



**Pennsylvania  
College of Technology**  
A Penn State Affiliate

***A Collaborative Approach to Expanding Nondestructive  
Testing Education Within a Welding Program***

Year Three Evaluation Report – April 2023

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**PREFERRED PROGRAM  
EVALUATIONS**  
"Unlocking Program Potential"

## List of Acronyms and Initialisms

*20NDT – A Collaborative Approach to Expanding Nondestructive Testing Education  
Within a Welding Program*

A.A.S. – Associate of Applied Science

ASNT – American Society for Nondestructive Testing

FTIC – First Time In College

HPO – High Priority Occupation

MT – Magnetic Particle Testing

NDT – Nondestructive testing

NWI – National Welding Institute

PAUT – Phased Array Ultrasonic Testing

PC Now – Penn College Now

PCT – Pennsylvania College of Technology

PRM – Public Relations and Marketing

PT – Penetrant Testing

RT – Radiographic Testing

UT – Ultrasonic Testing

VT – Visual Testing

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## EXECUTIVE SUMMARY

The findings, recommendations, and commendations that comprise this third annual evaluation report are based on grant-related activities and accomplishments occurring between April 2022 and early-April 2023. The goals, objectives, and working framework of Pennsylvania College of Technology's (PCT's) "A Collaborative Approach to Expanding Nondestructive Testing Education Within a Welding Program" (referred to as *20NDT*) are detailed herein. PCT has received approval from NSF for a 12-month, no-cost extension for *20NDT*. The project will formally conclude at the end of April 2024.

The project is being implemented under the leadership of Mr. Michael Nau, P.I., and two Co-P.I.s, Dr. Bradley Webb and Mr. James Colton. The project team remains committed to the success of this initiative, and all stakeholders expressed confidence that the buy-in of college administrators has been steadfast. The college is nearing the conclusion of its contractual relationship with the Naval Welding Institute (NWI). In partnership with PCT, the team of experts at NWI developed the curriculum, lecture materials, and test banks for the college's new NDT academic credentials in accordance with American Society for Nondestructive Testing (ASNT) requirements. The NDT curriculum focuses on discontinuity, defects, and processes of NDT.

The Radiographic Testing (RT) and Ultrasonic Testing (UT) competency credentials were officially approved by the college in spring 2021 and became available to students beginning in fall 2021. These competency credentials are structured so that each one can be completed in a single semester (among full-time students). They are standalone academic programs expected to appeal to incumbent workers looking to upskill or reskill. The project team is creating pathways for students in other degree programs at the college, such as machining, diesel technology, and aviation, to complete these NDT competency credentials.

The A.A.S degree in NDT was officially approved in December 2021. Two students were enrolled in the A.A.S. degree in fall 2022 and spring 2023. At the time of this report, four tuition deposits for the degree program have been received for fall 2023, and one current welding student has elected to switch majors to NDT.

Students who complete the requirements of the A.A.S. degree in NDT will have accrued the requisite number of classroom hours for ASNT Level II certification in RT and UT. NWI will proctor the ASNT exam for up to 10 students beginning in spring 2024 with the first cohort of graduates. In spring 2023, 47 students were enrolled in the 18-credit hour NDT minor.

The courses were held in the NDT classroom and lab, which are part of the college's state-of-the-art welding facility. The college's industry partners continue to support the lab with donations of equipment and consumables from various manufacturers. The NDT Industry Advisory Committee Meeting was held on-campus on April 6, 2023. The ASNT section meeting was held beforehand, and the participants were invited to stay and join the Industry Advisory Committee meeting. Several advisory committee members expressed interest in being involved in periodic curriculum

review for the NDT programs, providing internships for students, and serving as guest speakers for one (or more) NDT classes, the summer camp, or faculty professional development engagements.

In program year three of *20NDT*, the project team and college admissions representatives actively engaged with students at high schools, career and technical centers, and community events. In an effort to draw more attention to the NDT program, in particular, the project team has been intentional about separating NDT from the welding program in all print and digital marketing materials. Beginning in 2023, open houses on PCT's campus prominently featured NDT as a standalone program (separate from welding). Other marketing efforts included digital advertisements, press releases, and the distribution of NDT handbills to prospective students of the college's welding program. Dissemination activities of the project team included presentations at national conferences, and featured articles in industry journals and magazines.

The faculty members were in agreement that increasing high school student awareness about NDT is a critical first step in promoting the college's new academic credentials. One opportunity for building a pipeline of students interested in technical fields is to leverage "Penn College Now," the college's dual enrollment initiative. An NDT module was added to the stick welding course for dual enrollment students, and in spring 2023, 16 high schools students were exposed to this new material in WEL 114 (Shielded Metal Arc I).

