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ENCLOSURE
Fall 2020

Balancing Dose Reduction from Shielding and the Impact on Workplace Ergonomics

By: Jenelle Mann, LANL Nuclear Criticality Safety Division - Jacqueline Linn, Martha Chan, LANL Ergonomics Group - Luke Hetrick, LANL Radiological Engineering Team LA-UR-20-22703

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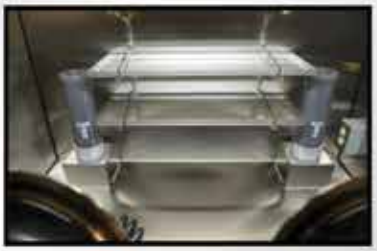

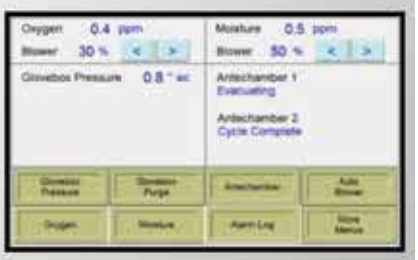

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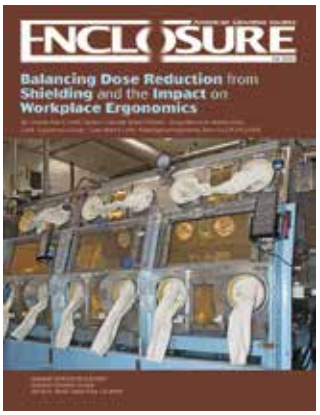

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President's Message

By: Gary Partington

I hope this issue of the Enclosure finds you all safe and well. 2020 has been an interesting year to say the least as we all adapt to life in a pandemic. Many are still working from home while others are working on site just a few days a week. We still may be several months away from a vaccine which we hope will allow us to be together again. There are several vaccine candidates in Phase 3 clinical trials and others in Phase 2. Vaccines are produced aseptically, and many Pharmaceutical Companies utilize isolator technology to produce these drugs.

These isolators differ from our gloveboxes, as aseptic isolators operate under positive pressure with uni-directional airflow to keep germs away from the product being produced. These isolators are also decontaminated before the fill process begins, typically with hydrogen peroxide vapors killing viruses and bacteria that could potentially contaminate the product.

Although we cannot meet in person, we are planning a webinar series that will allow us to meet and learn virtually beginning in November. The webinars will be held November 11th and December 2nd. Each webinar will be 2 hours in length will 2 speakers per session. **Topics include:**

- Stuck in the box - Challenges in Glovebox Ergonomics
- Optimizing the Welding of 300 series Stainless Steel for Glovebox Applications
- Low Moisture Glovebox Applications
- Testing of Unleaded Shielding Gloves
- LANL Lessons Learned
- AGS Update: What is Happening and What is on the Horizon

For more information and to register for the webinars, visit our website: Glovebox-Society.org

We hope to continue the webinar series into Q1 of 2021 as we head towards our live annual meeting July 12-15 in Nashville. I hope that you can participate in the webinar series and attend our conference in Nashville. Until then, stay safe and well.

Gary Partington ❖

The Enclosure

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Balancing Dose Reduction from Shielding and the Impact on Workplace Ergonomics

By: Jenelle Mann, LANL Nuclear Criticality Safety Division;
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LA-UR-20-22703

Introduction

The unified goal of ergonomics and radiation protection is worker safety; however, the two professions approach safety in a different manner. Ergonomics seeks to reduce the risk of worker discomfort and injury, while improving efficiency. This is accomplished by using ergonomically friendly equipment or modified work procedures. Radiation protection seeks to eliminate and mitigate the acute and chronic hazards present from working with radiation. Often this is accomplished through limiting the duration of exposure, increasing the distance of a worker and the radiation source, and the use of shielding.

Although ergonomics and radiation protection have the same goal of worker protection, best practices and design objectives of each profession can be in conflict. For example, radiation protection may require a large distance between personnel and the radiation source, while ergonomics may require specific actions to be conducted within the primary work zone (the length of the forearm) to prevent injury to the worker. A comparison of an ideal glovebox design from an ergonomic and radiation protection perspective is shown Table 1.

