FOCUS

Replacing Film in a Modern Industry

by Wesley Soape

Converting to Computed Radiography

All too often, people come to me and say, “My company has allotted XX amount of money to get us into computed radiography. What is the best brand?” The first time I was approached with this question, I went into a long explanation of the many facets involved with converting to digital. I eventually answered the question, but only after explaining how complicated the transition is.

When I was asked that same question recently, I just said, “Hire a consultant” to the inquisitive individual. This may be because I had given that speech many times before and felt that it mostly fell onto deaf ears. It may be because I did not have time to go into all of the small details. Either way, it comes back to one simple concept: replacing film, the right way, with new technology, is extremely complicated.

Why is it so Complicated?

Anyone who knows me will tell you that I regard computed radiography simply as a film replacement, then why is it so complicated?

When you replace film, you have to replace your standards. The average technician could shift gears from traditional film to computed radiography in a matter of minutes with some minor hands-on training. However, when it comes to any type of examination or technique within that examination there are always standards to follow.

Figure 1. Film requires processing time and chemicals, but provides good, clear images.
The most prevalent standards are Digital Imaging and Communications in Medicine (DICOM) and Digital Imaging and Communication in Nondestructive Evaluation (DICONDE). These give the basic standards for equipment and software to follow. The most basic rule is that the image must remain in a raw state from formation to archival. Some machine and software combinations filter the image before delivering for review, which is not compliant of these standards. That is an evaluation that needs to be made first thing. Your client may accept pre-filtered images, though that segment is getting smaller and smaller. For most work, DICOM/DICONDE compliance is necessary.

If your client requires DICOM/DICONDE compliance, you will need to refer to something like ASTM E 2339 or ASTM E 2738 as accepted standards for compliance (ASTM, 2011; ASTM, 2013). ASTM E 2445 will give you the guidelines for performance evaluation and long-term stability, which is an important part of using any method or technique (ASTM, 2014). As a standard guide to computed radiography, you will need ASTM E 2007 (ASTM, 2010). Those are just a few ASTM International standards. If you use another evaluation standard, you will need to check into your applicable requirements.

There are also considerations with certification standards. You need to see how digital technology fits into your certification program along with a possible revamp of your own written practice. That could become a considerable task and expense, depending on the size of the company.

With the introduction and evolution of digital technology in our modern world of radiography, we have lots of standards with which to comply. Most of these standards go completely unnoticed by new and seasoned technicians alike, but clients are beginning to embrace these new standards, often before the service provider does.
Sensitivity Matters with Computed Radiography

The sensitivity level matters with computed radiography (Figure 2). Sensitivity is measured in microns (µm), or 1 millionth of a meter, in both the imaging plates and the scanner that creates the image. It is a physical measurement of width for each pixel on the image. Most weld-quality systems measure in the range of 50 to 100 µm, or 0.00005 to 0.0001 m. We use this same measurement for film, but film requires no attention to microns. The reason being is that the grain size is set. You can adjust the grain size by switching film, but that is the only adjustment. Computed radiography allows you to adjust micron size in multiple ways, ways we could never adjust with film (Figure 3).

Many technicians do not regard this number as important because they do not know what it means. Most people do not know that the lower the number, the finer the detail. When it comes to fine adjustments, this setting can make all the difference. Some situations may call for the micron settings to be as low as possible, while other situations will yield a better image at higher settings. In some cases, the extra noise that comes along with higher sensitivity can be detrimental. It depends on every possible variable you can consider. Should you need a unit with high sensitivity requirements, you will need to favor one that has those settings. These are all details that a consultant should be able to sort out.

Portability is an Important Consideration

With computed radiography, you can get a system that is as portable as needed and that meets your sensitivity needs. It is important to establish your specific needs. If the operation is in-house but you do perform fieldwork, do not limit yourself to a stationary unit that is ultimately going to make you less money. Odds are your company is looking at the utilization of that unit very closely in order to see whether it was worth the investment.

Large scanners are impressive to clients, but small scanners can go out to do jobs that net you more profit. If you tell your company at the end of the year that you need money to expand a program that is still in the red, you may not get approval. On the other hand, if you tell your company that the machine is always being pulled at from all sides for work, they may be willing to invest more money to expand on that newfound profit center. You want to have access to the most remote inspections where you would apply this technology. When you get started on applying this technology, you will want to try it on everything.

Phosphor Plates are Consumables

Contrary to what any salesperson tells you, phosphor plates are consumables. You cannot continue to use them over and over with no replacement or the quality will degrade along with the appearance. I have been told by the occasional individuals that their plates last longer than others, and that may be true. Whether that is useful is another matter (Figure 4).

It is not about how long these plates last, but how useful they are. A plate may last through 300 exposures without a scratch, but the image will be degraded from the first exposure. The common number that I hear is approximately 100 exposures until a plate begins to lose sensitivity. X-ray machines will shorten the life further than that. This means that each program needs to consider the cost of plates the same as the cost of buying film. These resources are not permanent and have to be renewed.

Finding the Right Consultant

Your consultant needs to be a good listener. He/she needs to listen to a walkthrough of your daily operations, know the materials for which computed radiography is required, understand configurations of equipment, and just generally understand
your operations. Ask basic questions on required space, equipment, and capital, but talk more than anything. You have all of the information that your consultant needs, not the other way around.

You may find a consultant at an ASNT conference or in your local section meetings. Those would be good places to start. Entire businesses are built simply on consulting, and many training facilities also consult. The right fit is out there, though it may take some hunting.

Your local computed radiography equipment salespeople are not consultants. No matter how they plan to be on your side, they still have a vested interest in selling to make money.

Conclusion

These are just a few of the key details to sort out for a film replacement unit. There are lots of other things to consider, with meeting your clients’ needs at the top of the list. Your end user needs to sign off on this technology in order for you to get paid, so keep them in mind for the entire process. Ultimately, in order to do something, you have to find someone who has successfully done it and knows the details. Hiring a consultant makes sense, but choosing the right one is important. Someone who can get you into the process and someone who can replace your film operations the right way may be two different people. The fact is that few people have been down that road and quality consultations could go a long way to help. I have personally seen the results of good and poor consultation and even compared it to no consultation. The differences in consistency are huge.

AUTHOR

Wesley Soape: ASNT NDT Level III in RT; Hellier NDT.

REFERENCES


