (see figure 12). [2]

The UMOPC standard fabrication for custom bivalve TLSO for an average sized adult is three (3) 1½" Dacron and Velcro straps attached to the anterior shell of the brace using 8/23" Chicago screws. Three (3) chafes made with 12" Dacron may be folded in half to make a 6" long chafe which is attached to the posterior shell (see figure 13 for exact placement of the straps and chafes).[2] This placement allows adjustability when tightening the straps on the patient. Additional holes can be drilled 1" medial and lateral from the attachment point to allow for additional strap adjustability by the practitioner (see figure 14).

Figure 13

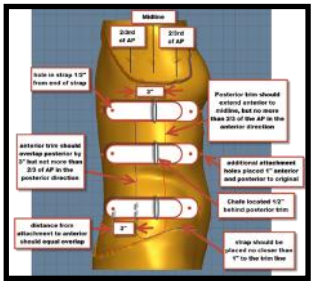
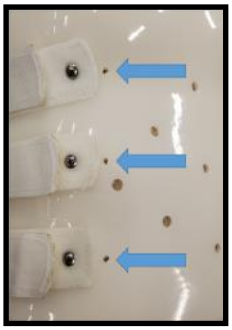


Figure 14



Other Design Methods

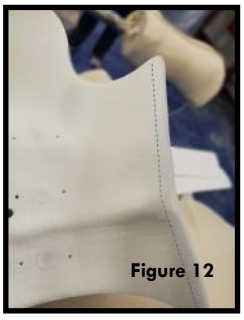


Figure 12

Separator (cornstarch or baby powder) may be used if a cut-out of polyethylene is indicated with the aliplast foam intact. Apply separator liberally over the area you will be cutting out, extending the separator to the trimline (typically the superior or inferior trimline) to allow the aliplast to be pulled away from the plastic to provide space for a cast saw and router to be used to trim and buff the plastic in the indicated area. Spray adhesive can be used to adhere the aliplast to the polyethylene after trimming is complete. Apply the glue to the foam and plastic, and with the brace placed back on the mold, put a plastic bag over the TLSO, then place under vacuum until the glue has dried.

If vent holes are required, a pneumatic punch allows holes to be made without tearing the soft aliplast. A pneumatic punch is preferred overuse of a drill as it prevents plastic burrs.

Figure 15

References

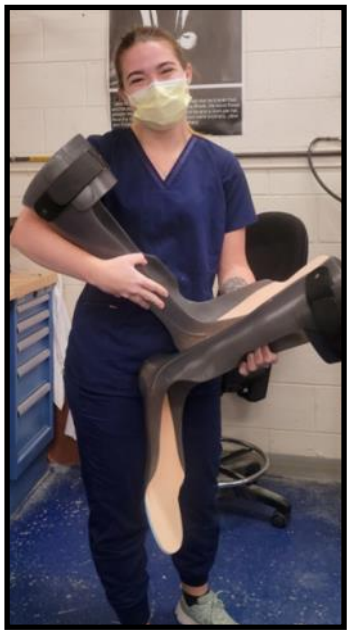
1. Webster J, Murphy, D. Atlas of Orthoses and Assistive Devices. Fifth ed. Philadelphia, PA: Elsevier; 2019.

2. Custom Bivalve TLSO Fabrication [Standard Practice Guideline]. Ann Arbor, MI: University of Michigan Orthotics and Prosthetics Center; updated 2020.

Abby Cull MSOP, CTOP and Erin Maltbie BS, EMU MSOP graduate student

Abigail Cull, Prosthetic Resident, MSOP, CTOP

Abby received an associate degree in Orthotics and Prosthetics Technology from Baker College in Flint, Michigan in 2016. She then became an ABC dual certified technician at the University of Michigan Orthotics & Prosthetics Center (UMOPC). Abby worked as a technician for six years before accepting a position as a Graduate Assistant at Eastern Michigan University (EMU).



Abby graduated in 2023 with a Master of Science in Orthotics and Prosthetics from EMU. Currently, Abby is a Prosthetic Resident at UMOPC where she enjoys working on clinically relevant research while providing patients with the devices needed to live a more active life. When she is not working, Abby enjoys chatting about books (in book club with Erin Maltbie), baking, crafting (she is currently learning to embroider) and going on nature walks with her dog Charlie.

Erin Maltbie, BS, EMU MSOP graduate student

Erin Maltbie received a bachelor's degree from Michigan State University in May 2022, majoring in kinesiology and minoring in health promotion. She then accepted a fabrication technician position at the University of Michigan Orthotics and Prosthetics Center in June 2022. During her time there, she learned and enhanced her skills making devices ranging from AFOs to TLSOs.