Glovebox Design Goals	Ergonomic	Radiation Protection
Windows	Full Visibility Windows	Smaller Windows
Glovebox Thickness/ Shielding	Minimal Glovebox Thickness Minimal Shielding Thickness	Thick Gloveboxes, Polyethylene and Lead Shielding
Gloveport Shape	Oval Gloveports	Round Gloveports
Glove Type	Non-Leaded Gloves	Leaded Gloves

Table 1 Glovebox Design Goals for Ergonomics and Radiation Protection

It is necessary for involvement from all groups within safety (safety basis, fire protection, nuclear criticality safety, ergonomics, radiation protection, etc.) to identify the needs from each safety-related group. One way to encourage involvement from each group is to include representation on the integrated project team. This can also be accomplished through collaboration between groups to determine design requirements, basis for these requirements, if small changes can be made that have minimal impact, and if any alternatives exist.

Through increased collaboration, we can create a unified approach to safety, where we are cognizant of the requirements of other safety-related groups and when/where they should be involved. This study was created through a collaboration between the Los Alamos National Laboratory (LANL) Ergonomics Group and the Radiation Protection Group. The goal was to have an understanding of the impacts of shielding on workplace ergonomics (worker dexterity) and the benefits of shielding on worker radiation doses (dose reduction). Specifically, this investigated the impact of the addition of poly(methyl methacrylate) (PMMA) to the front of gloveboxes where ^{238}Pu is processed (see Figure 1).

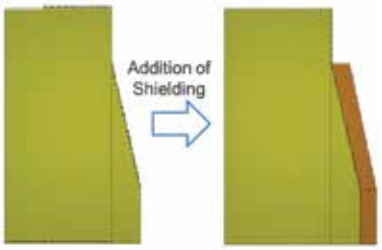

Figure 1 Depiction of the Addition of PMMA Shielding to the Front of Gloveboxes

Study

This study investigated the impact of the addition of poly(methyl methacrylate) (PMMA) to the front of gloveboxes where ^{238}Pu is processed.

^{238}Pu is primarily used at LANL for heat source production for radioisotope thermoelectric generators (RTGs). RTGs are primarily used for situations were a long-term, low-maintenance power source is required, such as satellites, space probes, and rovers. ^{238}Pu has a moderate half-life, as seen by Table 2, making it ideal for a heat source, since it is long in terms of a human lifespan, but short enough to still have a large specific activity. ^{238}Pu decays has a, ß, y, and n emissions (spontaneous fission fraction of 1.9x10-^{7} %).

Half Life (yrs)	Specific Activity (Ci/g)	Decay Type
87.74	1.7 X 10^{1}	α, β, γ, SF

Table 2 Radiological Information about ^{238}Pu

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^{238}Pu heat sources can be made with metallic plutonium or plutonium oxide (PuO_2). If made with PuO_2, the oxygen is treated for the final heat source to remove ^{17}O and ^{18}O, which have a significant (a,n) reaction cross section. The presence of ^{17}O and ^{18}O can increase the neutron emission by an order of magnitude.

To reduce dose rates, shielding is utilized. For ^{238}Pu work, PMMA ($(C_5 O_2 H_8)_n$) is used to simultaneously reduce neutron and photon dose rates. Characteristics of PMMA include: shatterproof, excellent light transmission, and resistance to UV light and weathering. Typical shielding PMMA shielding thicknesses for LANL ^{238}Pu gloveboxes, 2" to 4" of shielding is used; however, some gloveboxes can include up to 6" of shielding.

Although shielding is necessary and beneficial from a radiological perspective, thick shielding can have ergonomic ramifications through limitation of range of motion. For reference, the average upper arm length (from shoulder to elbow) for a woman is 12.28" and for men it is 13.42" [1]. If there is not sufficient distance between the glovebox extent and the elbow, this can result in severe limitations of the elbow arc of motion. As the elbow arc of motion dictates available range of motion for the upper extremities, workers can find themselves spending more time working in awkward positions and experience increased muscle fatigue.

Thickness of shielding can also contribute to ergonomic viewing issues; this is worsened by radiation-induced degradation of PMMA shielding. Prolonged exposure to radiation can cause or effect the color and translucence of plastics (darkening) and brittle the material, further impacting visibility. Increased material degradation is seen at LANL, especially for ^{238}Pu work due to its high specific activity. Studies have shown that dexterity decreases as ability to view one's own work task decreases [2] [3]. The thicker the shielding, the more difficult it is for workers to view their work, particularly if work task involves fine motor skills. Consequently, this causes decreased hand dexterity and possible increases the time required to complete a task, which will affect the radiation dose received by the worker.

A typical PMMA glovebox shielding configuration installed on LANL gloveboxes is shown in Figure 2. As seen by Figure 2, the gloveports are beveled to increase range of movement. Additionally, there is a hinge on the PMMA shielding, so that it can be "removed" for certain activities (such as maintenance).