The three-day NDT summer camp was held on campus in July 2022. The NDT summer camp is designed to attract underrepresented high school students for an immersive residential experience. The 21 participants in grades 10-12 were exposed to the topics of RT, UT, Magnetic Particle Testing (MT), Phased Array Ultrasonic Testing (PAUT), and welding through a series of eight concurrent workshops. Participants reported gaining an understanding of NDT and welding techniques, and increasing their confidence to work in a team.

## PROJECT DESCRIPTION

In May 2020, PCT was awarded a three-year National Science Foundation Advanced Technological Education (NSF ATE) grant in the amount of \$599,816 to support *20NDT*. The project aims to address the growing unmet need for skilled technicians in NDT who are qualified to secure our nation's critical infrastructure. PCT is already regarded as a leader in welding and NDT instruction, and this ATE grant has increased the institution's profile and capacity to train traditional and non-traditional students to become NDT specialists.

As originally proposed, over the course of the project's first two years, *20NDT* would realize the development of a new A.A.S. degree program and two specialized competency credentials in RT and UT. The project's objectives include: 1) develop curricula for RT and UT that lead to fulfillment of ASNT Level II classroom requirements; 2) align the two competency credentials and A.A.S. degree program to create flexible academic pathways for students; 3) enhance student learning with new equipment for teaching RT and UT, and 4) recruit and enroll high school students and incumbent workers in new pathways to earning NDT credentials.

*20NDT* will provide specialized academic and real-world learning opportunities not currently available at the college, and the new academic programs are expected to attract FTIC (First Time In College) students and practitioners looking to upskill and reskill. *20NDT* represents a unique opportunity to build a pipeline of graduates with the theoretical knowledge and technical skills to succeed in the field. As *20NDT* has evolved over its three-year performance period, it has grown into a model for career and educational pathways in NDT worthy of replication at other institutions. The project is supported by a practical evaluation designed to assess the significance of the initiative on the advancement of student engagement, scholarship, and workforce readiness in NDT, and the capacity-building of the college and its community stakeholders.

A recent expansion at the college culminated in a 55,000-square-foot welding facility featuring a designated NDT classroom and lab. In year one of *20NDT*, several significant equipment purchases were made in support of the new NDT academic programs. The college acquired seven Olympus PAUT units, a digital x-ray bed, and a dummy radiographic source. An in-person training on the new PAUT units was conducted by Olympus in year two of *20NDT*. The project's industry partners have generously donated equipment and consumables in-kind for the NDT lab.

## METHODOLOGY

The external evaluation of *20NDT* is intended to satisfy NSF ATE's requirement that all funded projects conduct a thorough assessment of their activities and outcomes. The evaluation is being led by Blake Urbach, Principal Consultant of Preferred Program Evaluations. The evaluator has drawn from a combination of qualitative and quantitative data sources that provide an in-depth examination of project implementation and management processes, and informed mid-course correction throughout the performance period. Data sources include project records, artifacts, and activity logs; curriculum/frameworks; institutional records of enrollment, performance, and completion; one-on-one interviews with a cross-section of internal and external stakeholders (including NDT students); site visits to PCT, and surveys for summer camp participants, dual enrollment students, and industry partners.

The evaluation has aided PCT in measuring the impact – projected and unanticipated – on: 1) designing and adopting an industry-approved curriculum mapped to ASNT standards; 2) determining effective practices that promote and reinforce student success in the new degree and competency credentials; 3) assessing the fidelity of project activities and processes; 4) identifying constraints encountered that may pose threats to validity within the implementation process; and, 5) reviewing evidence of change among participating students. By the conclusion of the performance period, the evaluation will also seek to assess methods of recruitment and service delivery, characteristics of participants served, growth in faculty confidence and competencies, collaboration with industry partners, and changes in organizational capacity.

Ongoing assessment of the project has included routine correspondence, monthly meetings, ad hoc monitoring, survey results dashboards, and annual evaluation reports. Strategies employed during the performance period that are shown to have favorable student and faculty outcomes have informed subsequent changes in pedagogy and practice. Findings are reviewed each year with the project team and shared with the NDT Industry Advisory Committee, and at that time the parties strategize the most effective ways to address identified challenges.

The external evaluator's duties and responsibilities have included evaluation oversight, alignment of data to project goals, and meaningful reporting on program impact. Using a holistic evaluation design, the evaluator continues to present a current and complete picture of the project as it takes shape over the performance period (inclusive of the 12-month no-cost extension). The evaluation is being guided by a series of questions about participants, process, correction, and impact.

