

# **My Career & Some Advice for Industrial Engineers**

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IISE - Industry Advisory Board (IAB)

IISE - Puget Sound Chapter

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# My Professional Volunteer Activities

- **Institute of Industrial & Systems Engineers (IISE)**
  - IISE - Puget Sound Chapter - Past President
  - IISE - Industry Advisory Board (IAB)  
*(a group of 60 Sr. IEs & managers across the U.S.)*
  - IISE Fellow
  - IISE Annual Conference presenter - 14 different topics
  - IISE LinkedIn online discussions & mentoring
- **Puget Sound Engineering Council (PSEC) - Past Pres.**
  - Representatives from 22 local engineering Societies meet monthly
  - Several shared annual events: Mentor Nights at Community Colleges, K-12 Engineering Fair, Awards Banquet & Officers Workshop
- **University of Washington, ISE Department, volunteer**
  - Former, Executive Advisory Board member
  - Volunteer Mentor to ISE students

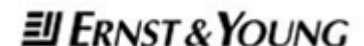


# My Education & Work History Summary

- B.S. in Industrial Engineering at Virginia Tech
- Co-op student (*7 work quarters while in college*)
- Much later - Consulting, Project, & Legal training

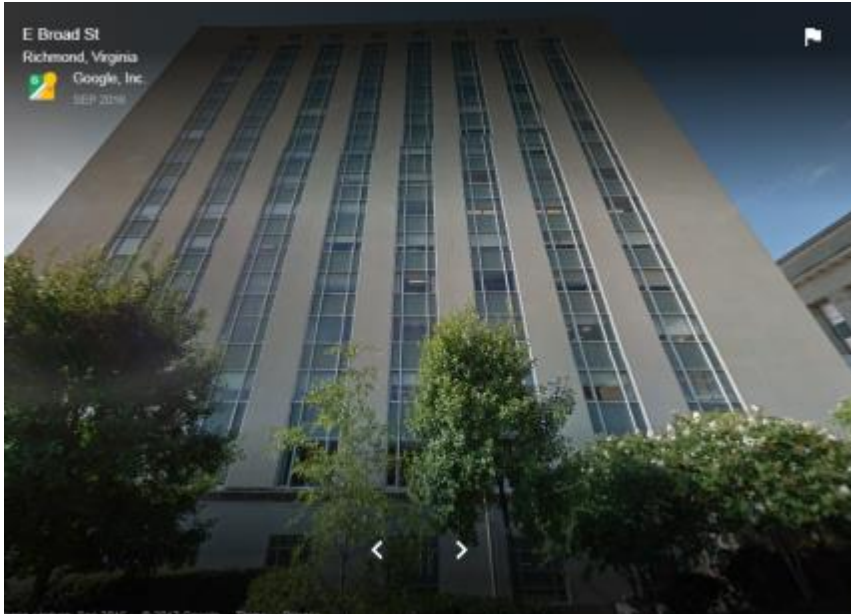


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- Summer Internship with Virginia Highway Dept.
  - Worked 5 yrs. as an Area Industrial Engineer (*following Co-op work with them while in college*)
  - Worked 12 yrs. as a Management Consultant
  - Worked 23 yrs. with the Boeing Co. as an IE-Special Projects Manager (*retired*) (*all twin-aisle airplanes: 747, 767, 777 & 787*)
- 



## Civil Engineering Internship at

- I did a Summer Internship following high school graduation
- I worked at the Virginia Highway Department, headquarters in downtown Richmond, Virginia
- This is the road-design portion of the Virginia Department of Transportation (VDOT)
- I was a Civil Engineer - trainee, working on preliminary routes of a new Interstate Highway to be built near Arlington, VA
- I was part of a Preliminary Engineering group, doing “cut & fill” cost calculations from road profiles, using detailed contour drawings, to determine the best route for a new road
- I worked under degreed Civil Engineers
- I enjoyed the work, and the Preliminary Engineering group, but decided not to pursue Civil Engineering at Virginia Tech
- During the Summer, I toured all the engineering departments at Virginia Tech (as part of an orientation) and chose Industrial Engineering as my major