Figure 2 (Left/Right) Typical PMMA Glovebox Shielding Configurations at LANL

This study seeks to evaluate the relationship between dose reduction with PMMA shielding thickness (up to 6") and dexterity impacts with shielding thickness. Doses to phantoms were calculated using a Monte Carlo Code and using a mesh tally across the geometry; while dexterity impacts were investigated using a Two Handed Minnesota Turning Test and a Bennett Test.

Radiation Protection Considerations

PMMA shielding is used with ^{238}Pu activities to reduce dose rates primarily from neutrons, but also moderately reduces photon dose rates. Neutron shielding principles involve slowing down neutrons (moderation), absorption of neutrons, and shielding for produced photons. The high Hydrogen content of PMMA makes it an ideal moderator as ^{1}H has a similar mass to a neutron. The efficacy of PMMA for dose reduction from ^{238}Pu was investigated using version 6.1 of Monte Carlo N-Particle Transport (MCNP) code [1].

The source used was fresh 4,500 g PuO_2 that was not oxygen-treated (contained natural abundances of ^{17}O and ^{18}O). The source spectrum was generated using OrigenARP [5]. It should be noted that this source does accurately reflect typical work performed with ^{238}Pu at LANL.

The glovebox modeled was a four station glovebox (Figure 3) with the source at the second station from the left. PMMA thicknesses between 0 and 6 inches were investigated for phantoms at 2 cm, 15 cm, 30 cm, and 100 cm. The phantoms were modeled as 30 cm x 30 cm x 1 cm air phantoms to represent the surface area of the torso of a worker. Doses to phantoms and for the mesh geometry were calculated Dose Conversation Factors taken from ICRP 74.

(a) (b)

Figure 3 (above) (a) Depiction of a Four Station Glovebox without Shielding; (b) Depiction of a Four Station Glovebox with PMMA

Continued on page 12

Glove Integrity Testing or leak testing, how often should it be done?

Glove leak testing to monitor the integrity of glovebox & isolator gloves is often only done periodically. This practice is normally based on the thought that it takes too long. Years ago with old rudimentary leak test devices taking up a lot of space and only allowing very few gloves to be tested at one time, leak testing all gloves on a line use to take hours.

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Figures 4 and 5 represent the calculated dose rate in the XY plane at the midpoint of the source (horizontal plane) and is shown for 0", 3", and 6" of PMMA for neutrons and photons. As seen by the figures, the neutrons are the greater radiological hazard. Additionally, PMMA shielding has a larger effect for neutrons than photons.

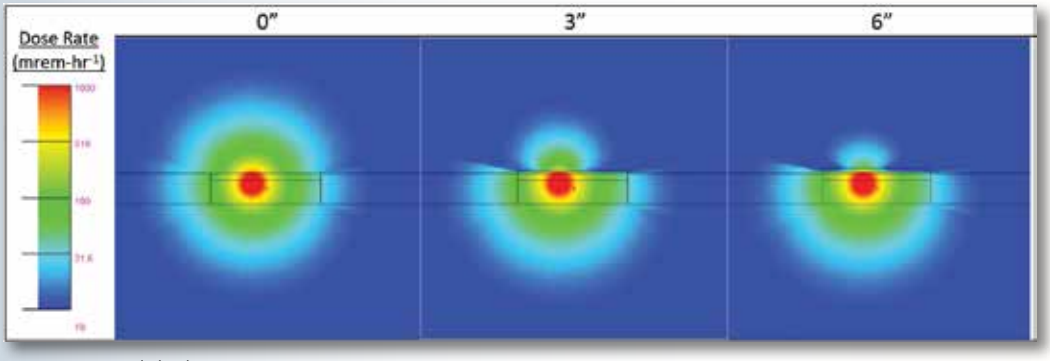

Figure 4 Modeled Neutron Dose Rate Maps (XY)

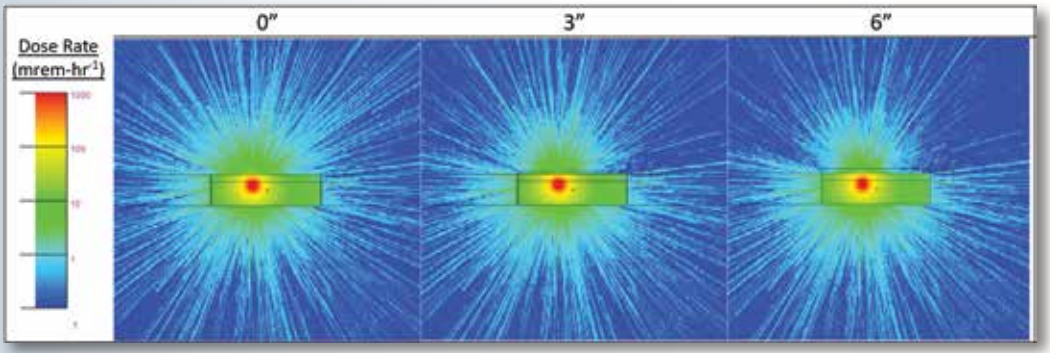

Figure 5 Modeled Photon Dose Rate Maps (XY)

