



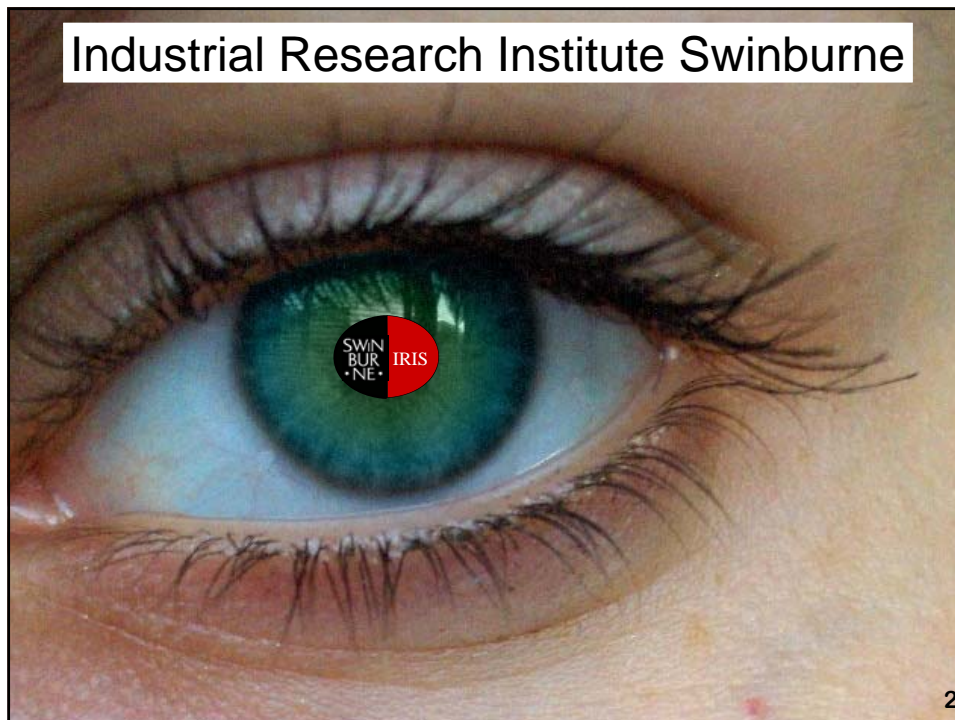
## Following your Passion while Navigating the Bumps in the Road

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Everything  
**Material.**



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**Or .....**

From here to there and back again  
..... a few times

**Or .....**

Making sense out of chaos!

## **Broad Instructional Aims**

- An environmental landscape analysis to paint the big picture
- Case Histories of “What I might have learned more quickly” (if I knew then what I know now).
- Some pointers on what you might like to think about.

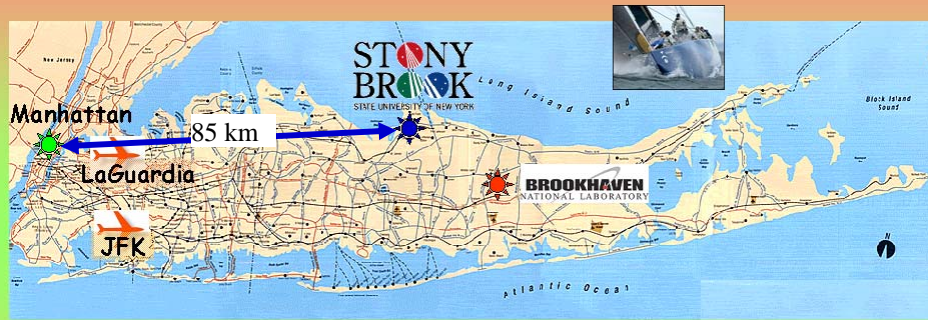
Where am I?



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Background: Where was I?



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## **A Fundamental Question: What are your career options?**

1. Industry
2. Academia
3. Government Labs
4. Consultancies
5. International
6. Internships, post docs etc.
7. A mixture of the above

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## **Rule #1: “Know what you know!”**

1. Learn factual knowledge
2. Create a mental organizational framework
3. Monitor your own thinking and learning process
4. Loop back to 1 infinitely

In ABET terms we would term this as  
“continuous learning”

## **Rule #2: “Know what you don’t know!”**

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TWA: 4

## Rule #2: Establish what you like



## Thermal spray research and applications

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## The complete picture of the Thermal Spray Coating Process

