Design Process: Gathering Information

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Overview

- How to gather information
- Identifying necessary information
- Types of design information
- Sources of design information
- Final Comments

How to Gather Information

Identify Necessary Information
What do we need to know?

Now that we know something, what else do we need to know?

Gather Information
Handbooks, Patents, Internet, etc.

Analyze, Categorize, Summarize
Write it up

Identifying Necessary Information

Identifying necessary information starts by asking the right questions.

- What is our application? What do we need to know about this application?

- How is this problem or similar problem solved today? What are the current designs? What is the state-of-the-art? What are the materials that are used for these applications (why)?

- What is unique about our problem?

Design Project Example

Problem Statement: *Design a rapid screening method, to be used by ATI Specialty Metals, for Inconel 718 connection bolts used in sub-sea oil and gas applications to prevent premature environmentally assisted fracture.*

Questions:

- Who is ATI? What do they do?
- What is Inconel 718?
  - Typical applications, properties, physical metallurgy, processing conditions
- What is environmentally assisted fracture?
  - What are the current testing methods?
- What is the nature of common failures and incidence rate?
- Existing specifications?
- Others?

Types of Design Information

Types of Information (the big ones):

- Customer
  - What do they do?
  - What do they need?
- Existing/Related Solutions/Products
  - What is the state-of-the-art?
  - What materials are currently used?
  - What are the performance/ environment requirements?
- Cost Information
  - Process, materials, etc.
- Applicable standards
  - Are there related ASTM or ISO standards?

TABLE 5.1
Types of Design Information

Customer
Surveys and feedback
Marketing data
Related designs
Specs and drawings for previous versions of the product
Similar designs of competitors (reverse engineering)
Analysis methods
Technical reports
Specialized computer programs, for example, finite element analysis
Materials
Performance in past designs (failure analysis)
Properties
Manufacturing
Capability of processes
Capacity analysis
Manufacturing sources
Assembly methods
Cost
Cost history
Current material and manufacturing costs
Standard components
Availability and quality of vendors
Size and technical data
Technical standards
ISO
ASTM
Company specific
Governmental regulations
Performance based
Safety
Life cycle issues
Maintenance/service feedback
Reliability/quality data
Warranty data

Information Sources

The big ones:

- Search engine (e.g. google)
- Technical Journals
  - Web of science
  - Google scholar
- Industry/Engineering handbooks
  - ASM Metals Handbook
  - Heat treaters guide
- Patent Search
  - Google Patent
  - USPTO
- Customer feedback
- Personal Network!!
  - Colleagues, co-workers, faculty, etc.

TABLE 5.2
Sources of Information Pertinent to Engineering Design

Libraries	
	Dictionaries and encyclopedias
	Engineering handbooks
	Texts and monographs
	Periodicals (technical journals and magazines, and newspapers)
Internet	
	A massive depository of information. See Sec. 5.6 for more detail.
Government	
	Technical reports
	Databases
	Search engines
	Laws and regulations
Engineering professional societies and trade associations	
	Technical journals and news magazines
	Technical conference proceedings
	Codes and standards, in some cases
Intellectual property	
	Patents, both national and international
	Copyrights
	Trademarks
Personal activities	
	Buildup of knowledge through work experience and study
	Contacts with colleagues
	Personal network of professionals
	Contacts with suppliers and vendors
	Contacts with consultants
	Attendance at conferences, trade shows, exhibitions
	Visits to other companies
Customers	
	Direct involvement
	Surveys
	Feedback from warranty payments and returned products

Journal Article Electronic Databases

TABLE 5.3
Common Databases for Electronic Access to Engineering Abstracts and Indexes

Name	Description
Academic Search Premier	Abstracts and indexing for over 7000 journals. Many full text.
Aerospace Database	Indexes journals, conferences, reports by AIAA, IEEE, ASME.
Applied Science & Technology	Includes buyers guides, conf. proceedings. Most applied of group.
ASCE Database	All American Society of Civil Engineers documents.
Compendex	Electronic replacement for Engineering Index.
Engineered Materials	Covers polymers, ceramics, composites.
General Science Abstracts	Coverage of 265 leading journals in U.S. and UK.
INSPEC	Covers 4000 journals in physics, EE, computing and info. techn.
Mechanical Engineering	Covers 730 journals and magazines.
METADEX	Covers metallurgy and materials science.
Safety Science and Risk	Abstracts from 1579 periodicals.
Science Citation Index (Web of Science)	Covers 5700 journals in 164 science and technology disciplines.
Science Direct	Coverage of 1800 journals; full text for 800.

Finding Literature On Campus

- http://www.sdsmt.edu/Academics/Library/Resources/ElectronicResources/
- Web of Science
  - Search for journal articles
- Knovel
  - ASM Metals Handbook (23 volumes!!)
  - Heat treaters guide (ferrous and non-ferrous)
- Interlibrary Loan
  - http://www.sdsmt.edu/Academics/Library/Interlibrary-Loan---Request-Delivery/

Summarizing Information

What To Do

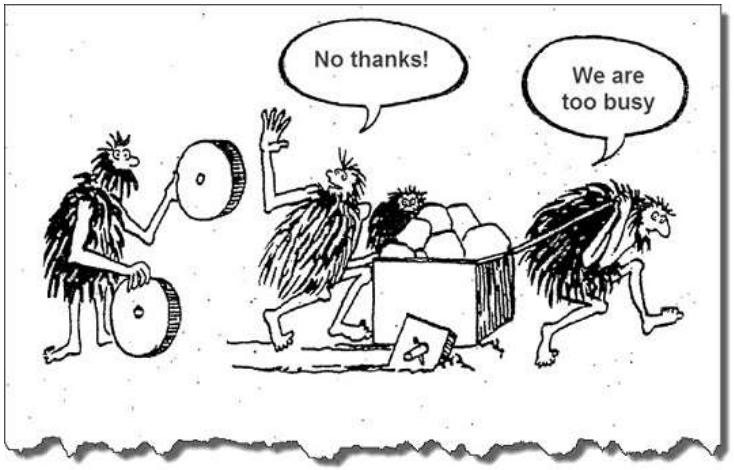
1. Organize your information and make an outline
2. Create a bibliography (reference list)
3. Write a concise summary for each topic in your outline using various resources you have gathered.
4. Reference your summary within the text.

What **Not** To Do

1. Write a series of paragraphs/sections that summarize information from a single reference source.
    1. Information is not organized and is not useful or informative.

Final Comments

- Look before you leap
- Don’t reinvent the wheel



- Don’t waste time – search smart
- Take notes – and make sure to summarize them
- Communicate your new knowledge with your team!!