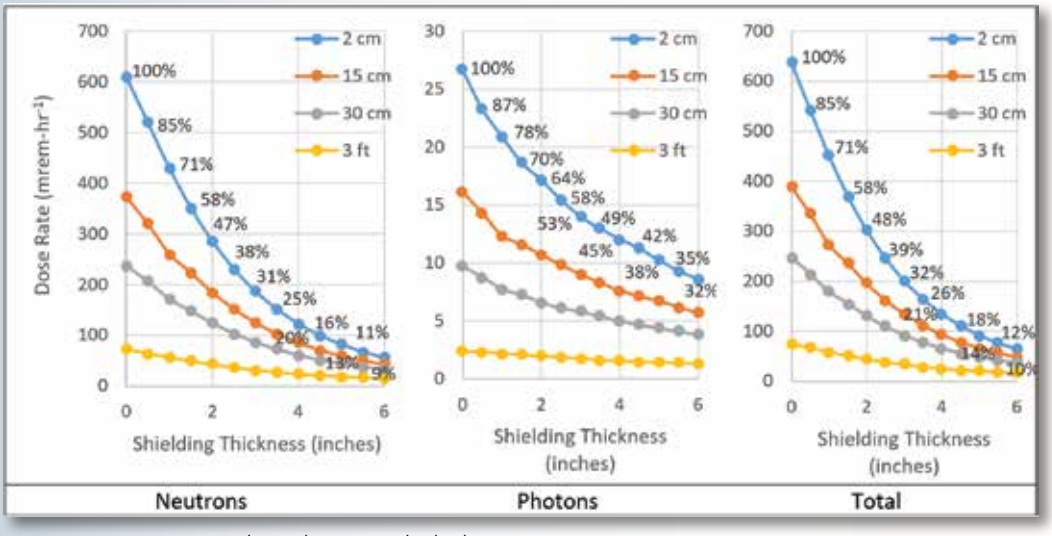

Figure 6 Dose Rate with Reduction Labeled

The dose reduction with shielding thickness for phantoms at 2 cm, 15 cm, 30 cm, and 3 ft is shown in Figure 6. For 2 cm, the percent of the original dose rate is labeled; similar reductions are seen for other phantom distances. As seen by Figure 6, the majority of the dose is from neutrons, as also seen in Figure 4 and Figure 5. At 2" of PMMA shielding, the total dose rate is less than 50% of the original dose rate. Larger percent reductions are seen for neutrons than photons for the same shielding thickness.

The additional dose reduction with added shielding is shown in Figure 7 (Page 14;) the percent of the original dose is labeled for phantoms at 2 cm and 3 ft. As seen by Figure 7, the first few inches of shielding added have the largest impact on dose reduction. As additional shielding is added, the shielding is less efficient at reducing dose. Shielding also has less of an impact on the dose to phantoms at further distances.

Ergonomic Considerations

The extra working distance caused by the thickness of the shielding can lead to several ergonomic concerns such as viewing, reach distance, and limiting shoulder and elbow arc of motion. Based on computer ergonomic simulation, the LANL ergonomics team recommends that glovebox workers should keep their main work tasks within 22 inches of their body. This becomes harder to accomplish the more external shielding is added to the glovebox. Reaching through extra shielding can put more strain on glovebox workers' upper extremities by decreasing usable arc of motion on their shoulders and elbows. 100 degrees of both flexion and extension of the elbow are needed for everyday tasks [3]. Discomfort and fatigue can occur earlier and more frequently with additional shielding, along with a decrease in worker's dexterity.

In order to determine the differences of worker's dexterity is between different thicknesses of shielding, a Dexterity Performance in Glovebox Shielding Study at the LANL Ergonomics Lab was conducted in the summer of 2019. The study was performed in front of a mock-glovebox with a shielding stand acting as PMMA shielding to allow to simulation of various shielding thicknesses (Figure 8 on page 14).