Erin is currently pursuing a master's degree in Orthotics and Prosthetics from Eastern Michigan University, where she has accepted a position as a Graduate Assistant. She looks forward to collaborating directly with patients during clinical rotations. Erin grew up in Ludington, Michigan where she enjoys boating and beach time on Lake Michigan.

THE O&P BENCHMARKING SURVEY
A VALUABLE BENEFIT TO O&P PRACTICES

The American Orthotic and Prosthetic Association (AOPA) conducts an annual Compensation and Benefits survey. All O&P facilities are invited to participate in the 2024 O&P Compensation & Operating Performance Survey that will collect, analyze, and compare the relative compensation/benefits and financial performance of the profession. Participants will receive a customized report that compares the performance of an individual practice to other participants in the region of similar size with easy at-a-glance evaluation. For the first time in its 46-year history, the survey is also open to nonmembers.

Every O&P clinic wants to operate at optimum efficiency *and* retain quality staff in its quest to provide excellent patient care. Benchmarking surveys compare data among peer organizations so that staff retention and organization performance can be quantitatively measured and improved.

Participation in the national 2024 O&P Compensation & Operating Performance Survey means O&P owners and managers will have measurable date that will help to:

- Retain valuable employees.
- Run a more efficient practice.
- Make informed strategic decisions.

The newly revised digital survey is shorter, easier to complete, and will feature infographic results.

The survey will be conducted independently by **Kai Analytics,** a market research firm that compiles the results and ensures the confidentiality of data provided by each facility participant. The survey is entirely online and is divided into easily digestible sections that can be forwarded to various subject area experts within your practice.

The survey **opens on May 1st** and **closes on June 30th with** the final tabulated **results available in September.** Participating practices will receive a customized company report showing how results stack up against similar O&P facilities, by size, geographic region, or profit leaders. Participating AOPA members are invited to attend a free webinar to learn how to use the compiled data to optimize business performance.

All participating companies are eligible to enter for a drawing of **one of ten $500 gift cards.**

Be in the know and encourage your clinic manager to participate in this important survey. This survey is the only way to procure the compensation and benefits data from the profession.

Highlights

Who: The American Orthotic and Prosthetic Association (AOPA) is sponsoring a nationwide confidential benchmarking survey conducted by Kai Analytics

What: The 2024 O&P Compensation & Operating Performance Survey

Survey Dates: Opens May 1; Closes June 30

Incentives: Drawing for one of ten $500 gift cards to be awarded each week

How: Notify your O&P Facility Manager of the opportunity to participate and provide this link to receive a participation code: https://bit.ly/OPCAccess

For more info, please contact Betty Leppin at bleppin@aopanet.org or 571-431-0810.

CHANGES IN THE O&P PROGRAM AT SFCC

Preface

At this time, there are only four colleges in the United States that educate and train students to become orthotic and prosthetic technicians. These colleges are in Spokane, Washington, Joliet, Illinois, White Bear Lake, Minnesota, and Versailles, Kentucky. This article is written about and focuses on the technician program located in Spokane, Washington. The exciting changes described below are just the beginning of the reimagining of the O and P technician and paraprofessional training program offered at the Spokane Falls Community College.

Justification for Changes

In the years that I have been a faculty member in the Orthotic and Prosthetic Technology Program at Spokane Falls Community College (SFCC), it has become apparent that there is a genuine need to change the way we train orthotic and prosthetic technicians. This needed change is the result of many factors, but several pressing issues indicated that we (the faculty) could no longer wait to execute these crucial curriculum revisions.

The predominant factor driving this change is that the cost of training technicians in the existing format has become prohibitive, both to the students and to the technical education programs as well. Over the past few years, the cost of enrollment for a two-year program has risen dramatically for students. The lack of availability of housing and the cost of housing have become significant hurdles. As the cost of consumable goods and materials used in the program continues to increase, so do the fees required from each student to cover these costs. As a result of these uncontrollable economic realities, the O&P Technology Program at SFCC is experiencing record low enrollment numbers.

Another major factor supporting the curriculum change is the increasing demand for O and P technicians throughout the country. Experienced technicians are retiring or moving to different industries at high levels, and newer practitioners are not being exposed to fabrication at the same level they once were. The employers that hire our students simply cannot afford to wait two years before hiring an entry level technician. Often times, a practice is forced to hire someone "off the street" who must be trained not only in fabrication skills, but also anatomy and medical terminology. As business expenses increase while profit margins get slimmer, the role of a capable and proficient technician has become more critical. One of our primary goals is to have these formally trained individuals in the workplace as quickly as possible.