# Co-op Industrial Engineering work at



- Starting the 3<sup>rd</sup> quarter of my freshman year at Virginia Tech, I started work as an Industrial Engineer - trainee with Reynolds Aluminum Co. (co-op program)
- I worked 7 work quarters with them (every Spring & Fall quarter), up until the start of my senior year
- It adds an extra year to graduate, and with my work schedule I attended school Winter & Summer quarters at VA Tech
- My first Co-op work session was at the company headquarters office building in Richmond, Virginia
- My next work sessions were at the foil printing plant, foil rolling plant, Reynolds Wrap plant, packaging plant, extrusion plant, and finally back at the headquarters office building
- I mainly worked on facility planning projects, that the senior IEs had identified but didn't have time to work
- I had great Mentors during my Co-op work, since the IEs & managers wanted their projects and me to be successful

# Area Industrial Engineering work at



- Reynolds Metals (Reynolds Aluminum) Company was the same company where I had been a Co-op student
- When I graduated from Virginia Tech, they let me select from several of their U.S. production sites & they gave me 4 weeks of vacation (they counted my start date back in college)
- I chose one of their larger plants in Northwest Alabama
- I had Area IE responsibility for Ingot Heating Pits, Hot Rolling Mills, Annealing Ovens, & Cold Rolling Mills
- I worked with several other IEs on process improvement & cost reduction projects/assignments
- I volunteered to coordinate all annual replacement Mobile Equipment purchases (all forklifts & battery charging equipment) – and really enjoyed the site-wide assignment
- I had great Mentors & Coaches during my Area IE work
- I stayed with Reynolds Aluminum Co. for 5 years





# Management Consulting Work at

ATKearney

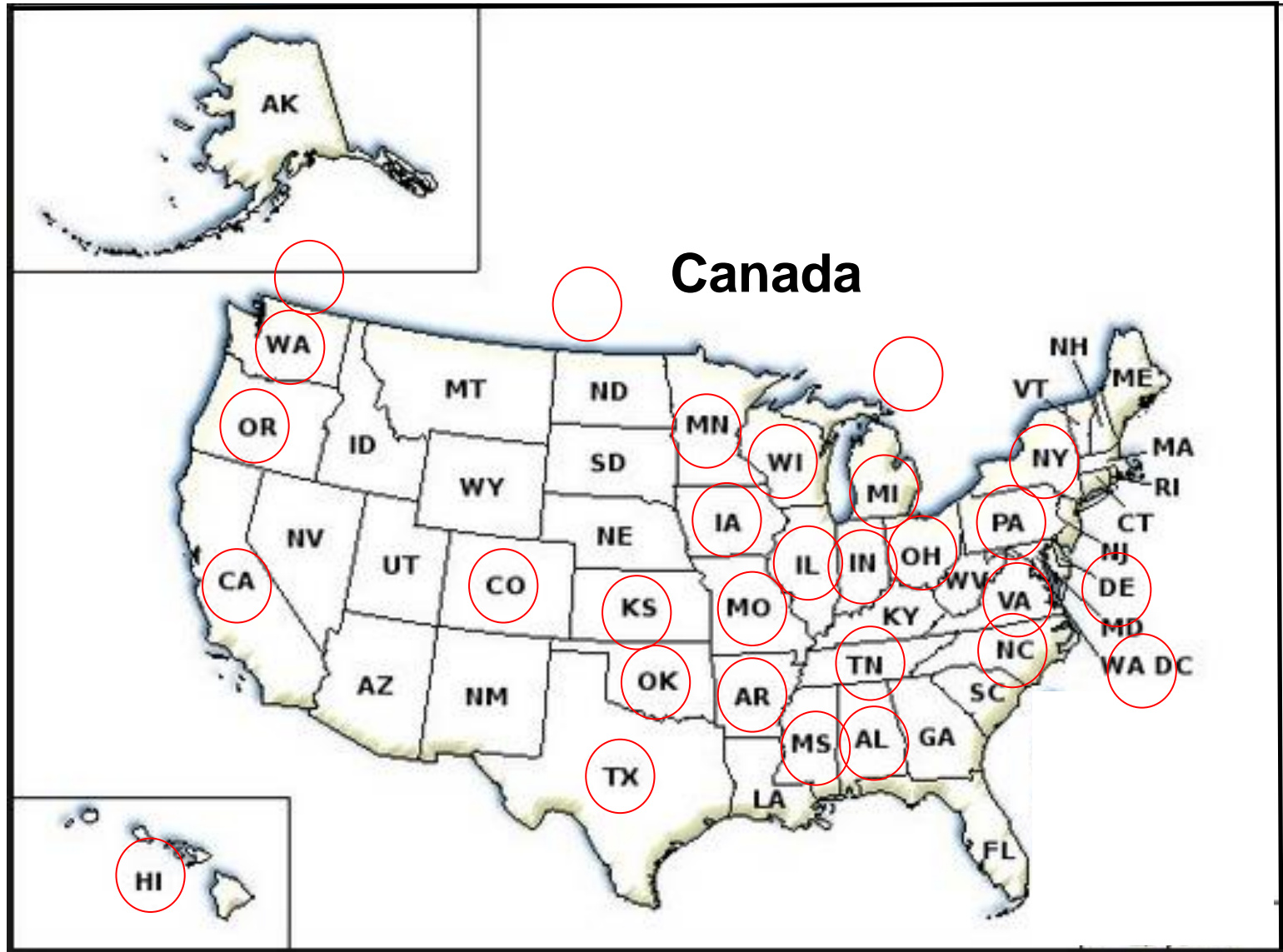
- I worked 12 yrs. as a Management Consultant, based out of Chicago, San Francisco, & Vancouver, Canada in 17 different industries
- I worked on Production & Operations Consulting Projects in 25 states & Canada (*visited all 50 states*)
- Eventually, I led small cross-functional Consulting Teams, on various length assignments, from 3 weeks to 6 months
- Most work was done on-site, in a variety of different Industries
- I led several Recovery/Turn Around projects for companies or divisions in severe financial trouble
- The work was challenging & very satisfying
- There was extensive travel, and long work hours
- I had great Mentors & Coaches early in my Consulting Career
- I started doing professional IISE activities while working as a Management Consultant