Continued on page 14

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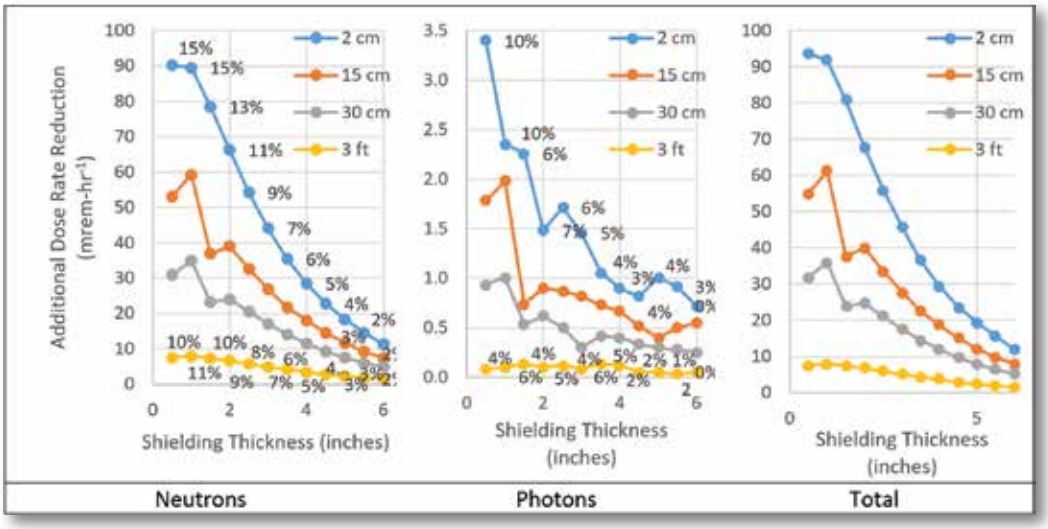

Figure 7 Additional Dose Reduction (Effectiveness of Each Inch of Shielding)

The results of the Two-Handed Minnesota Turning Test showed a total of 11% time increase in times between 0 and 6 inches of shielding (Figure 10a). When the data was compared by height, workers who were 5'8" or taller showed a trend of taking 14% longer in 6 inches of shielding versus 0 inches of shielding. Workers who were 5'6" to 5'3" took 17% longer in 6 inches of shielding compared to 0 inches of shielding. When the data was compared by anti-C glove size, sizes 6 and 9 (the smallest and largest hands) showed a trend of the 4 inches shielding taking 11% longer than in 0 inches of shielding. Size 8 hands (average hand size) showed a trend for 6 inches of shielding taking 10% longer for a task than in 4 inches of shielding.

Figure 8 Set-up for the Dexterity Performance in Glovebox Shielding Study

The Dexterity Performance in Glovebox Shielding Study consisted of 19 participants with a minimum of one year of glovebox work experience. Each participant performed the Two-Handed Minnesota Turning Test and the Bennett Board Dexterity Test (Figure 9) in each of the most common shielding thicknesses (0", 4", and 6"). Two-handed Minnesota Turning Test is a validated Occupational Therapy dexterity test that tests for gross motor skills, specifically arm-hand movement, which is important for a diversity of glovebox tasks. Bennett Board Dexterity Test measures tool manipulative skills, which is closely related to daily occupational tasks of a glovebox worker.

In this study, tests were placed inside the glovebox at a fixed 18" distance from the worker's body to control for individual ideal work zone differences. Data on participant height and anti-C glove size were also taken, for trend identification. The Two-Handed Minnesota Turning Test measures gross motor skills, while the Bennett Board Dexterity Test measures fine motor skills.

Figure 9 Depiction of Two-Handed Minnesota Turing Test (Left), Depiction of Bennett Board Dexterity Test (Right)

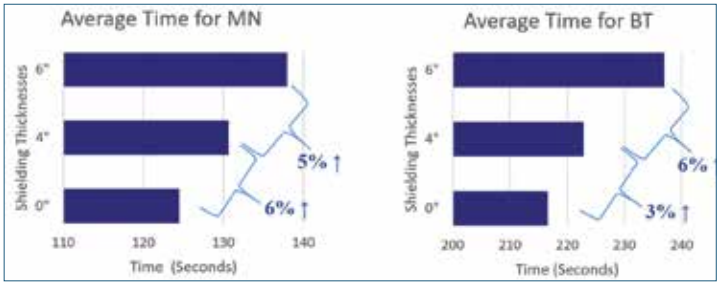

Figure 10 (a Left) Demonstration of change in Minnesota Turning Test (b Right) Demonstration of change in Bennett Board Test

The results of the Bennett Board Dexterity Test showed a total of 10% time increase between 0 and 6 inches of shielding (Figure 10b). Most of the data associated with the Bennett Board Dexterity Test was found statistically insignificant. We suspect a steep learning curve in this test as a limitation to this study.