Evaluation Questions	
<u>Participants:</u>	Are incoming students and incumbent workers enrolling in the degree and/or certificate programs on par with project outcomes? How have high school students been made aware of the summer camp and dual enrollment opportunities? Are faculty satisfactorily completing train-the-trainer modules?
<u>Process:</u>	In what ways is the project contributing to student engagement in NDT? How has the input of industry partners been used to shape/revise the new curriculum? How have teachers modified their instruction to incorporate NDT simulations using the new equipment?
<u>Correction:</u>	What adjustments were necessary for the promotion of the new program offerings? What corrective actions were taken to ensure students have the requisite knowledge and skills to pass the Level I and II ASNT practice exams?
<u>Impact:</u>	To what extent did the degree and certificate programs produce graduates prepared for employment as NDT technicians? How has the institution's capacity grown as a result of the new program offerings? In what ways have the external stakeholders contributed to the sustainability of this initiative post-funding?

In spring 2023, one-on-one interviews were conducted in-person during the evaluator's two-day site visit to PCT. Stakeholder interviews are valued for generating a candid, in-depth dialogue about project implementation and management processes unobtainable through traditional surveying methods. Participants were asked to respond to a set of questions about curriculum and program design, training, marketing, collaboration, and dissemination taking place during the third program year of 20NDT. The evaluator spoke with a total of six 20NDT stakeholders in spring 2023.

- Dr. Bradley Webb – Co-P.I., and Dean, School of Engineering Technologies, Pennsylvania College of Technology
- Mr. Michael Nau – P.I., and Welding Instructor, Pennsylvania College of Technology
- Mr. James Colton – Co-P.I., and Assistant Professor of Welding, Pennsylvania College of Technology
- Mr. Mark Hurd – Instructor of NDT and Welding, Pennsylvania College of Technology
- One female A.A.S. in NDT degree-seeking student
- One male A.A.S. in NDT degree-seeking student



Goals and Objectives	Measures	Data Sources
<p><b>Develop AAS/certificates in NDT</b></p> <ul style="list-style-type: none"> <li>• Fully develop 80 hours for certification in RT and UT</li> <li>➔ 14 new NDT courses (including a radiation safety course) have been developed and approved</li> <li>• Fully develop courses for PAUT</li> <li>➔ PAUT curriculum was finalized in time for the initial course rollout in fall 2022</li> <li>• Acquire equipment for RT and PAUT</li> <li>➔ 7 PAUT units, a digital x-ray bed, and a dummy radiographic source have been purchased for the NDT lab</li> <li>• Create pathways from certificates to A.A.S. to B.S.</li> <li>➔ The RT and UT competency credentials have been embedded in the A.A.S. degree</li> </ul> <p>The project team is creating a pathway for students who want to pursue a dual degree: A.A.S. in NDT and A.A.S. in Welding Technology. Creation of a pathway for students in the aviation degree program to pursue the UT competency credential is also underway.</p>	<ul style="list-style-type: none"> <li>• Number of new NDT courses leading to AAS and certificates</li> <li>• Pathways in place to share credits between certificate, A.A.S., and B.S. programs</li> </ul>	<ul style="list-style-type: none"> <li>• Document review</li> <li>• Curriculum/frameworks</li> <li>• Institutional records</li> <li>• Stakeholder interviews</li> </ul>
<p><b>Recruit students into the NDT A.A.S. and certificate programs and place graduates in industry positions</b></p> <ul style="list-style-type: none"> <li>• 10 students enroll annually in A.A.S.</li> <li>➔ Two students were enrolled in the A.A.S. degree in fall 2022 and spring 2023. Five additional students are slated to begin in fall 2023.</li> <li>• 5 students enroll in each certificate program</li> <li>➔ 47 students were enrolled in the NDT minor in spring 2023</li> <li>• 90% of completers are placed in an NDT position</li> <li>➔ The first NDT degrees are to be awarded in spring 2024. The ASNT certification exam will also be proctored in spring 2024.</li> </ul>	<ul style="list-style-type: none"> <li>• #, %, demographics of students applying for and enrolling in the A.A.S. and certificate programs</li> <li>• #, % who complete the program requirements and who pass the Level I and II ASNT practice exams</li> <li>• #, % program completers who secure employment in an NDT field</li> <li>• #, %, demographics of summer camp, Philadelphia summer event, and PCNOW participants who enroll in Penn College's NDT programs</li> </ul>	<ul style="list-style-type: none"> <li>• Project records and activity logs</li> <li>• Recruitment event participation</li> <li>• Institutional records</li> <li>• Stakeholder interviews</li> <li>• Student surveys</li> </ul>

