Presentation To RICOWI
This information has been provided by ISANTA – International Staple, Nail & Tool Association.

ISANTA members are industry leaders in power fastening tools and fasteners.

For additional information regarding ISANTA please visit www.isanta.org or send an email to info@isanta.org.
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Nails 101
If you are involved in building design, construction or inspection you have no doubt been involved with nails. But what do you really know about a nail?

This presentation will cover some of the basic aspects of nails, applications and some of the terminology you may have experienced in the industry.
What is a nail?

By definition – a straight, slender fastener, usually pointed and headed; typically 6 inches or less in length; designed to be driven; to hold two or more pieces together or to act as support.

Most nails made today are formed from wire
Nails consist of 3 basic components

- The Head
- The Shank
- The Point
Before getting into the specifics regarding nails let’s explore where they are referenced in the various Codes and Standards
There are various standards and codes that reference nails and staples. Among the more prominent are:

- **American Wood Council's National Design Specification for Wood Construction**
- **American Wood Council's Special Design Provisions for Wind and Seismic**
- **International Building Code**
- **International Residential Code**
- **American Wood Council’s Wood Frame Construction Design Manual for One-and Two Family Dwellings**
- **Standard Specification for Driven Fasteners: Nails, Spikes, and Staples**

For more information, visit <www.isanta.org>.
ASTM F1667 provides specifications regarding such subjects as:

- **Terminology**
- **Dimensions and tolerances for**
  - nail heads
  - nail shanks
- **Materials of fabrication**
  - steel
  - stainless steel
  - copper
  - etc.
- **Coatings**
  - hot dip galvanized
  - electrogalvanized
  - coated
  - etc.
- **Mechanical properties**
  - bending yield strength
  - ductility
- **Packaging requirements & labeling**
The NDS provides industry specifications including but not limited to

- Terminology for use of fasteners (e.g. edge distance, spacing, etc.)
  - Reference nail withdrawal values
    - Reference lateral design values
      - Adjustments for Reference Design Values
SDPWS provides industry specifications including but not limited to:

- Design and construction requirements for diaphragms (roofs and floor) and shear walls
  - Shear capacities for diaphragms
  - Shear capacities for shear walls
The WFCM provides industry specifications including but not limited to

- Reference to material standards and definitions
  - Engineering Design for
    - Connections
    - Floor Systems
    - Wall System
    - Roof System
  - Prescriptive Design for
    - Connections
    - Floor Systems
    - Wall System
    - Roof System
The list is long and prominent
Within the 2015 IBC

Chapter 15 Roof Assemblies and Rooftop Structures “nails” are mentioned 17 times.

Chapter 23 Wood
“nails” are mentioned over 100 times
“staples” are mentioned 80 times

Within the 2015 IRC

there are 100+ references to nail
20+ references to staples
Nails 101.a

Components of a Nail
The Nail Head

- Full Round
- Offset Round
- D-Head
- Notched Head

Typical head configurations used in construction and in particular with power tools.

There are other types such as finish, brad, umbrella, washered, etc.
The Nail Head

- Full Round
- Offset Round
- D-Head
- Notched Head

Driven by a hammer or specific power tools (nailers)

These styles are intended for use in power tools (nailers) and are collated to maximize the number of nail per pack and use in the particular type of tool for the job
Nail Construction

The head if formed in the tooling when the end of the wire is struck with a device appropriately name a “hammer” which cause the material to cold flow into cavity of the tooling forming the head.

It should be noted that there are limitations in forming the head.

The material will only consistently flow so far.

And the applied force to form a head is limited or else premature tool wear takes place.
Typical Nail Shanks

Smooth  Ring  Screw  Barbed
Smooth Shank Nails

Smooth shanks are the result of forming round wire into a nail.

A feature to note on the shank is the gripper marks below the nail head.

The wire is firmly gripped to hold in place during the forming of the nail creating this feature on the shank.

Gripper marks are not a “performance” enhancing feature of a nail.
Nail Construction

Ring Shank Nails are created by special machinery and tooling that deform the smooth shank after the nail is formed.

The material of the shank is compressed and rolled. This forms the root diameter. The design of the tool then allows the material compressed into the root to flow out to form the crest diameter.

The difference between the nominal shank diameter and the crest diameter is referred to as ring growth.

The spacing between the rings (P) is the pitch and is referenced as rings per inch (rpi).
Nail Construction

Screw Shank Nails (sometimes known as twist shanks) are created by compressing and twisting.

Like the ring shank nail, there will be growth on the crest of the twist as material is moved out of the root area.
Diamond
A diamond point is a 4-sided taper. In high quality nails, each of the 4 tapers are equal and free from burrs and defects. The tip of the point may be blunted or flattened.

Needle
A needle point is a conical shaped point that comes to a sharp tip.

Blunt or No
A blunt point, flat or no point is one that is flattened at the tip.
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