When the pandemic occurred, it caused major disruptions to the established O and P technical programs, forcing rapid adaptation. At that time, all course offerings were on campus and in person. We learned quite a bit about alternative educational models that worked well, didn't work at all, or most importantly, what could be possible if the models were refined and fine-tuned. While at the time this change was a rough and forceful transition, we have now had a couple of years to smooth our processes. As a result, we think that now is a perfect time to permanently implement these changes. In fact, at this time, we do not have a choice if we wish for the O and P Technology Program at SFCC to survive.

Proposed Changes

We decided that identifying underlying processes involved in O and P fabrication would be the best place to begin this venture. We reasoned that if we could effectively educate a technician to understand these processes, they should be able to fabricate any device they are asked to create. Working with members of our advisory committee, other O and P technical educators, and program alumni, we identified skillsets that are universal in O and P fabrication.

Once we had a grasp on these processes and concepts, we went through the list of devices that have traditionally been required to teach. From this list, we identified redundancies and overlaps in the skills demonstrated during fabrication. As a result, we were able to compress the curriculum and shorten the program from a two-year degree program to a one-year certificate program. It is our belief that we can deliver higher quality education and career training in this timeframe while keeping up with industry demand. A major factor in shortening the program was our ability to shift much of our didactic curriculum into online modules that students complete independently of class. In this way, time in the lab is focused on the development of hand skills and fabrication competencies. With these changes, the SFCC O&P Technology Program will be operating as a hybrid program beginning in 2025.

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In the one-year program, students will begin as a cohort during fall quarter. During this term, we focus on foundational content areas including lab safety, O and P terminology, plaster work, plastic identification and processing, metal processing, finishing work, sewing, material technology, componentry, basic alignment and understanding of the gait cycle, functional anatomy as applicable to the understanding of what makes a device work, the roles and scope of practice of different levels of O and P professionals, and professional behavior development. We also present basic device fabrication. The focus in this introductory term is on foundational knowledge and fabrication skills in both orthotics and prosthetics. While there has traditionally been a divide between these two disciplines, we aim to highlight the overlapping skills in the curriculum with specifics in each discipline provided later in the year.

Once a student has completed the introductory coursework, they will move into one of the discipline specific quarters of instruction. These discipline specific courses focus on the biomechanical principals of orthotics or prosthetics, lower extremity orthotic or prosthetic technologies, and upper extremity technologies in either discipline. Fabrication skills continue to be refined, anatomy and biomechanics are explored in a discipline specific manner, and advanced concepts are introduced. We are also adding digital workflow competencies into the curriculum. Students then switch from one discipline to the other discipline during the following quarter.

When a student has completed three quarters of instruction, they will complete two six-credit practicums with each practicum lasting for 198 hours. Students (or practicum site supervisors) have the option of completing both practicums at one site or choosing another site for the second practicum. Since students need a full course load to receive financial aid, the amount of time required for each practicum was increased to meet requirements. It has been very difficult for students to afford to travel outside the Spokane area without access to financial aid. This expanded format also allows a student to be exposed to a broader array of fabrication experiences, if desired. Practicum experiences can be paid or unpaid, depending on what the student negotiates with the host site.

At the conclusion of the one-year program, students will be awarded a certificate and will most likely be eligible to sit for the ABC exam in either, or both, disciplines. Approval from NCOPE for the curriculum and program changes is expected later this year. Much of the content in this new course structure is the same, including a wealth of viable and relevant competencies laid out in the previous curriculum. Some projects that were deemed obsolete, too time consuming, or too material heavy were removed to maintain the compressed timeline. In every case where a project was removed, we were certain to map the knowledge and skills demonstrated to another task remaining in the curriculum. These changes result in less repetition, which was not an easy sacrifice, but one that was deemed necessary. Our emphasis in these curriculum changes remains on developing the basic knowledge and requisite hand skills, as well as a sense of professionalism through the development of soft skills, that enhance student employability.

The Future

These exciting changes are just the beginning of the reimagining of the O and P technician and paraprofessional training at Spokane Falls Community College. There are many additional possibilities for program change that we are exploring.

We built the new program to include the possibility of remote training for technicians who live and work outside of Spokane. For example, a person working in a lab anywhere in the country who wishes to become certified, may participate in the program without having to relocate. They can stay employed while improving skills and knowledge. While this model will likely include brief trips to Spokane for skills testing, we are exploring several remote options for testing as well. This option may help solve employability challenges in high cost living areas where we have had difficulties relocating students. If employers are able to recruit from local populations, while allowing SFCC to provide education and training, dramatic changes in the workforce are possible. At SFCC, we have the technical capabilities to make this a reality. We enthusiastically wish to have practitioners know of these changes and new options for the training of technicians. We are eager to meet potential students or employers who may be interested in discussion about further developing this model.