Goals and Objectives	Measures	Data Sources
<p><b><i>Provide faculty with train-the-trainer opportunities to improve their NDT knowledge</i></b></p> <p>➡ NWI facilitated a virtual training on RT</p> <p>Olympus provided training on PAUT to PCT faculty</p> <p>PCT faculty attended training on Eddy current</p> <p>PCT faculty have trained high school welding faculty through a variety of professional development engagements</p>	<ul style="list-style-type: none"> <li>• Faculty ability to teach the NDT curriculum and use equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Project records and activity logs</li> <li>• Stakeholder interviews</li> </ul>
<p><b><i>Disseminate curriculum, lessons learned, instructional best practices</i></b></p> <p>➡ Materials were disseminated at the ATE P.I. Conference, ASNT Annual Conference, Skills USA Project-Based Learning National Conference, and AWS FabTech Trade Show &amp; Annual Meeting</p> <p>Articles featuring the college's NDT program appeared in "Inspection Trends," "Materials Evaluation," and "FF Journal"</p>	<ul style="list-style-type: none"> <li>• Dissemination of project results</li> </ul>	<ul style="list-style-type: none"> <li>• Publication and presentation of materials</li> </ul>

## FINDINGS AND RECOMMENDATIONS

### NDT Course and Program Offerings

The college's contractual relationship with NWI for the development of a rigorous and relevant industry-driven curriculum for the new NDT academic credentials has been fulfilled. NWI aligned the core curriculum to ASNT standards. Mr. Nau indicated that the labs used in the NDT courses were developed in-house at PCT. The curriculum and supplementary materials will be reviewed annually to ensure the content remains current and is responsive to industry trends and demands. The feedback of the 20NDT Industry Advisory Committee will help inform future additions and other changes.

The faculty members indicated that they have intentionally woven soft skill development into their instruction. Skills such as teamwork, and writing and interpreting reports are required for completing the degree requirements, and will be critical once the student is performing his or her job in the field. In addition, whereas other institutions with NDT degree programs do not provide exposure to the fundamentals of welding, PCT's program graduates will have developed an understanding of each welding process and be able to identify discontinuity in the welding process.

The NDT course offerings for the 2022-2023 academic year are shown in Figure 1.

Fall 2022 NDT Course Offerings	Spring 2023 NDT Course Offerings
QAL 102 (Radiation Safety)	QAL 122 (Radiographic Testing I)
QAL 241 (Non-Destructive Testing I)	QAL 123 (Radiographic Inspection & Recording)
WEL 103 (Welding for NDI I)	QAL 222 (Radiographic Testing II)
WEL 141 (Introduction to Welding Inspection)	QAL 241 (Non-Destructive Testing I)

Figure 1.

Three NDT courses that correspond with the third semester of the A.A.S. degree will be offered for the first time in fall 2023. They include: QAL 124 (Ultrasonic Testing I), QAL 224 (Ultrasonic Testing II), and QAL 103 (Governing Technical Documents for NDT). Mr. Nau and Mr. Hurd will once again teach the NDT courses that correspond to the first semester of the A.A.S. degree in fall 2023 for the incoming cohort of NDT degree-seeking students. The college has several certified welding inspectors on staff but only one, Mr. Hurd, is ASNT certified.

Two students were enrolled in the A.A.S. degree in fall 2022 and spring 2023. Limited enrollment during the first year of the new degree program was anticipated. At the time of this report, four tuition deposits for this degree program have been received for fall 2023, and one

current welding student has elected to switch majors to NDT. Mr. Nau and Mr. Hurd provide advising to NDT students on course selection, internship opportunities, and career planning.

Beginning in fall 2022, all welding students were scheduled to take QAL 241 (Non-Destructive Testing I) during their first semester (in lieu of a computer science course). The 20NDT project team is hopeful that this early exposure to NDT will pique student interest in this discipline. Additionally, they are redirecting applicants who are waitlisted for the welding program to consider NDT. Encouraging these students to “pivot” to NDT is expected to boost enrollment in the NDT program offerings.

In spring 2023, 47 students were enrolled in the 18-credit hour NDT minor. For students pursuing the B.S. in Welding & Fabrication Engineering Technology, the addition of nine credit hours will yield both of these academic credentials. Dr. Webb noted that it may not be economically viable for the college to continue offering the NDT minor in addition to the A.A.S degree in NDT.

The 20NDT project team is developing two “crosswalks” for degree-seeking students of NDT and welding. The first would allow students to complete the A.A.S. degree in NDT and the B.S. in Welding & Fabrication Engineering Technology in five years, and the second would allow students to complete the A.A.S. degree in NDT and the A.A.S. in Welding Technology in three years. The NDT degree may also be attractive to students considering other degree pathways at the college, such as machining, diesel technology, and aviation.

Per Dr. Webb, possible revisions to be implemented in fall 2024 include a reduction in the total number of credit hours for the A.A.S. degree in NDT. This modification will require the approval of the college’s Curriculum Committee. The project team intends to work with the college’s financial aid office to make sure students pursuing the dual degree option are able to make the most of their financial aid benefits.