Thermal Spray  
Source



Processing  
Science &  
Engineering



Materials  
Microstructure

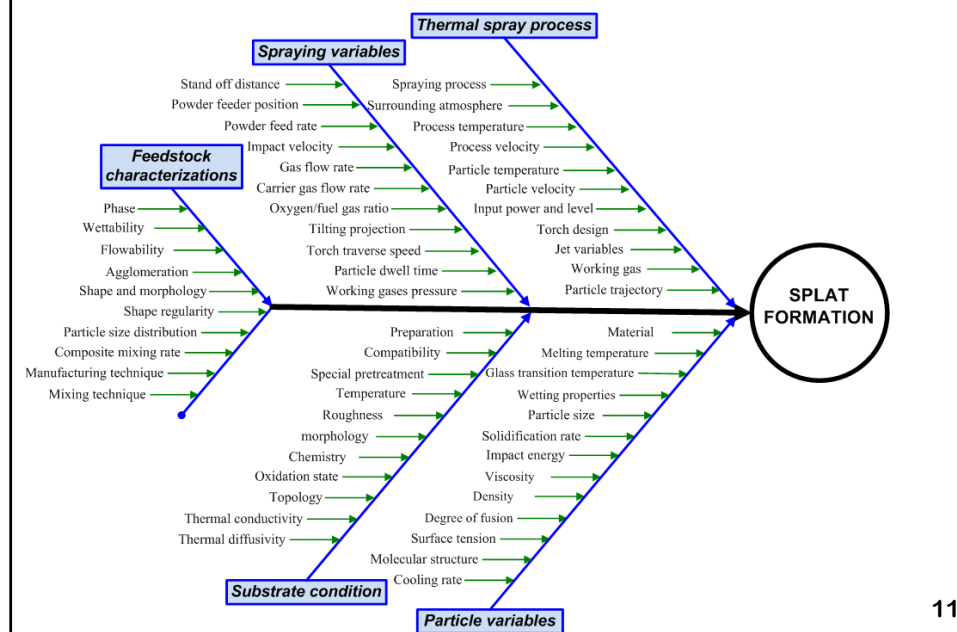


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## Challenge #1: Solving complex problems



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## Applications

- Neck Rings
- Plungers
- Bottom Plates
- Moulds
- Preform Blanks
- Guide Rings

- Debarking Knives
- Wire Guides
- Chipper Anvils and Segments
- Knife Clamps

- Extrusion Screws
- Barrels
- Pelletizers
- Granulators
- Banbury Mixers

- Sucker Rod Couplings
- Polish and Compressor Rods
- Plungers
- Valves, Thermowells
- Pump Impellers

Ref. Colmonoy

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### GLASS



### POWER GEN.



- I.D. Fan Blades
- Pump Impellers
- Coal Chutes
- Valve Flanges
- Centrifuge Scrolls
- Boiler Tubes

### PULP & PAPER



### AGRICULTURE



- Rasp Bars
- Tillage Tools
- Cultivators
- Conveyers

### PLASTICS/RUBBER



### TRANSPORTATION



- Railroad Tie Tamper Bars
- Truck Brake Cams and Shafts
- Camshaft Lobes
- Clutch Components

### PETRO/CHEMICAL



### CONSTRUCTION



- Brick and Tile
- Cement Mixers
- Conveyers
- Saw Blades

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## **Process-related Tools (these should be easy)**

1. Have a plan
2. Have a life
3. Keep your CV up to date
4. Keep options open
5. Keep doors open

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## **Process-related Tools (these are not so easy)**

1. Recognize that we all have bosses
2. How to say “no”
3. Develop a network
4. Cultivate a reliable mentor
5. Develop and nurture reliable referees
6. Timing issues: 3-5 years per transition?

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## Hints

1. Think about your current qualifications with regard to your future needs (PE?, PhD? etc.)
2. No one likes surprises!
3. Be cautious concerning social media and e-mails
  1. Never in haste
  2. Never late at night
  3. Never with poison or negativity
4. People will only remember you from their last interaction with you
5. The engineering is easy .. It's the political engineering that is hard!

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## Challenge #2: Difficult situations

1. How to handle difficult people?
2. How to handle impossible deadlines?
3. How to judge priorities?
4. How to contain "risk"?