Discussion

The ergonomic study showed that there are specific cases, where shielding in combination with anthropometrics of the worker, can effect dexterity of the worker. In general, as long as the worker works in at least the secondary work zone (up to 22 inches out from their body, usually within 18" from the front of the gloveport), then shielding minimally effects dexterity. We expect shielding thickness having a larger effect as workers expand their work zones where more reaching and awkward posture is necessary. The ergonomic study only looked at one component. Further studies would be beneficial on reach distance testing with shielding, range in motion testing with shielding, and further testing considering larger amounts of shielding.

The radiation protection study showed that small amounts of PMMA shielding result in large dose reductions (less than 50% of original dose rate at 2"). As more PMMA shielding is added,

Continued on next page

Continued from previous page

it is progressively less effective at reducing radiation dose rates. Localized PMMA shielding is very effective at reducing dose rates to the glovebox worker, but also reduces ambient dose rates in the room (exhibited by reduction of dose rate at 100 cm). It would be beneficial to take measurements in the field to determine if similar trends are seen in the field as through modeled data.

A summary of the observed increase in time and the modeled dose rate reduction is in Table 3. It should be noted that the ergonomics study looked at one component and may not correlate exactly to the subsequent increase in time for tasks performed in ^{238}Pu gloveboxes. Additionally, the dose reduction is a modeled dose rate and it's necessary to corroborate these values with in-field measurements.

	Time Increase		
Shielding Thickness	Minnesota Turning	Bennett Board	Dose Reduction
4"	106% original	103% original	26% original
6"	111% original	109% original	12% original

Table 3 Summary of Ergonomic and Radiation Protection Study Results

Conclusions

Although increasing PMMA shielding thickness for ^{238}Pu work reduces the dose rate, it increases worker time. The increase in time was gauged by looking at the Minnesota Turning Test and the Bennett Board Dexterity Test; these tests measure gross and fine motor skills, respectively. The reduction in dose rate was modeled using MCNP6.1.

When choosing PMMA shielding, especially for ^{238}Pu where thick shielding is required, a cost-benefit analysis should be performed balancing the dose reduction with the ergonomic detriment. The most optimal analysis would be mock ups in conjunction with calculations.

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By: John T. Newman, P.E.

When Things Go Wrong

I think one of the toughest things for me in custom equipment design has always been the fear that I've experienced from the anticipation of what will go wrong with a project and how bad it will be. Perhaps not everybody thinks like that, but I seem to be one who has that anxiety. You would think that the older you get and the more experience that you gain from all of those mistakes that you made in life, the less it will happen. Well, it does lessen some, but it never goes away completely and things will still go wrong. I guess that's why I get so anxious about it, from all those experiences from things that went wrong. Murphy's Law, one of the truest law's in physics, always seems to come into play.

You remember good old Murphy, right? There are many versions of his law, but the main one goes like this "Anything that can go wrong, will go wrong." Then you can add "At the worst possible moment." I don't think Murphy was a physicist, but his law, which is based on the rules of probability, seems to be true most of the time in the physical world. There are many cute and creative elaborations on this, one that I particularly like: "The chance of the bread falling with the buttered side down is directly proportional to the cost of the carpet." It has a tendency to make us all think of the negative and forget the positive, which is the cause of the anticipation that most of us feel about our designs.

We are all human and humans make mistakes, some more than others, but if you are one who is regularly pushing out into new territory, into the realm of the unknown, it can be rather impossible to exist without making any mistakes. One of my earlier employers, who is with the ancestors now, used to say "If I can make 50% of my decisions right then it's a good day." It took me a while to really appreciate what he was saying, but I sure understand that concept now. Especially after spending a lifetime working in the custom equipment business.

This custom equipment, which for me has been in the containment/glovebox field, is all about creating and building something that has never been done before. They don't all start completely from scratch, but just about every project has some varying degree of "never been done before." In this business, the process always starts with the "Specification", a document written by the purchaser, describing in great detail, the expectations of what and how the said equipment/system is expected to perform. Then, based on that specification, we equipment designers, create a brand-new machine that has never been done before. We have one shot, to get it right and failure is absolutely NOT an option. Oh, and I should add, done on a budget and schedule, arrived at through sometimes intense negotiation, and usually awarded as the low bid in a competitive bidding process. Kind of helps to fuel the fore mentioned anxieties just a bit.

Everyone makes mistakes, it is how you deal with it that will make all the difference.