Full-time NDT students will have the requisite number of classroom hours to sit for the ASNT Level II exam in RT and UT at the end of spring 2024. NWI will proctor the exam for ASNT certification for up to 10 students, per the terms of its contract with PCT. The 20NDT project team received confirmation that students may work in pairs on the equipment to earn their ASNT classroom training hours. Each student will need to accrue his/her industry hours for ASNT certification on the job site.

The RT and UT competency credentials are embedded within the A.A.S. degree program. All three of these NDT academic credentials have become part of the college’s digital program catalogue. The RT and UT competency credentials are structured so that each one can be completed in a single semester (among full-time students). They are standalone academic programs expected to appeal to incumbent workers looking to upskill or reskill.

Completion of an internship is not a requirement for the A.A.S. degree. However, the NDT faculty members noted that they are proponents of undergraduate internships, and highly encourage their students to secure these positions. Although this is a student-driven activity, the college's NDT faculty and Career Services staff are available to provide guidance throughout each work-based learning experience. Mr. Hurd emphasized that the student's internship hours must be properly documented in order to count toward the student's training hours for ASNT certification.

The NDT faculty members discussed the importance of maintaining a running list of internship opportunities for students. NWI has offered to provide internships for NDT students at PCT. Students are advised by the NDT faculty to view the current job listings on the ASNT website and then reach out to the companies of interest to them and inquire about possible internship opportunities.

### **First-year NDT Student Experience**

The two students pursuing the A.A.S. degree in NDT were interviewed during the evaluator's site visit to PCT in March 2023. One of the students transferred from Penn State University when she decided studying music education at the university-level was not the right fit for her. Her father works at PCT and encouraged her to check out the college's NDT program. The second student interviewed was a fourth-year welding student who added the A.A.S. degree in NDT to his program of study. Doing so prolonged his graduation date by two semesters. He shared that he is determined to diversify his skillset, and is mindful of the fact that NDT jobs will be less physically demanding than welding, especially as he ages.

The students mentioned that the NDT courses have been enjoyable, challenging, and well-paced. One student indicated that much of the coursework thus far has focused on "hands-on instrument of measurement." This student would like to take a class specific to MT and penetrant, as these methods closely align with the majority of current job openings in the field.

Both students indicated that the lecture portion of the courses – four-and-a-half hours twice per week – is more time than is necessary for delivery of the content. Mr. Nau purposely modified the class meeting times to be a "more reasonable" two-hour block plus instructional time for labs. He was described as engaging and approachable, and was commended for integrating theory and practice in order to make an "immediate connection" for the students. Both students were also pleased with the course textbook. One interviewee indicated that the students would benefit from better alignment between the practice quizzes and the material covered in the labs. Assessments have included proper execution of the labs, chapter tests, a written mid-term and final exam, and class participation.

The female student secured a paid internship with Lycoming Engines for the 2023-2023 academic year. She worked 20 hours per week during the fall and spring terms, and will work 40 hours per week during the summer months. Her main job responsibilities include communicating with the

company's suppliers, completing audit forms, and following standards of code and specifications for magnetic particle inspection. She noted that her soft skills related to communication, time management, and logistics have improved during her time with Lycoming Engines.

Her post-graduation plans are to find employment specific to radiographic testing. She would like to work in the field of NDT within the travel industry. The male student had a previous internship in automation, and is eager to get hired by a company that has tremendous growth potential. His post-graduation plans are to pursue a job in the fabrication field, and eventually secure an NDT position. He is eager to gain government clearance for "secret projects" of the U.S. government. This student's long-term goal is to own his own fabrication company.

One interviewee encouraged the faculty to make it better known to welding students that they can also pursue the A.A.S. degree in NDT by committing to only two additional semesters. "People need to be exposed to the very cool job prospects; focus on the 'quality control' aspect of NDT." This student also thought it was worth emphasizing that once ASNT certification is earned, it remains with the individual for life. There is no additional testing or requirement for continuing education to maintain one's level of certification. The male student recommended engaging in "future-focused discussions" with welding students, thus drawing attention to the fact "you won't always be physical enough for welding, crawling around on your hands and knees."

The female student proposed having current NDT student serve as "ambassadors" for the degree program. Select students would be eligible to receive a stipend for speaking at local high schools and career and technical centers to inform students about the NDT academic pathways at PCT.

## NDT Lab

The NDT lab is part of the college's state-of-the-art welding facility, and is designed to offer students real-world experience. The lab is outfitted with the latest equipment (from a variety of manufacturers) for the students to hone their technical skills. The NDT lab can accommodate up to 16 students per class section. There are eight PAUT units available for students (working in pairs), and one demo unit for the faculty member.

