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The Scholarly Publishing Scene: Materials Properties Data

Myer Kutz

Myer Kutz Associates, Inc., myerkutz@aol.com

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I spent the early portion of my professional career working as a mechanical engineer. (I hold mechanical engineering degrees from MIT and RPI.) Specifically, I was involved in thermal design. Among other pursuits, I worked on temperature control of the inertial guidance system used in the Apollo program. (If the components of such a system become too hot or too cold, it steers a vehicle off course.) Like most young men, I thought I knew everything. So, for example, when I needed values of materials properties, such as the thermal conductivity of high-performance metals to use in calculations to determine operating temperatures of key components of the Apollo inertial guidance system, I believed that tables of materials properties published in something called Materials Selector were sufficient for my purposes.

Materials Selector was an annual publication of Machine Design, an advertising supported magazine that arrived on my desk free of charge, as I recall, and Materials Selector was replete with tables of materials properties data. I don’t remember caring too much about whether there was any documentation testifying to the validity of the numbers in the tables. Whatever was in the tables was good enough for me, and I had faith in the results of my calculations. It was the equivalent of using Wikipedia today, I suppose. In any case, the projects I worked on didn’t suffer any catastrophes because I used materials properties values that might not have been fully vetted. They were good enough for engineering work, as a variation of the old joke would have it. Besides, I knew that my calculations weren’t the last word. The groups I worked in ran tests to determine how things would be under operating conditions.

I used tables from Materials Selector (with permission, of course) in my first book, Temperature Control, back in 1968. Years later, when I started putting together engineering handbooks, I keenly felt a responsibility not to lead young practitioners astray. For the materials chapters in my Mechanical Engineers’ Handbook, for example, I made sure to enlist expert contributors who would provide detailed references about the origins of materials properties tables in their chapters. As time went on, industry groups such as the Aluminum Association and the Copper Development Association became involved with and even sponsored the compiling of data in chapters covering materials. Those are the chapters that tend to have the most exhaustive materials properties data, although I should say that a handbook cannot strive for completeness in this area. There are just too many variables affecting the precise value of a material’s property — the ingredients in it, how it was manufactured and the conditions under which the property was measured, to name just a few.

In the Internet age, I’m not sure how much of this vetting process matters to young engineers, who have been thought to be the principle market for engineering handbooks. The Internet is filled with materials properties...
Fictional researcher Hannah Chen, the main character in each scenario, is a representation of future patrons and the types of environments in which the business of acquisitions might be conducted. In scenario one, where individual researchers are akin to rock stars or action heroes, Hannah expresses how it feels ‘strange’ to be on a university campus because she usually works remotely. Hannah achieves success as a researcher in scenario two because of her networking skills and talent in “following the money.” In scenario three, Hannah, who had never planned to work for a university, is employed by a private research cop or group where she excels in project management and logistics support. In scenario four, Hannah thrives because she is mobile and able to shift from a research culture formerly based in North America to one that is based in China, India, and the Middle East.

The metamorphic change of the acquisitions department between 2015 and 2030 will be remarkable in a variety of ways. First, current dependence on cost-per-use (CPU) as a primary assessment tool will give way to an emphasis on a rate on investment approach (ROI). In other words, purchases and renewals will be measured more by what a researcher gets out of the product than by how much a product is used — quality over quantity. Second, the big deal will be replaced by big data. Digital repositories, shrinking grant funding, and open access will put a premium on data that requires laser-beam-type acquisition practices. Third, a new philosophy of service from one of isolation, control, and limited flexibility to one of cooperation, fluidity, and mobility will emerge as the cornerstone of acquisitions service. Fourth, all acquisitions professionals will need to think globally to address the transfer of information knowledge from West to East as Pacific Rim countries develop their knowledge bases and Web services like Baidu Scholar, the Chinese search engine for Websites, audio files, and images. In short, by 2030 acquisitions librarians will be living in a professional world that operates vastly differently than their 2015 environment.

Conclusion

Recent July 2014 headlines in the Chronicle of Higher Education including “Around Retail Giant Amazon, University Presses Tiptoe and Whisper” and “Did Amazon Just Change the World? Unlimited Kindle Books is a Game Changer” seem to forecast the 2030 scenarios.

Endnotes

3. Chronicle of Higher Education.