An ongoing goal is to have our program offer an Associate of Applied Science degree once again. To do so, we are working on adding additional coursework that leads to other certificates, for example, orthotic fitter or pedorthist. There is also much interest at the local, state, and national level about the concept of 'micro-credentialing' or 'stackable certificates,' a model that may work extremely well for this level of training and education. These changes will be provided in the form of abbreviated training sessions (one quarter in length). These sessions will result in specialty certifications that may be taken as either an individual or employer deems necessary. Students will be awarded college credits and after completing a specific number of the certificates, awarded an AAS degree.

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Changes, cont'd

Imagine the concept of being able to design your own education (or the education of your technician) to fit your employment (or business) needs. We hope the increased accessibility this model affords will better suit the needs of potential students and the industry.

Spokane Falls Community College recently launched several new Bachelor of Applied Science degrees. The Allied Health Department is exploring the development of a general Allied Health BAS degree. This degree will be designed to satisfy the prerequisites for a Master of Science degree in different Allied Health professions, including Physical Therapy, Occupational Therapy, Audiology, and of course, Orthotics and Prosthetics. While we know that not every technician wishes to or is interested in a career providing clinical care, we do have some students with that goal in mind. We believe a foundation in the fabrication of O and P devices, combined with a strong undergraduate education and experience in the industry, will provide an extremely well-prepared practitioner student. We are interested in this concept and wish to hear from anyone who agrees and wishes to explore possibilities.

Conclusion

As the current Program Director for the Orthotic and Prosthetic Technology Program at SFCC, I have never been so excited about the possibilities that lie ahead. I am grateful to be in this role, at this time, and in this environment. At the college, we have a local administration open to exploring these opportunities, an advisory committee supportive of these changes and the development of new training models, and a dedicated faculty and staff eager to make this education and training model work successfully.

On a national level, our colleagues in O and P technical education are also innovating program changes. We are working with each other in many ways to improve our offerings collectively. The NCOPE, our Committee on Accreditation for CAAHEP, is supportive of our goals. The Board sees the need for updating the technician standards to be flexible enough to support innovation within the technical education programs. At SFCC, we now have the infrastructure in our lab to allow unprecedented levels of training and collaboration. Everything seems to have aligned perfectly to make these new possibilities a successful reality. I look forward to a bright future for O and P Technician education. Personally, I can hardly wait to see where we end up!

Ambrose Cavegn, **BOCP, CPA, CTPO**

Ambrose graduated from Spokane Falls Community College (SFCC) in 2009 with an AAS degree in O&P Technology. Since then, he has worked around the United States at several nationally renowned rehabilitation centers, including The Center for the Intrepid at Brooke Army Medical Center, the Washington DC VA Medical Center, Walter Reed Army Medical Center, and MedStar National Rehabilitation Hospital. Ambrose has been a Certified Technician of Orthotics and Prosthetics since 2010, a Certified Prosthetic Assistant since 2012, and he became a Certified Prosthetist with the BOC in 2016. He has been teaching Prosthetic Technology since 2017 and in 2019 became the Program Director for the O&P Technology Program at SFCC. Ambrose earned his Bachelor of Applied Science Degree in Professional Technical Education and Instructional Design from South Seattle College in 2019.

HOW AMPUTATION SAVED MY LIFE

My name is Josh Hodgson. I was first introduced to the field of orthotics and prosthetics at age seven when I was diagnosed with Osteogenic Sarcoma and later had an amputation of my right leg above the knee to remove the cancer. I have lived most of my life as a RAKA (Right Above Knee Amputee). Being an amputee formed me as the person that I am proud of being today and because of my amputation, I was interested in and attracted to the field of Prosthetics. I loved the technician side of things and had a creative mind that thought that I could invent something to help amputees like me.

Early on my family heard the name Sabolich and thought that I would get the best of the best care from a facility like that. At my consultation, I met with John Sabolich and he explained that he has taken a different role with his business and that his son Scott Sabolich, CP would provide my care. Right away, Scott blew me away with the best fitting socket that I have ever worn. And through this initial experience, I was drawn to Scott. I admired him and was very grateful for the life he was helping me live.