There are always great expectations at the start of the project, and then at the end, everyone expects this never been done before machine to run like a Swiss watch right out of the gate. In your dreams, maybe. This virtually never happens. So, what next? When you get to the finish line and it doesn't work like expected. Or worse yet, it gets out into the field and it doesn't do the job as expected. First you have to get past all the yelling and screaming. Why is that always the case? Everyone seems to get all emotional about it. One of my favorite movie quotes from "Jurassic Park" where Jeff Goldblum says "Ooh Ah! That's how it always starts. Then later there's running and then screaming."

It doesn't seem to matter what you do, because on every project, there always seems to be something that goes wrong. You just have to hope it doesn't kill somebody or make the main stream news. Fortunately, in our business, it is usually not that dramatic, and thankfully I have never been responsible for killing anybody. Although I have been threatened with people dying because we were late with our delivery, but that is another story. But, be assured it happens to everyone, as even the big boys mess up and things can go terribly wrong. Remember the de Havill and Comet, the space shuttle Columbia, the Mars Climate Orbiter, and of course the Titanic, to name a few.

So how do things go wrong and what can we do to prevent it from happening? First, we have to do our best to catch everything during the design process. This is our best defense against things going wrong. I'm sure you've heard "The devil is in the details." The design is where this applies. You have to think about everything down to the tiniest of details and leave no rock unturned.

When designing a new custom equipment project, try to keep the new "never been done before" things to an absolute

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minimum. All designs are made up of a collection of components that work together to make up the whole. These components are either fabricated or purchased and it is usually always safer and more economical if the component can be purchased. Purchased components have been designed, built, tested, and proven to work by the manufacturer before you get them and all you have to do is plug and play. Although, they do have to be properly selected and sized for the application at hand. Meaning it is up to the designer to perform due diligence and make sure the component will meet the requirements of the design. This entails reading and paying attention to the fine print in the component brochure and/or web page. Discussions with the applications engineer can be very helpful as well, but be cautious, because these people are not always completely understanding of your application and can sometimes inadvertently give bad advice. I've been burned by this in the past and I have also been guilty of not reading the fine print, which led to components failing or not working as I had intended.

Most projects will have components that cannot be purchased and must be specially fabricated. Try to apply known or proven concepts as much as possible and stay out of the "create completely from scratch" realm. This will minimize the risk of something going wrong and will also speed up the design process, especially if you can reuse existing 3D models and drawings. At the start of a new project, I always search the previous project database for similar projects or designs that can be re-configured to meet the new project criteria. A word of caution here, be careful with old projects, as sometimes they don't get updated to fix the things that went wrong and you can wind up repeating the same mistakes again and again.

There are always a few brand-new components that can't be purchased, have never been done before, and must be created from scratch. This is the risky part with the greatest potential for something to go wrong. Attention to detail here will help mitigate some of the risk. Many times, it will be well worth the time and the cost to complete a "Proof of Principle", which involves building a prototype that can be analyzed and tested to verify that the concept or process works as intended. This can sometimes be done by fabricating a simple or less costly version of the part close enough to demonstrate that things will work. Other times it will be necessary to make the full version of the part to get a valid test, but the upside to this is that sometimes if the testing is positive, the prototype part can be used in the actual project.

As the design is completed, errors can be discovered by drawing reviews, pier reviews, and independent analysis. Dimensional errors in the drawings have always been a potential for problems. These days with the CAD software that we utilize, it's not as bad as it was in the old days when everything was drawn by hand. But the CAD is not fool proof. One area that has the potential for mistakes are design revisions and changes that happen once the design has been completed. When dimensions are off, it will usually become very apparent in the 3D model. Depending on how the model was created, changes can affect parts in ways that are not readily apparent. As an example, sometimes hole locations can unknowingly change position, due to changing the surface that locates the hole. This is just something to pay attention to when making revisions. I've seen the results of this cause some pretty serious errors in fabrication.

FEA analysis and stress calculations are a good idea as well, as often a part that has been modeled won't be strong enough to survive the expected loads. If you have time, the whole design can be analyzed, but that is usually not the case or even necessary. Just be sure to check all of the suspect parts or those that can cause a catastrophic failure and affect the safety of people. Safety and personnel protection should always be the most important part to consider in all design analysis.

Ok, now you've done everything humanly possible to prevent something from going wrong and/or not working, well, at least within the bounds of the project schedule and budget. So now your project will succeed without any issues, right? Well, perhaps, but most likely it won't. Remember Murphy? There surely will be something that was overlooked, forgot about, or not even considered in the design. It's during the fabrication and testing of the project when the bad things start to appear. The dreaded phone call or email that always comes when you are neck deep in the next project, which drops out of the sky like a bomb, stating the classic "Houston, we have a problem." Now what are you going to do?