 ERNST & YOUNG  
&  
**Independent  
Contractor**

# I've worked in 17 different industries

- Airplane Assembly
- Aluminum Production
- Construction
- Consulting (Engineering & Management)
- Electronics Assembly
- Explosives Manufacturing
- Food Production
- Forestry & Tree Planting
- Large Equipment Production
- Materials Testing
- Military & Department of Defense
- Plastics & Forming
- Shipbuilding & Repair
- State, Federal & Provincial Government
- Transportation
- Utilities (electric & gas)
- Warehousing

# ○ I've worked in 25 States & Canada



I've visited all 50 states & most Canadian provinces.

# Some of my Strangest Management Consulting Assignments

- Consulting for a **Food & Stores Contractor at a remote Helicopter-Logging operation in Northern British Columbia**
- Consulting for **Tree Crushing & re-planting operations on the Oklahoma/Arkansas border** (combined settings area, covered over a 100 square miles)
- Part of a Chemical Engineering Consulting **Team designing a new HMX/RDX & C4 explosives manufacturing plant** for DOD (Dept. Of Defense), with no site at the time
- Determining the best location for a **new Maintenance building to service large Portal Cranes, at Pearl Harbor Naval Shipyard, Hawaii**
- Contracts advising for a **Saturation, Deep Water Diving contractor** (it also involved marine vessel support)
- **An acquisition study for a Tree Farms Co-Operative.** All 30 farm owners were at the final presentation, and made a group decision 10 min. after we finished talking (they didn't meet often)

# One of my Best Consulting Assignments

- ❖ I was consulting with an **Environmental Engineering & Construction Div. that was in severe financial trouble.**
- ❖ A Div. of a much larger company; they had been losing large amounts of money for 5 years (many of the engineers at the division did not know this; the financials had not been shared with them, until I showed up).
- ❖ The entire Div. was targeted for elimination, if a turn-around could not be accomplished soon.
- ❖ After considerable research & investigation on-site, I determined the main problem was how they wrote & bid on contracts to design & build large city water sanitation systems (sewage plants).
- ❖ They were a great civil engineering firm, doing terrific design work – but they had a bad history of not writing risk-avoidance contracts.
- ❖ I worked with them to develop a completely new, in-house method of researching & writing contracts – based on an in-depth analysis of all projects they had lost money on over the last 10 years.
- ❖ With my help, they also created a new, in-house Contracts team.
- ❖ Within 6 months they were no longer losing money; and within a year, they had made back everything lost over the last 5 yrs.