A few years went by, and we received a letter saying that Scott would no longer be my prosthetist as he was no longer working with Nova Care Sabolich. I was devastated. My parents reached out to Scott and learned that he had started his own clinic. Without hesitation we scheduled an appointment. Scott made me feel included in everything, giving me a tour of the lab to see how prosthetic devices were made. This experience inspired me at the young age of nine years.

When I was 12 years old and in the 8th grade, my junior high school was preparing for career day. The school asked students if we knew anyone who could come and give a presentation. I immediately thought of Scott Sabolich. I called him and he told me that he would love to participate, but his schedule was completely booked up.

Then, he said, "what about you?" I thought that idea was the coolest thing. Scott said, "you can come here and build your new leg. I'll give you a video and some parts from your old leg. We will let you work in the lab for a week, so you get the whole experience of being an O&P technician."

Spring break was the following week and my mom drove me to the Sabolich practice every day so I could "work" as a technician. I felt so cool! I got to pour my own cast and pull my own check socket while messing with resin and carbon fiber. The staff let me see the grinders from outside of the doors and I got to assemble the prosthesis myself.

What stood out in my mind was that Scott gave me the stuff and said, "Okay, now build it." I immediately grabbed the foot and pylon and started to screw in the bolts. Scott stopped me and asked, "Why did you start with the foot?" I did not have an answer, but he responded by telling me that this is the proper way to build this device. I was so proud. I took that information to school and participated in the career day. I spoke about O&P with conviction. I was a huge hit. All of my friends asked questions and I was able to answer all of them. I knew that I would make the field of orthotics and prosthetics a career one day.

Once I graduated from high school, I started to explore information about college. I remembered that Scott had told me about Francis Tuttle Technology Center and that it had an O&P Technology Program. This program was in Oklahoma City, and I would not have to leave Oklahoma if I was accepted there. I scheduled a visit and before you knew it, I was enrolled on my first day.

The Francis Tuttle Technology Program gave me the education I needed to start a successful career in O&P. The prosthetics program laid down the foundation and showed me how complex the devices were and how much problem-solving was needed to create a fully functioning device. Through the prosthetics education program, I was accomplishing and learning everything that I wanted to achieve.

During the summer, I worked at Sabolich and later did my prosthetic clinical rotation there. Shortly after graduating, Scott Sabolich hired me as a full-time technician. I felt like I had achieved what I had always set out for myself. I was very proud but quickly became humbled.

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Amputation, cont'd

Though Francis Tuttle taught me basic fundamentals, I now had to learn how to become a professional. I had to learn what the true meaning of being a technician was. Nobody tells you that being a tech is not about what you can build, being a tech is about having the ability to solve a problem, using the skills learned through the devices that you build.

But I wanted more. I wanted to see patients and to experience providing care to a patient helping them become something they thought they could be. At first, I set my sights to become a clinician. I enrolled in college to get my bachelor's degree. I signed up for online courses so I could keep my full-time job as a technician. Little did I know, however, that my plans were about to take a different direction. Shortly after completing my first year, ABC made an announcement that the BOC certification would no longer be accepted and that you now had to be an ABC certified clinician. Not only that, but to become certified a master's degree was now required. That new requirement was not in the cards for me. I was happy being a technician and did not want to finance the cost of a master's degree. I completed my education and graduated with Honors for my bachelor's degree.

I figured that I could become a Certified Prosthetist Assistant and have the best of both worlds, but once again, the world had a different plan for me. That plan moved my family and me across the country to Florida to work for Ossur, at their fabrication facility. There I learned more about being a technician as well as the world of Lean Six Sigma (LSS). Ossur trained me in LSS and I was fortunate to be part of their transformation leaders. The skills that I learned greatly changed the career path I had envisioned. I learned that I could achieve the things that I wanted to achieve as a 12-year-old but in a different way.

I have expanded my career and now work for the Hanger Corporation. I am the Senior Manager for the Hanger Fabrication Network in Phoenix Arizona. We have 50,000 sqft of fabrication space and fabricate everything from head to toe in both Orthotic and Prosthetic devices. We are the home of the Cranial bands, scoliosis braces and Post Operative AmpuShield devices. Working for Hanger has provided the resources that I needed to expand and enhance my career ways that I always dreamed of.

Last year, I led the fabrication team for C-Brace at Hanger Fabrication in Phoenix. This microprocessor device helps to assist patients with neurological indications of the lower limb. Our team won the 2023 Hanger Impact Award for Collaboration. This award represents Hangers greatest honor and is only given to a small number of candidates. Achievement of this award has been a huge honor for me. I have the capability now to wake up every day knowing that I have the skills and abilities needed to change the life of another human being.