And don't worry, because it will always be the engineer's fault, no matter what. The important thing is to remain calm, and don't panic, even if there is yelling and screaming. If you remain calm, the yelling and screaming will usually subside, and things can be dealt with in an orderly adult fashion. Remember, it most likely will be your fault, so you might as well fess up right out of the gate that you made a mistake. Get it over with and you will feel better right away, and can then figure out how to resolve the problem without getting sucked down the "Blame Game" rabbit hole. At this point, it is really irrelevant who's at fault. The important thing to realize is that it will not go away if you ignore it. Everyone makes mistakes, it is how you deal with it that will make all the difference.

When dealing with problems, it is very important to look for and fix what is wrong. I can't stress this enough. There is always the tendency to change one thing to compensate for something else that is wrong. It may work, but it will usually back fire and cause the problem to cascade into other unforeseen issues. It is very important to understand what is wrong, and then fix what is wrong, no matter how painful. This usually involves backtracking through all the drawings and analysis until you arrive at the mistake. Then fix that, if at all possible. At least by understanding what is truly wrong, or by understanding what actually first caused the problem, only then can you entertain making any alternate changes to compensate without creating other problems.

I know it can seem like the end of the world, and sometimes, driven by cost or schedule impacts, your first inclination is to run for the hills. You have to fix it, and there is no walking away. I've been there, in that situation so many times, I can't even keep track. But you know, I survived them all so far and no matter how bad it seemed at the time, we've always managed to come up with solutions and moved on to the next project. The take away here is to check your ego at the door, put your head down, work through it no matter how bad it gets and you will survive. And if the problem gets out of the building and it's your end customer making the call, a quick humble response to take care of it right away will always bring them back for repeat business. A poorly handled problem will surly send them to your competitor for their next purchase. ❖

LESSONS LEARNED

By: Justin Dexter
Lessons Learned Committee Member

2020 has been a hell of a year. First, I hope this message finds everyone in the AGS family safe and healthy during these crazy times. The COVID-19 pandemic has had an impact on our society and on our supporting industries. Many of us have had to learn to work in a different way, either remotely, or distanced in some way from our shops, co-workers, and clients. We have had to learn new software programs or applications to communicate with each other. Business is definitely different now, and I have a feeling this has changed us forever in one way or another. As you all know, this virus forced the AGS Board of Directors to cancel the annual conference in Nashville this past July. We have re-scheduled the conference to July of 2021, and we hope that everything gets better and that we don't have to postpone it again. To continue our goal to disseminate information to the society, the AGS will be conducting webinars over the coming months. Lessons Learned will be discussed during several of the webinars.

As I mentioned in the last Enclosure, the Lessons Learned Committee will be focusing on Knowledge Capture and Knowledge Transfer from our colleagues that are looking to retire soon, to the younger generations that are beginning their careers in the glovebox industry. Whether it is the journeyman welder in the fabrication shop, or the design engineer about to move on, we need to make sure that we get as much knowledge, stories, glovebox related experiences, and other industry information out of them before they retire and are not available to help out. As a young engineer, I thought I knew everything about sheet metal since my books taught me everything I needed to know about stainless steel. One project of mine had a lot of rework due to my lack of knowledge of the machines in a certain shop. An older engineer mentioned to me that you need to understand the different types of tooling that shops might have and the consequence of adding multiple constraints on drawings. I learned to let the shops manage the dimensional constraints of a glovebox shell based on the tooling they had available. Different dies, different dimensions and outcomes.

If you have been following OPEXShare, you might have heard about the glove breach at Los Alamos National Laboratory. Some of our upcoming discussions and webinars will address the lessons learned from this event and the importance of transferring the experience to others as they take on new roles and are learning on the fly. We will also address the recommended processes and procedures that we should consider as our older "boomers" are moving on. We need to get as much information out of this generation (one of the greatest) as possible. We also plan on having some input from the United Kingdom on their challenges and ideas on how to capture these "skills" and pass them along.

We will continue to discuss this topic of Knowledge Capture and Knowledge Transfer at the annual conference next year in Nashville, the Lessons Learned Committee will be discussing this topic and will have a breakout session to brainstorm knowledge transfer within the AGS and throughout the industry.

Please share any lessoned learned, general knowledge, or best practices with the AGS and OPEXShare. By sharing your experiences, you could help others who might have a similar challenge or are encountering the same concerns.

I am looking forward to finally seeing everyone again in Nashville next year! Please stay safe, focused, healthy and more importantly, patient during the upcoming months. Take care and see you soon.

If you would like to be a part of the Lessons Learned Committee, please contact the AGS front office.

Justin Dexter
Lessons Learned Committee Member ❖



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