# BCA - Boeing Commercial Airplanes



**Commercial Airplanes - Military Aircraft & Missiles - Space & Communications - Air Traffic Management - Boeing Capital Corporation - Shared Services Group - Phantom Works**

## BDS - Boeing Defense & Space

## IE Special Projects Work at

- I worked 23 yrs. with the Boeing Co. - Commercial Airplanes Div. as an Industrial Engineer - Special Projects Manager at Everett, Washington (I retired on August, 2012)
- I supported the assembly of all twin-aisle airplanes: 747, 767, 777 & 787
- I managed small teams working on Process Improvement, Root Cause Analysis, & Lean Manufacturing projects
- I sometimes worked “*up stream*” from Production with Design Engineering groups and Supply Management groups (including going on-site to Suppliers to resolve delivery problems)
- We used a Project Management approach for all projects
- I was a Projects Coach for newer Industrial Engineers
- I used the internal Training presentations I prepared, to be a speaker (or co-speaker) at twelve IISE Annual Conferences
- I also worked on several company-wide Team assignments and visited several of the U.S. Boeing locations

# Boeing U.S. Sites with IEs





# Everett, Wash. factory building



# 747 Airplane in Final Assembly & Final Body Join positions



# 767 Airplane in Final Assembly & Systems Installation positions



# 777 Airplane in Final Assembly & Systems Installation positions



# 787 Airplane in Final Assembly



# Special modified 747 – Dreamlifters (4) (carries large 787 fuselage sections & wings)



Interior - looking aft



Uses special equipment for removing & transporting large 787 fuselage sections



# Everett Field Operations



# Everett Field Operations





# Everett Field Operations



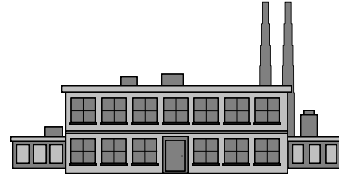
# Types of IE Projects

## Project Management



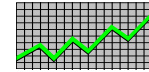
- Project Planning
- Project Scheduling
- Projects Coaching
- Risk Assessment

## Factory Operations



- Production Scheduling
- Lean Manufacturing
- Systems Integration

## Quality



- Chronic Rework
- Supplier Quality

## Production Control



- Product Mix Analysis
- Forecasting
- Constraints Analysis

## Material/Parts



- Supplier On-Site Visits
- Supply Chain Management
- Parts Storage & Movement

## Facilities



- Layout Design
- Process Flow Analysis

## Product Engineering



- Integrated Product Teams
- Product Development
- Product Costing

## Costing



- Comparison of Alternatives
- Cost & Savings Estimating

## Safety



- Safety Investigations
- Ergonomic Evaluations
- Mitigations

## Tooling



- Machine Capacity
- Tool Usage
- Tool Certifications

## Transportation



- Logistics Planning
- Material Handling
- Alternative Methods

## Training



- Training Presentations
- Course Scheduling

## Some of my **BOEING** Projects

- Worked with **Engineering Design & Supply Management** on initial **747-8 Flight Test “Discovery”** that created changes for Field & Factory installations – **for new entry-into-service airplanes.**
- Worked with **747 Design Engineering’s - Integrated Product Teams (IPTs)** of Mechanical, Electrical & Aerospace engineers **on factory impact savings estimates.**
- Part of a **Non-Advocate Review (NAR) special team** for a **787 Vertical Fin painting proposal.** Revised process, equipment & facility plans.
- Participated on & led several **Supplier on-site visits (“Tiger Teams”)** with **Supply Management and others;** focusing on Supplier’s production capability & production control procedures, to resolve critical delivery problems to airplane assembly Production.
- Prepared **Project Management techniques presentations** for newer IEs. Several presentations were used at IISE Annual Conferences.