Joshua Hodgson, Senior Manager

Hanger Fabrication Network Phoenix Arizona

Josh graduated from the Francis Tuttle Technology Program in 2009 as an orthotic and prosthetic technician. Immediately after graduation, he began working for Scott Sabolich Prosthetics in Oklahoma City. After working a couple of years at this position, Josh moved to Dallas to work as lab manager at Sabolich Prosthetics & Research.

Fast forward…Josh now has a BA in Business Administration received from ECPI University in 2016 and a certificate for Master Black Belt in Lean Six Sigma in 2020. He is currently the Senior Fabrication Manager at Hanger Fabrication Network in Phoenix Arizona.

SETTING UP A SAFE ORTHOTIC AND PROSTHETIC FABRICATION AREA

We all know fabricating orthotic and prosthetic devices of various forms and sizes comes with workplace hazards. This article will examine the specific hazards associated with each process in fabrication, and the modern equipment used to address them at their source. Each piece of equipment will be described with a few common standards.

First, all equipment must come with the ability to test the efficacy of the machine, like having a light-indicating when a filter needs to be changed or drum capacity is full. Second, this change cannot affect the exterior envelope of the building, or no holes cut in the building to vent outside.

Most offices can just open a window, but where does that smell, or dust go? Usually to the smoking area, but they do not care anyway, right? Another important reason is we do not want to affect the HVAC system of the building. If you are running a 900 CFM dust collector that is exhausting outside, you are pulling more air out of the building than a 1-ton AC system can circulate. With these few parameters in place, we will set a quantitative fabrication standard for offices large or small.

The four principal areas for a fabrication safety standard are fire safety, chemical handling, fume scrubbing, and dust collection. Fire safety, being already regulated by the fire inspector upon certification of the office, is mostly taken care of, but a few items specific to our industry can be added. Chemical handling is widely unregulated and undermaintained in most offices, but simple changes can have a drastic effect. Fume scrubbing is almost non-existent in small offices, but with a minor investment the practice of blowing contaminated air outside can be squelched. Dust collection is my personal enemy. I believe it is our biggest problem in composite carbon fiber fabrication.

The fire code states that at least one 2A or a larger fire extinguisher for every 3,000 square feet or 100 feet of travel is required. However, most labs are much smaller than 3,000 square feet, and fire extinguishers are needed closer than next door. OSHA regulations state fire extinguishers must be mounted at least 4 inches off the floor, and the handle mounted between 3-5 five feet off the floor. Fire extinguishers must be placed on the outside of any room with a fire risk, like the oven, lamination, and machine rooms. Be certain to have visual signage identifying the extinguishers, first aid area, eye wash stations, and caution HOT oven.

Another important item for both fire safety and chemical handling is installation of a double walled, steel, self-closing chemical cabinet. Chemical cabinets are necessary to keep all volatile chemicals safe when not in use. One drop from a bottle of thinner stored on a table at night can drip on a hot charging battery pack, quickly creating a fire. Specific to our industry, we have both wet and dry chemicals that should be stored separately. The small bag of dry catalyst used for resins can work its way to the bottom of a large chemical cabinet and is in danger of being spilled on. Should this occur, an exothermic reaction within the chemical cabinet can lead to a dangerous chemical fire. To prevent such an event, purchase a second small fire cabinet for storage of your dry chemicals.

All hazardous chemicals sold come with an SDS sheet, Safety Data Sheet. Learn these rules! The Safety Data Sheet contains all the information we have forced manufactures to include by law. SDS are laid out in a universal format for easy access in an emergency (Fig 1).

