Careers in HVAC&R and Updates on ASHRAE

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Aug 2015
Contents

• Introduction
• Careers in HVAC&R
• About ASHRAE
• ASHRAE Publications
• Recent Developments
Introduction

• What is HVAC&R?
  • HVACR is an acronym or abbreviation for the products and services related to the functions of:
    • **Heating**
    • **Ventilation**
    • **Air-Conditioning**
    • **Refrigeration**
Introduction

• **HVACR** involves a lot more than just temperature…

• It impacts:
  • The indoor air that we breathe
  • Moisture levels & potential mold growth
  • The amount of energy used and money it costs to cool or heat buildings and indoor environment
  • **Our health and comfort!**
Introduction

• Applications of HVAC&R:
  • Industrial sector
    • e.g. textile mills, electronics, pharmaceutical
  • Commercial sector
    • e.g. offices, hotels, retails
  • Residential sector
    • e.g. apartments, houses
  • Transport sector
    • e.g. aircrafts, buses, private cars, trains
Check the air-conditioner at your home.

See also: “How Air Conditioners Work” (1:07) [http://youtu.be/nKZ2DPvvua8](http://youtu.be/nKZ2DPvvua8)

(Source: www.howstuffworks.com/ac.htm)
The HVACR industry is critical to ensuring human comfort, preserving food supplies, medical/research processes, energy efficiency and environmental sustainability.

(Source: http://www.careersinhvacr.org/)
Introduction

- HVAC&R industry’s major roles:
  - Equipment manufacturing
  - Sales and marketing
  - Distribution
  - System design
  - Construction
  - Operation and maintenance
  - Education and research
Careers in HVAC&R

- **HVAC&R Engineers and Technicians**
  - Job duties include design, installation, maintenance, and repair of HVAC&R systems
  - For residential, industrial, institutional, and commercial buildings, including schools, office buildings, and health care facilities
  - Design new systems or find solutions for existing system problems
  - Can work for consulting/design firms, contractors, government agencies, utilities, facilities offices, or equipment sales offices
Careers in HVAC&R

- Videos:
  - Careers in the HVACR and Water Heating Industry (2:40)
    www.youtube.com/watch?v=crMPmGUNgsY
  - Choose a Career in the HVACR Industry (1:29)
    www.youtube.com/watch?v=bFDkDYpjx8
Careers in HVAC&R

- **Required education:**
  - **Entry-level HVAC&R Engineer jobs**
    - A bachelor degree in HVAC&R, mechanical engineering, building services engineering, or architectural engineering
  - **Technician jobs**
    - A higher diploma, diploma or associate degree in relevant engineering technologies
  - **Apprenticeship**
    - Vocational technical training
Careers in HVAC&R

- Skills required:
  - Problem solving
  - Attention to detail
  - Integrity and dependability
  - Mechanical aptitude
  - Computer and technology
  - CAD software
  - Communication skills
  - Concern for the environment
Careers in HVAC&R

People who enjoy the following should investigate a career in HVAC&R:

- Figuring out how things work
- Working with their hands or with tools
- Diagnosing & solving problems
- Using computers & technology
- Working independently
Updates on ASHRAE

Shaping Tomorrow’s Built Environment Today
About ASHRAE

- **ASHRAE** = American Society of Heating, Refrigerating and Air-Conditioning Engineers
- Founded in 1894, a global society advancing human well-being through sustainable technology for the built environment
- Focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability

About ASHRAE

- 2012 ASHRAE Rebranding:
  - A refreshed logo
  - A new tagline (*Shaping Tomorrow’s Built Environment Today*)
  - A change to using only its acronym

(Logo created in 1959)  (Refreshed logo 2012)
About ASHRAE

• What Makes Us Different
  • Technical foundation built by *volunteer* members
  • One of few HVAC&R organizations in world with own *research* program
  • Encourages *participation* from people all over the world

• Power of Chapters

  ASHRAE can share the knowledge by bringing members together via chapters --- to build the community of HVAC&R
About ASHRAE

- Nine Chapters in ASHRAE Region XIII:
  - Hong Kong
  - Indonesia
  - Japan
  - Malaysia
  - Philippines
  - Singapore
  - South Korea
  - Taiwan
  - Thailand