In program year three, the NDT lab continued to evolve and expand. Mr. Nau carries out the majority of the purchasing, and was pleased to report that the college's industry partners continue to support the lab with equipment and consumables. Some of the recent donations from industry partners included transducers for UT equipment, a UV flashlight for inspection, metals, penetrant materials, magnetic particles, and radiographic film. PCT benefits from vendor/manufacturing educational discounts and other price breaks. The college's NDT and welding programs received a \$10,000 donation from BAE Systems to enhance the current offerings.

## Industry Collaboration

In program year three of *20NDT*, the project team continued to strengthen its partnerships with industry to further the college's NDT credentials by way of exposure, resources, professional development, and content expertise. The NDT Industry Advisory Committee Meeting was held on-campus on April 6, 2023. The ASNT section meeting was held beforehand, and the participants were invited to stay and join the Industry Advisory Committee meeting. The meeting featured a guest speaker from Lycoming Engines and a tour of the NDT facilities.

At the conclusion of the meeting attendees received a link to the electronic *20NDT* Advisory Committee Survey. Their responses will be used to help the college understand how it can best collaborate with industry partners, and to inform the co-curricular activities it can offer students and incumbent workers. Two industry partners responded to the survey. The advisory committee members expressed interest in being involved in periodic curriculum review for the NDT programs, and serving as guest speakers for one (or more) NDT classes. Additionally, they are willing to serve as panelists during the NDT summer camp or faculty professional development engagements. One respondent indicated that his company is eager to provide internships (both paid and unpaid) to students enrolled in the college's NDT degree program. One respondent agreed that his company would be interested in donating equipment (new or used) for the college's NDT lab.

The respondents were asked to rank a series of NDT and welding academic credentials in order of importance for new hires at their company. They indicated that the A.A.S. degree in NDT was the most important credential. In second place was this degree in conjunction with the A.A.S. in Welding Technology, or the pairing of the B.S. in Welding and Fabrication Engineering Technology and minor in NDT.

One idea proposed for this coming academic year is to hold an NDT Recruitment Day in the fall and spring. Mr. Colton shared that the college's Career Fair sold out in four hours, and the desire to participate in this event among employers in the region is at an all-time high. NDT Recruitment Day would be a spin-off of the college's Career Fair, focusing exclusively on companies looking to hire NDT employees (incumbent workers) and students for internships and co-ops.

## Marketing, Recruiting, and Outreach

Making prospective students aware of a brand-new academic program is a challenging undertaking requiring resources, visibility, creativity, and patience. In year three of *20NDT*, the project team and college admissions representatives actively engaged with students at high schools, career and technical centers, and community events.

The project team worked closely with Public Relations and Marketing (PRM) at PCT on all print and digital marketing materials: handbills, featured advertisements on digital platforms, and outreach to companies in the region. These materials highlight the hands-on learning experience for NDT students, and the high-priority, high-paying jobs that awaits students upon graduation.

Outreach of this nature remains a collaborative effort insofar as NDT faculty members have the contact list of companies, institutions, and organizations that should receive these marketing materials. In an effort to draw more attention to the NDT program, in particular, the project team has been intentional about separating NDT from the welding program in all print and digital marketing materials.

Beginning in 2023, open houses on PCT's campus prominently featured NDT as a standalone program (separate from welding). Mr. Nau and Mr. Hurd will continue to provide tours (approximately five per semester) of the NDT lab, and be available to answer the program-specific questions of prospective students and their parents. Mr. Colton proposed the idea of granting release time for NDT faculty to conduct outreach activities at local high schools and career fairs in an effort to raise awareness of and interest in the college's NDT program offerings.

In year three of *20NDT*, other marketing efforts included:

- All prospective students who expressed interest in the college's welding program received an email about the NDT program offerings.
- All students who requested additional materials about the college's welding program were also mailed a handbill about NDT
- NDT is highlighted in the AWS Welding Journal School Profile
- Digital advertisements in the mid-Atlantic region have showcased NDT
- Three press releases have been widely shared on social media
- Mr. Hurd was interviewed for the college's NDT promotional video. The video will include a virtual tour of the NDT lab and testimonials from current NDT students. It will be available on YouTube and other digital platforms, and played during outreach activities both on and off campus.

Dr. Webb shared that the project team was successful in its efforts to get the college's RT and UT credentials designated as High Priority Occupations (HPOs). HPOs are part of Pennsylvania's industry-driven approach to workforce development. Higher education institutions can petition their local workforce development boards to propose adding an HPO that meets the state's criteria. HPOs are eligible for state subsidies for education, making them advantageous for prospective students with limited financial means, and the educational institutions offering credentials in these recognized career pathways.



