

Transcending Cultures

Susanne Mordike

Many years back, the British novelist C.P. Snow talked of the world of two cultures: sciences and arts. He enumerated the problems one faces in trying to develop a common appreciation, an understanding that transcends the domain one is in. As a materials engineer working to develop industrial applications of laser technology, encountering this problem of two cultures is almost a daily event. However, the cultures are different from that of Snow's, and are also more than two. As a professor at a German technical university, I work closely with industry. I am a woman, but work in an environment where there are so few of us. I also work with industries in different countries: from my native Germany to Korea, France, and the United States.

I find that men in industry work differently than I do. I strive for cooperation and compromises. I am reluctant to enter into long-winded debates because I structure problems differently from the way men do and I might be found out! When I see a new problem I look for information—as everyone does—but tend to draw heavily on experience while developing a mental picture of a solution. The solution is intuitive and is yet to be validated. But I find that men invariably start with the physical laws and list several possible solutions. This happens at least initially until they encounter problems in their applications. The approximations then come in and they opt for solutions that may not be the best, theoretically speaking. Through each approach, we end up where we should

have been in the first place. If my original intuition lacked formal rigor, their structured solutions were incompatible with the real environment. In an industrial environment this can be time consuming and ignores the knowledge that has not been documented but has grown out of experience. I therefore prepare to be a willing listener and to cooperate, if only to accelerate the process of problem solving. How do you build an understanding where intuitions are not given the same weight as formal solutions? Familiarity of different approaches to problem solving may help along with the confidence that every problem does not have to be blown up into a war between genders.

But this is not always possible as I discovered while working in two industries in Germany. When a major automobile manufacturer decided to introduce laser treating of their camshafts, I was chosen to lead the technology transfer team. Although at one of the first presentations on laser technology I was asked by a senior manager whether I knew how to spell laser and what it meant, an open

Materials Characterization *at temperatures as low as 35K.*

Our new two stage Joule-Thomson cooler provides at least 100 mw of cooling capacity at 35K using nitrogen gas in the first stage and neon gas in the second stage.

Applications include:

- Four Point Resistivity
- Optical Property Studies
- DLTS
- MEMS



no liquid cryogenics to handle!

MMR MMR Technologies, Inc.

For more information, contact Bob Paugh at 650 / 962-9620 or bobp@mmr.com. Or visit our website at <http://www.mmr.com>

Circle No. 13 on Reader Service Card.

SEE ME

See for yourself

For the first time ever, you can have your imaging and analysis fully embedded with your TEM microscope. Everything running under Microsoft Windows NT®. Watch how it all comes together now, on one single monitor

Tecnai
See it *your way!*

PHILIPS
Let's make things better.

Circle No. 17 on Reader Service Card.

atmosphere was soon created with the formation of a team of 20 motivated engineers. During this project, I often had the impression that men, while working for the project, also wanted to demonstrate their competence to a woman. This reminded me of my earlier years as a teacher in an adult education school where many young men would work for me, instead of working for a male colleague, perhaps seeking recognition of their capabilities! This industrial experience was salutary. In this environment I treated the team members impartially, ensuring that the shyest also contributed. I saw that gender issues or my academic origins were not the determining factors, but my competence to help reach the objective of replacing tungsten-inert gas surface remelting with laser surface treatment.

I had however another experience at a surface engineering company. The engineers in that company were from a different discipline and they were openly hostile. Nothing I suggested was accepted even when proven experimentally. My time was taken up with enormous patience, repeated experimental validations, and innumerable proving trials before my suggestions were accepted. It was a frustrating environment of persistent confrontation where I was constantly on the defensive. I find that this type of communication does not address the problem but is conducted to demonstrate power. On a similar occasion, working with a dozen male industrialists, I was horrified at the number of times I was professionally challenged even on trivial questions. Meanwhile, among themselves, the men were very civil and appeared to solve problems without much bickering. When I received a prize from the Chamber of Commerce for technology transfer, my colleagues thought technology insufficiently scientific and that recognition of the toils in making a technology work was not there for them!

I tend to think that the country's cultural traits are important in determining men's behavior toward women engineers.

Among top managers I did not see the same combative spirit I saw among middle managers. Perhaps middle managers find gender issues to be an additional distraction in their attempts to move up the corporate ladder. In Germany the society continues to be hierarchical and male-dominated. A woman materials engineer is not easily taken as a leader except in organizations with global connections and experience. Her minority status in the field, however, makes her accustomed to seeking compromises which may be invaluable when she leads a project team.

My experience in France seemed refreshingly different when I worked for an automobile company on laser processing. The French company team was completely unified from the very start. The hierarchy seemed minimal and the group worked toward proving a technology and, of course, for the greater glory of France! I found that French engineers love debates and discussions but no one was singled out for a greater scrutiny. I participated in innumerable discussions where I felt that team members genuinely desired my participation. Even at middle levels, gender issues did not seem to be important as, each day, a handful of managers discussed over coffee the progress and the plan to be followed.

I experienced a similar cooperative and constructive environment in U.S. industries in which the object was to transfer acquired knowledge in applications of high-power lasers. The young, U.S. engineers I worked with accepted my report and my experience as the starting point for their particular technology development or application. They recognized the potential of laser technology and formulated innumerable detailed questions. I found the engineers to be flexible and eager to

learn and absorb new information. They were ready to try new ideas and carry them forward with innovative designs, new machines, and even new specifications. They did not cling on to an old practice in spite of their years of experience in it. The gender of the messenger seemed to be inconsequential.

It is assumed with some justification that the role of women is more restricted in many parts of Asia as compared to the West. In Korea and India, however, I found the engineers readily willing to collaborate with me. As part of newly industrialized countries, they were keen to learn new technologies that would enhance the performance of their products. Perhaps the rules of hospitality ensured that I was not subjected to the same treatment as women at home!

When I look back, I find the cultural divide is not so much between sexes or even between countries as it is between cloistered laboratories of university and the industrial shop floor. The pressure to deliver quickly is so high in industries that engineers in universities are unable to cope, and they ultimately blame industry for not understanding the processes. While working on an industrial problem in Germany, I found that with increasing pressure to deliver, the participation of academics in discussion meetings with industrial engineers decreased steadily. The industrialists were in a hurry and the academics were talking of hypothetical issues. I spent much time translating the different languages spoken by industry and academia. Perhaps the practices in the United States of building consortia or involving government laboratories ease the interaction. Germany needs more such interfaces in order to transfer knowledge seamlessly from universities to industries.

Susanne Mordike works at Technische Universität Clausthal, Clausthal, Zellerfeld, Germany. For over a decade, she has been collaborating with her husband, Barry Mordike, in transferring laser materials processing technologies to industries in a number of countries.

Material Matters is a forum for expressing personal points of view on issues of interest to the materials community.

SEND LETTERS TO THE EDITOR TO:

Editor, *MRS Bulletin*, Materials Research Society
506 Keystone Drive, Warrendale, PA 15086-7573
Fax 724-779-8313; E-mail Bulletin@mrs.org

Letters must include your full name, institution, address, phone number, and e-mail if available.