### Guiding Principle:

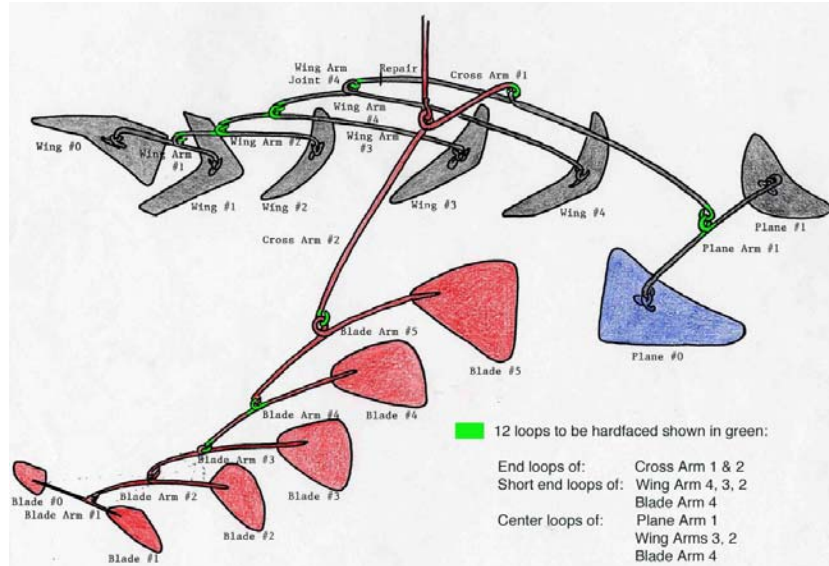
**Your reputation takes decades to develop. It can be destroyed in 10 seconds!**

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## An Example: Alexander Calder



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### June 1 2004: Questions from the National Gallery

- ... aluminum linkages of the mobile are hard-faced
- ... in 1977 coated with plasma sprayed molybdenum.
- ... by 1988 divots had worn in these linkages.
- ... in 1989 the divots were filled with TIG welding, ground down and then **thermal sprayed with moly/nickel/aluminum bond coat and titanium dioxide top coat.**
- ... now its 14 years later, and the divots have reformed .... we are considering different hard-facing products.

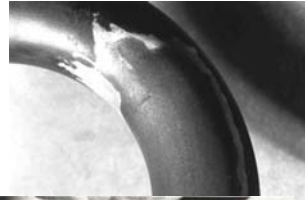
#### Questions

- ... choosing an appropriate material and application method
- ... how to compare the resistance wear of these products to one another?
- ... numerous constraints are created because this is a work of art.
- ... we would like the work done on-site in our sub-basement, and the resulting surface must be smooth enough so that it can be painted.

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## Alexander Calder



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### A Final List!

1. Do not be afraid of change. Embrace change as an opportunity.
2. "Loyalty" is not considered as an attribute by all people.
3. Cultural awareness and sensitivity can swing the game plan.
4. Read, take courses and reinforce your knowledge about conflict management.

**Guiding Principle:**  
**Be open minded and guardedly confident.**

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### **Hint 1: Most of life is attending it**

Attending lectures, on time and every time, should be the highest priority of your life at University. Your expectation for high achievement cannot be met if you do not attend. Just turning up and taking up a seat should be the easiest part of your life. The next part of “attending” is actually being awake, taking notes and participating in active learning over this 50 minute period. Attending also implies that you must check your class web site and e-mail accounts at least once in every 24 hour period; and as a professional this would imply a 7-day week. Attending also means coming to the tutorials and the practicals

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### **Hint 2: Marks are just one part of the story**

Achieving a mark and a grade is only one aspect of attending a subject/course. (And, in my opinion it is not the major outcome.) What you can learn most in a subject/course is not just content, but you can also learn about (i) how to give (or how not to give) a presentation, (ii) understand the fine points of the subject, (iii) work with your peers, (iv) discover those areas of science and engineering that really interest you, and, maybe, (v) how to pick the brains of your lecturer so that you can improve.

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### Hint 3: E-mail etiquette

E-mail has become a means of mis-communication. A University instructor should not be sent an e-mail as you would to one of your peers. A University instructor should be treated as you would a potential employer. Thus, unless you are advised otherwise by the individual, be quite formal in your English expression and tone, use a spell checker and, above all, make sure that you do not ramble.

Students e-mail me for various reasons. The tone of some e-mails is lacking in professionalism.

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### Hint 4: Two important words for success: “Please”, “Thanks”

Expressing courtesy and gratitude, as well as smiling and not frowning, can go a long way to making “a connection” to your peers and University Instructors. Thus, you should demonstrate a sincere respect towards all individuals and this will often be reciprocated.

The same hint is valid in your professional life and interactions. Courtesy will go a long way to helping you do your job. It is sometimes quite difficult to be courteous under some environments and work situations; however, my advice is to try very hard so that your own standards of civility are not artificially lowered by others. Remember: People will always throw back at you the swearing and cursing rather than the situation and particular circumstances that created it.