## Engaging High School Students

The NDT faculty noted that most high school students have no exposure to the field of NDT and its associated career pathways. One opportunity to build the pipeline of students interested in studying NDT is to leverage “Penn College Now” (PC Now), the college’s dual enrollment initiative. Guest speakers are often brought in to demo a particular skill and stimulate interest in the career opportunities surrounding welding. Per one interviewee, approximately one-quarter of the students who complete a welding course at a partner high school end up enrolling in PCT’s welding program. PCT has an impressive graduation and placement rate for its welding program and anticipates the same for students in NDT.

In program year three of *20NDT*, an NDT module was added to the stick welding course for dual enrollment students, and at the time of this report, eight different welding courses were offered at partner high schools. In spring 2023, four students at Northern Tier Career Center and 12 students at SUN ATI were enrolled in WEL 114 (Shielded Metal Arc I) through PC Now. A participant survey has been designed for the high school students enrolled in this welding course. The survey will be posted to the course homepage on D2L and the students will be encouraged to respond at the conclusion of the spring 2023 semester. The survey asks students to report on their learning gains, level of engagement, exposure to NDT careers, and interest in future NDT coursework.

The three-day 2022 NDT summer camp was held on-campus in July 2022. This “immersive” pre-college experience was open (at no cost) to students entering grades 10-12. In addition to hands-on workshops in RT, UT, MT, PAUT, and welding, students were provided meals and on-campus housing. A total of 21 students participated in the NDT summer camp. The NDT camp was held in conjunction with the Thingamajig Fabricators Camp for students interested in manufacturing. Students who complete any of the college-sponsored camps are eligible to receive a \$1K annual scholarship to apply to their PCT tuition.

The *20NDT* summer camp participant survey was designed to inform this extracurricular program offering, and assess student engagement and learning in the discipline. Participants of the July 2022 camp reported gaining an understanding of NDT and welding techniques, and increasing their confidence to work in a team. Students were pleased with the variety of camp activities and gained exposure to career opportunities in NDT. (The survey results dashboard is included in the appendix.)

This year’s NDT summer camp for up to 20 high school students will be held in July 2023. Dr. Webb indicated that each student will be charged a fee of \$50 to participate in this year’s camp. The project team introduced the fee for 2023 in hopes of reducing the no-show rate among registrants. The Philadelphia Education Fund reached out to Dr. Webb and asked to buy 10 seats for this year’s summer camp. They intend to sponsor 10 diverse, low-income students for attendance at the camp, and will manage the transportation for these participants.

## Dissemination and Training Opportunities

Dissemination activities in program year three of *20NDT* included the ASNT Annual Conference, Skills USA Project-Based Learning National Conference, AWS FabTech Trade Show & Annual Education Meeting, and ATE P.I. Conference. In February 2023, Mr. Colton spearheaded the Skills USA State Welding Fabrication Competition. Contestants competed in a series of timed exercises to test their ability to use welding tools and execute welding processes. Winners of the state competition will move on to the national contest in summer 2023. This well-respected competition attracts both high school and college students, and is one more outlet for increasing the visibility of the college's new NDT degree.

In May 2022, Mr. Nau and Mr. Hurd co-facilitated a three-hour session on UT for participants of the Welding Teacher Training held at PCT. More recently, the National Center for Welding Education and Training (Weld-Ed) asked to partner with PCT on the delivery of instructional labs in NDT for participants of its Summer Training 2023. This professional development opportunity is designed for welding educators in secondary and post-secondary welding programs. Mr. Nau and Mr. Hurd have agreed to co-facilitate one of the training modules at the request of Weld-Ed.

Introducing additional high school faculty to the portfolio of NDT offerings at PCT remains a focus of the *20NDT* project team. Dr. Webb reallocated funds from the grant's travel and participant support line items to fund a first-of-its-kind NDT faculty externship. This hands-on event will take place on-campus the week of July 16, 2023. The engagement will host 10-15 non-STEM faculty members from across the state. An email about the event and how to register has been sent to educators in Pennsylvania. The website for the event is live <https://www.pct.edu/academics/et/ndt-grant>.

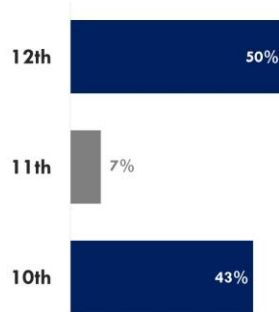
The goal of the faculty externship is to broaden the participants' awareness of NDT and the program offerings at PCT, and change the prevailing perception of the skilled trades. Mr. Nau and Mr. Hurd will co-facilitate the faculty externship. This event will take place the same week as the *20NDT* summer camp, and the project team's intention is for the faculty and student participants to interact with one another during an exercise. When these faculty members from different disciplines return to their classrooms in fall 2023, they will be equipped to share their knowledge and excitement about NDT with high school students from across the state.