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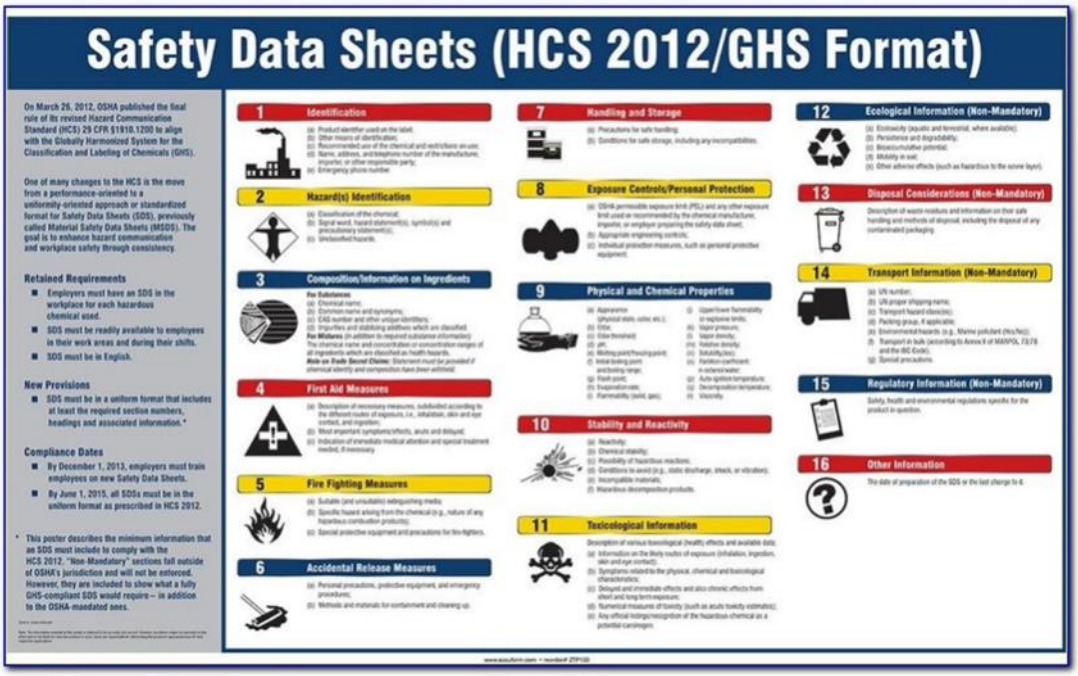

Figure 1

Create an SDS binder listing all the chemicals in your practice, not as many as you think, in alphabetical order. Insert duplicates like "C" for cyanoacrylate and "S" for super glue, so that in an emergency the information about spills, ingestion, disposal, and clean-up can be quickly and easily found. Identifying and knowing the chemicals in your practice will make it easier to mitigate them with equipment, like using activated charcoal to scrub the air when laminating.

Fumes are created in orthotic and prosthetic fabrication when using glues, thinners, and wet laminating techniques. Generally, fumes are delt with through forced air ducting, blowing the contaminated air outside of the work area. However, this choice is not always an option in rooms without outside walls. And as mentioned previously, this practice can ruin the HVAC system by blowing heated or cooled air outside. Thankfully, the VOCs off gassed during fabrication can easily be removed by activated charcoal. The clean air can then be recirculated into the room making it safe to breathe and keeping the HVAC system balanced. To keep up 4 lamination stations safe, we recommend units with at least 20 lbs. of charcoal, a VOC filter light, and an articulating arm to suck up the fumes at the source (Fig 2).

Figure 2

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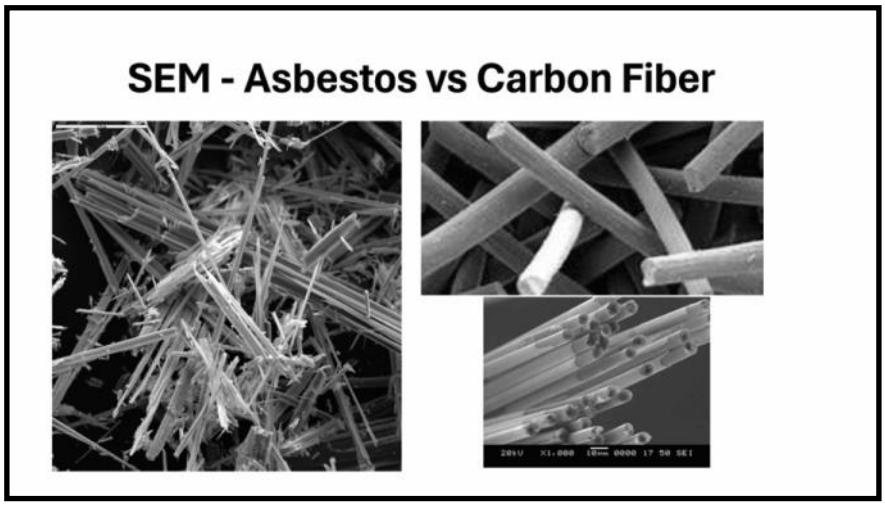
A high-quality fume scrubber with filter, VOC light, 3 speeds, and an articulating arm will cost $2,500-$3,000. VOCs have a strong odor, indicating when the fume scrubber is doing its job.

However, dust is a little bit harder to reveal when it is dangerous. The amount of dust created in fabrication changed dramatically with the use of laminated devices over thermoformable plastics, foams, and wood. Laminated devices are denser, and when ground at high speed, they create smaller chips. Dangerous particles for human lungs are generally between 1-10 microns in size. The 2.5-10-micron sized particles are less dangerous, but long-term exposure has shown carcinogenic properties. Anything smaller than .5-1 micron in size can be digested by lung cells, and any particles larger than 10 microns can physically be coughed out if there are no sharp or irregular shapes. When grinding composites, particles throughout this range will be created. How does carbon fiber compare to a known carcinogen asbestos (Fig3)?