ASHRAE Publications

- ASHRAE Handbooks (four volumes, one of them is updated each year)
  - Fundamentals
  - HVAC Applications
  - HVAC Systems and Equipment
  - Refrigeration
- Now in different versions:
  - Printed
  - CD and online
Important ASHRAE Standards (latest update)

- 15-2013, Safety Standard for Refrigeration Systems
- 55-2013, Thermal Environmental Conditions for Human Occupancy
- 62.1-2013, Ventilation for Acceptable Indoor Air Quality
- 100-2015, Energy Conservation in Existing Buildings
- 170-2013, Ventilation of Health Care Facilities
- 203-2014, Commissioning Process for Buildings and Systems
ASHRAE Publications

• Guidelines
  • 0-2013, The Commissioning Process
  • 4-2008 (RA 2013), Preparation of Operating and Maintenance Documentation for Building Systems
  • 13-2015, Specifying Direct Digital Control Systems
  • 14-2014, Measurement of Energy and Demand Savings
  • 32-2012, Sustainable High Performance Operation and Maintenance

• Magazines and Research Journal
  • ASHRAE Journal
  • High Performance Building (HPB) Magazine [www.hpbmagazine.org](http://www.hpbmagazine.org)
  • Science and Technology for the Built Environment (formerly HVAC&R Research), ASHRAE’s journal of archival research
ASHRAE Publications

- Design Guides/Manuals (latest ones)
  - Data Center Design and Operation: ASHRAE Datacom Series
  - District Cooling and Heating Guides, 2013
  - Energy Efficiency Guides for Existing Commercial Buildings, 2012
  - HVAC Design Manual for Hospitals and Clinics (2nd ed.), 2013
  - UFAD Guide (2nd ed.), 2013
ASHRAE guide books
ASHRAE Publications

- Free resources, such as:
  - Advanced Energy Design Guides
    - [www.ashrae.org/freeaedg](http://www.ashrae.org/freeaedg)
  - Indoor Air Quality Guide
    - [www.ashrae.org/FreeIAQGuidance](http://www.ashrae.org/FreeIAQGuidance)
  - Refrigeration Commissioning Guide
    - [www.ashrae.org/freeRefCxGuidance](http://www.ashrae.org/freeRefCxGuidance)
  - Procedures for Commercial Building Energy Audits
    - [www.ashrae.org/pceba](http://www.ashrae.org/pceba)
  - ASHRAE Green Standard 189.1
    - [www.ashrae.org/greenstandard](http://www.ashrae.org/greenstandard)
Recent Developments

- Indoor Air Quality Association (IAQA [www.iaqa.org](http://www.iaqa.org)) has become part of ASHRAE, while maintaining own brand and Board of Directors
- To join forces, combining resources to improve IAQ and to strengthen programs and services of both organizations
Recent Developments

- ASHRAE’s Building Energy Labeling Program, bEQ
  - As Designed
  - In Operation
- Information
  - bEQ Workbook
  - bEQ Certificate
  - bEQ Dashboard
  - bEQ Plaques

(* Further information: www.buildingenergyquotient.org)
ASHRAE 90.1 (building energy standard) compliance approaches
[New version 90.1-2016 will come soon]

Mandatory Provisions
(required for most compliance options)

Building System
- Envelope
- HVAC
- SWH
- Power
- Lighting
- Other

Compliance Options
- Prescriptive Option
- Trade Off Option
- Energy Cost Budget
- Simplified

Energy Code Compliance

(Source: US Department of Energy)
History of ASHRAE Standard 62.1 (indoor air quality)

62-1981
- Alternative Indoor Air Quality Procedure

62-1973
...first issued

62-1989
- Removed Thermal Comfort
- Ventilation Rate Procedure
- IAQ Procedure

62-1999
- IAQ-Health disclaimers
- Smoking disclaimers
- Clarified CO₂ for use as a ventilation metric

62-2001
- Prescriptive
- Commissioning
- O&M
- Combustion air
- Filtration

62.1-2007
...updates every 3 yrs

62.1-2010

62.1-2013


62.1-2004
- Commercial and high-rise residential
- Enforceable code language
- ETS ventilation rates not covered
- Ventilation Rate Procedure modified
- Occupant and area ventilation rates

(Source: ASHRAE)