## 20NDT Summer Camp Survey Dashboard – July 2022

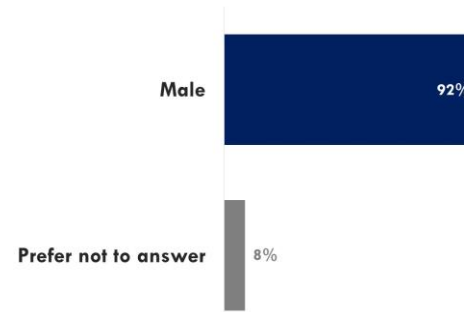
The 20NDT Summer Camp Participant Survey weblink was distributed to all 21 participants during the close of the overnight pre-college program. The three-day immersive experience was held free of charge on July 17-19 for students entering grades 10-12. In addition to hands-on workshops in RT, UT, MT, PAUT, and welding, students were provided meals and on-campus housing.

The participant survey was designed to inform this extracurricular program offering, and assess student engagement and learning in the discipline. Students were pleased with the variety of camp activities, and gained exposure to career opportunities in NDT. Students reported gaining an understanding of NDT and welding techniques, and increasing their confidence to work in a team.

Half of the 14 respondents will enter 12<sup>th</sup> grade in fall 2022, and 43% will enter 10<sup>th</sup> grade.



Thirteen of the respondents identified as male.

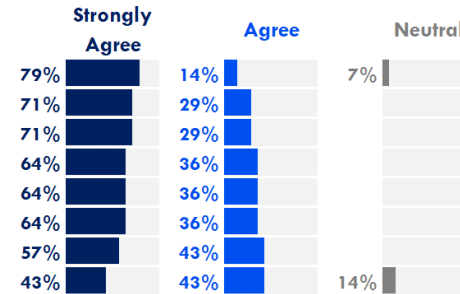


# 20NDT Summer Camp Survey Dashboard – July 2022

The original scale “strongly agree” to “strongly disagree” has been condensed in the following figures in accordance with the selected responses.

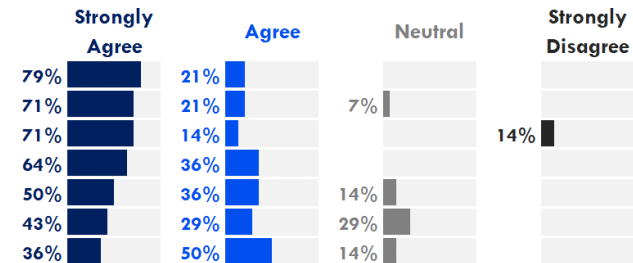
## Describe your experience in this camp.

- I would recommend this camp to a peer.
- Camp activities offered plenty of opportunities for hands-on engagement.
- Overall, my interactions with the facilitators and volunteers were positive.
- I found my camp experience to be enjoyable.
- The learning objectives of this camp were communicated clearly.
- The diversity of topics presented during this camp maintained my interest.
- Overall, my interactions with the other participants were positive.
- The length of this camp was the right amount of time to complete the activities.



## My participation in this camp . . .

- increased my exposure to career opportunities in non-destructive testing
- broadened my understanding of welding techniques
- increased my knowledge of magnetic particle testing
- helped me explore the difference between UT and RT
- increased my confidence to work effectively in a team environment
- increased my interest in taking a Penn College NOW course in NDT while in high school
- increased my interest in studying non-destructive testing once I graduate high school



# 20NDT Summer Camp Survey Dashboard – July 2022



## How did you first learn about this summer camp?

“my welding teacher told me”

“OVR”

“I first learned about this program by hearing it from my guidance counselor.”

“my teacher recom[m]ended I take it to learn”

“A family friend”

“I saw this program on the website.”

“sibling”

“summer campus tour”

“flux core welding”

“through wanting to go to pct and by going on to the website”

# 20NDT Summer Camp Survey Dashboard – July 2022



**Pennsylvania  
College of Technology**  
A Penn State Affiliate



## Describe your key takeaways from participating in this camp.

“what the school has to offer and what it is like in the shops”

“Learned about interesting career opportunities”

“I think my key take away from this camp will be how much hands on learning that they offer.”

“understanding ndt”

“I learned how to use welding machinery”

“I don't want to go into welding, rather ndt or inspection.”

“I learned a lot about welding.”

“Welding is cool and has variety. NDT can pay a lot”

“teamwork”

“learning the basics of welding”

# 20NDT Summer Camp Survey Dashboard – July 2022



## What suggestions do you have for improving this camp?

“more welding labs”

“more free time”

“I don't have any suggestions on improving the summer camp I had a great time and would participate in it again.”

“more welding”

“give us more free time and activity variety”

“Make the evening activities voted on from a variety of activities to make sure the campers like the activity.”

“more freedom for personally selected activities”