As you can see, carbon fiber is not as sharp or brittle as carcinogen asbestos but keeping it out of our lungs is critical. Dust collectors with an inflatable canvas bag as the filter have a 30-micron hole; but are not effective against 1–10-micron particles. The good news is that 1 micron and finer dust collectors are not that expensive and are manufactured worldwide for the woodworking industry. A high quality, 900 CFM dust collector, that will serve 3 grinders can be purchased for roughly $2,000 (Fig4).

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Not only do these dust collectors have proper filters they also have disposable collection bags. To empty the dust can, tie up the top of the bag, like a trash bag, and throw it away--you do not have to shake out a large canvas bag. Making maintenance easier will ensure that it happens more often.

With all these equipment changes added to your workplace, PPE or personal protection equipment is still necessary. Safe eye, hearing, and lung protections are ultimately your personal responsibility to wear them correctly and diligently. Small things, like removing clothes and shoes before hugging your loved ones after work will help keep your home and family safer, too. Demand and create a safer work environment for your practice and your patients. You all deserve it!

Niles Leonard, CEO
Leonard industries

Niles began working in the O and P industry at the age of 19 as a technician while in college. After graduation, instead of enrolling in an O and P program, he went to welding school to become certified in all types of welding.

In 2006, Niles founded Leonard Industries to build custom high-quality tools designed specifically for the O and P industry. In the last 18 years, he has been privileged to build dozens of labs and thousands of tools focusing on efficiency and safety.

Leonard Industries is headquartered in sunny De Leon Springs, Florida with a machine and welding shop dedicated to the O and P industry. Niles frequently gives presentations at O&P national meetings about the need for a safety standard in orthotic and prosthetic fabrication. For more information, sales@leonardindustries.com

Calling all Students and Residents—
Gain National Recognition and Advance Your Career

Enter to win one of two prestigious awards— the Student Resident Poster Award honors two meritorious scientific papers submitted for presentation as a poster at the AOPA National Assembly.

The American Orthotic and Prosthetic Association (AOPA) invites Students and Residents to present orthotic and/or prosthetic research findings or a case study via a poster presentation at the 2024 National Assembly to be held September 12-15 in Charlotte.

Poster presentations should be a graphical display in a poster format using photographs, diagrams, flowcharts and graphs and any sample educational materials. Your confirmation will include a link to templates and tools to help you create and ship your poster.

1. The Otto and Lucille Becker Award will be presented for the best orthotic abstract submitted for a poster presentation.

2. The Edwin and Kathryn Arbogast Award will be presented for the best prosthetic abstract submitted for a poster presentation.

Winners receive a cash prize of $500, plus hotel and airfare to the 2024 National Assembly. The submission deadline is July 15, 2024. For further information, contact (571) 431-0860 or Assembly@AOPAnet.org.

Submit at https://bit.ly/4bma3bH

WILLOWWOOD BECKER

The University of Washington's Department of Rehabilitation Medicine, Division of Prosthetics & Orthotics, invites faculty candidates to apply for a full- or part-time faculty for the following positions, based in Seattle, Washington:

Assistant Professor WOT
Assistant Professor, without tenure due to source of funding (which is typical of ranked faculty appointments within the department). The base salary range for this position will be $8,694 – $10,228 per month ($104,328 – $122,736 annually), commensurate with experience and qualifications, or as mandated by a U.S. Department of Labor prevailing wage determination. Anticipated start date is Summer 2024, but other dates may be considered. View details and apply at www.apply.interfolio.com/120659

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This non tenure-track position will have an annual service period of 12 months (July 1 – June 30). The base salary range for this position will be $8,694 – $10,228 per month ($104,328 – $122,736 annually), commensurate with experience and qualifications, or as mandated by a U.S. Department of Labor prevailing wage determination. Anticipated start date is Fall 2024, but other dates may be considered. View details and apply at www.apply.interfolio.com/120653

The UW Department of Rehabilitation Medicine is committed to continually building an inclusive culture; has a strong commitment to diversity, equity, and inclusion; and believes that diversity fosters excellence. Seattle is one of the most scenic and livable cities in the United States.

For questions about these positions, please contact Dr Stefania Fatone (Program Director): sfaton@uw.edu or 260-685-7918

DEPARTMENT OF REHABILITATION MEDICINE
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