## Some of my **BOEING** Projects *(continued)*

- Conducted a **study & full implementation of an Everett site-wide Certified-Tools process** including: review of all Cert Lab processes, Tool Room procedures, and Portable & Small Tool Repair. Goal was to extend the certification life of all hand tools. Also was an FAA compliance issue.
- 747, 767 & 777 Parts Control Areas (PCAs) **Ergonomic reviews & mitigations of all parts handlers' work.**
- **Material Handling of 747 & 767 bulk commodities (very large) parts flows**, for engines, landing gear, doors, flaps, radomes, stowbins, galleys, lavs, & curved aluminum panels. Analysis included: parts staging & delivery, outside and inside forklift bulk commodities movements, return of shipping tools, and overhead crane scheduling improvements. Introduced more Just-in-Time deliveries and Point-of-Use staging.

## One of my best **BOEING** Projects

- My last 2 years at Boeing, I worked with a **company-wide team of Senior Industrial Engineers, doing “*knowledge capture*” activities.**
- This eventually led to the development of Boeing’s IE - “Virtual University”, a special in-house website that captured over 3,000 documents & presentations (many newly created for this activity).
- I was the “Chair” of the Project Management department, 1 of 14 “departments” representing the functional areas IEs work in at Boeing.
- I was also a “faculty” member of the External Technical Affiliations (ETA) department (due to my active involvement with IISE & PSEC).
- The group of 14 Dept. Chairs was made up of all volunteers, who had been approached by Senior Management, based on their knowledge of one or more of the broad topics chosen to represent a department for the Virtual University development.
- The Dept. Chairs met “virtually”, every 2 weeks (via WebEx); and met “physically”, every 6 months at any of the 20 main Boeing U.S. sites.
- Over 1,600 Industrial Engineers within the company (Commercial and Defense & Space Div.) became users of the new informational website.

# My Retirement

- I retired in 2012 and have really enjoyed my Retirement activities:
  - ✓ Occasional lunches with former Boeing co-workers
  - ✓ Volunteer activities with several engineering Societies
  - ✓ Mentoring of engineering students & young professionals
  - ✓ Presenting at IISE Annual Conferences
  - ✓ “Road trips” to National & State Parks
  - ✓ Visiting relatives (in 6 East Coast states)
  - ✓ Doing some fun writing

# **Some Summary Comments on my Overall Career**

- I really enjoyed working as an Industrial & Systems Engineer and as a Management Consultant (both External & Internal).
- My Virginia Tech education and my early Co-op work provided a great start to my professional career.
- Having great Mentors throughout my career has been very helpful.
- Project Management Techniques with small Teams is a great way to get things done, and the work is fun & interesting.
- Personal Computers, software, file servers, the Internet, WebEx meetings, and email have really aided my engineering work.
- Volunteering with professional Societies is very rewarding, as is Mentoring engineering students & young professionals.
- Giving presentations at Professional Conferences is a good way to meet other engineers, and exchange work experiences.

# **Some Career Advice for Students**

1. Interview well for all jobs you take; and work for companies that you admire.
2. Get as much experience and knowledge as you can from each company & each position you hold.
3. Learn the company's products & the product build-sequence (if applicable).
4. Develop a "network" of useful contacts.
5. Volunteer for a new assignment at least once each year.
6. Develop a good Attitude and be a good Team player.



# **Some Career Advice for Students**

(continued)

7. Find a few Mentors & Coaches, and follow their advice, but only if it works for you.
8. Join a professional Society like IISE, volunteer, and try to attend professional Conferences often.
9. Practice life-time learning to stay current in your field.
10. Enjoy your Career as it unfolds; make a Career Plan & update it periodically.
11. Give back to your University & the ISE Dept.
12. Later in your Career, be a Mentor.

***“Life is a Journey, not a Destination.”***

***- Ralph Waldo Emerson***