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### Hint 5: Create a study group

The aim is, simply, to elevate the quality of the learning environment. You can each do this by learning off others in your course/subject. Find or form a group of colleagues who you get on with and organize a study group. The group could be from 3 to 5 people. Meet somewhere on campus in a professional setting (that is, not in a social context where you are “having a drink”); have a set agenda such as working through a certain book chapter or problem set; then have a regular meeting time so that you all get together for a few hours. You can use the study group to work through problems together and learn together. In your professional lives your study group will be an engineering team; thus, the skills that you learn during your formal university life will be quite rewarding throughout your professional careers.

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### Hint 6: The shoe is on the other foot

Just before you voice a complaint or a concern, you should do the following.

1. Test your concern off colleagues, for instance your study group, to make sure that you have not misunderstood the dynamics of the situation. It could be that you have made a simple error in judgment.
  2. Phrase your question in a simple, non-confrontational fashion and take note of using Hint #4.
  3. Be prepared to offer an appropriate solution if you are asked; that is, come prepared so that you have examined alternatives.
  4. Imagine how you would react if “the shoe was on the other foot”; that is if there was a role reversal in this specific situation.
- You will find, as I have, that this simple process helps you achieve the resolution of the concern that best suits your needs.

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### **Hint 7: Enjoy study: “Become infected: Infect others”**

Enjoy study, enjoy your work, and infect others with a positive approach within your professional sphere. You will find that things will happen more quickly and will less inertia.

I know that this sounds corny. However think about it and practice it; then your study and your future job will be so much easier.

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### **Hint 8: Avoid “the McDonald’s syndrome”**

At McDonald’s “you can have it your way every day”. Within your professional environment, for a large variety of reasons, this may not be possible. There are going to be times where your common sense does not fit in with a corporate culture or a particular manager’s way of doing business. You may never be able to change this; thus, do not spin your wheels by wasting energy and moving nowhere. Instead, use these energies to do your job as best and ethically possible.

Of course there are similar analogies with regard to your university live where you may not be able to get things going your way. My advice would be not to dwell on it, but to get on with the job of learning and understanding.

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### **Hint 9: The half live of an engineer is 4 years**

In other words, after 4-years you will probably be performing more management duties that hard core engineering. Thus, the so-called “soft skills” will become more dominant and be needed immediately after graduation.

You should work on all skills during your university career so that you can jump into action upon graduation as a more rounded professional.

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### **Hint 10: Join a professional society**

A Professional Society can be thought of as an extended study group (see Hint #5). You, or in many instances your company, will pay good money to join a society. The benefits are many.

You will (i) gain access to the most current information in your professional field, (ii) you will interact with your peers and managers, (iii) you will net work across many fields of engineering, and (iv) you will, potentially, find a new job when you think that it is time to move on.

In short, joining a Professional Society is like an insurance policy for your future.

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### **Hint 11: “You are how you talk”**

Let me explain. First impressions do count. Thus, if you come across as being ill-spoken, rude and full of expletives; then that is how you will be judged for a long time thereafter. Learn and practice good grammar in your spoken English (or French, or German etc.); say what you want to say and then keep quiet; let people finish their discussion without interruptions; and do not mimic the poor behavior of others who may be cursing and swearing. In other words, pay very careful attention to your behavior since that is what people will remember.

As an exercise try to quantify how many ‘uhms’, ‘errs’, ‘basicallys’, ‘you know what I means’ you say in your day-to-day discussions .. and then try to reduce them since then you have more clarity of thought.

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### **Hint 12: We all have bosses**

It might seem an obvious statement. The point is that it is best to listen and learn rather than get upset because of some action, process or thought. There may be an extra dimension of the discussion that you do not understand.

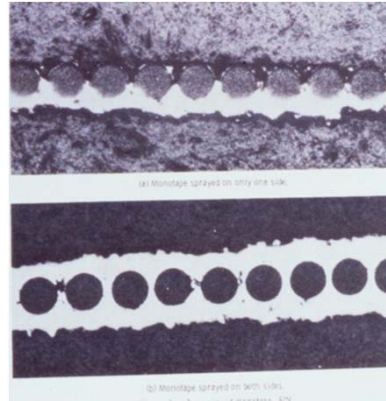
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## Example: Spray-Forming



Plasma spray-formed tubes,  
& composite structures.



Plasma spray formed  
fiber-reinforced  
"monotape" composites.

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Let's not forget how it all happens!

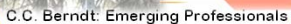


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**An individual needs to be continuously rewired and occasionally re-booted.**

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**The only future guarantee is  
adaptation to change.**

**Failing to adapt is at your own  
peril.**

**An individual needs to be  
continuously rewired and  
occasionally re-booted.**

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