



New Research on the Role of Firebrands in Home Ignitions

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Topics: WUI

One of the biggest threats to homes in WUI fires is firebrands. Lofting onto shingles or floating into eaves, firebrands smolder before setting their resting place ablaze. More intrusive firebrands can drift through gable vents or down chimneys and ignite the home from within, resulting in new firebrands, which are a threat to nearby structures.

Since 2008, the National Institute of Standards and Technology (NIST) has been conducting research to discover when, how, and how often embers start fires after they land.

Some of their findings have overturned a number of existing myths about wildfires:

- 6 millimeter (1/4-inch) wire mesh, when used to cover outside vents, as required by code, keeps embers out. NIST found that mesh with 6mm holes actually allowed many embers to slip through and easily ignite building materials placed behind the vents. Safety was improved with 1mm mesh (1/25 inch). While firebrands smoldered and passed through the mesh, building materials placed behind the vents no longer ignited.
- Firebrands cool too quickly to ignite a ceramic-tile roof. In NIST's tests, firebrands actually blew under newly laid tiles, then scorched through the underlying insulating tar paper and ignited the sheathing material. The situation was worse with aging tiles, whose gaps often trap materials that increase the fire risk.
- Most WUI house fires are sparked by a single rogue firebrand. The NIST found that most house fires erupt from an accumulation of glowing firebrands.

Attempts to model the effects of wildfires of different housing materials have always been hindered by the variability of key elements, such as leaves in gutters, dry needles under roofs, and smoldering embers in wooden joints. To address these challenges, fire researchers needed a controlled way to study firebrand-ignited house blazes.

Working with international partners at Japan's Building Research Institute, NIST's Engineering Laboratory hatched the NIST Firebrand Generator. Referred to as "The Dragon," this 6-foot-tall, stainless-steel, fire-breathing stovepipe burns evergreen wood chips and releases smoldering firebrands."The Dragon" has now been tested on a range of full-scale housing components, including gutters, siding, eaves, walls, vents, and roofs



The NIST Dragon (left) breathes smoldering firebrands (center, time-release photo) toward a wood board at a precisely controlled rate. As a ceramic-tile roof ages (right), it collects debris. Once ignited, the debris can set tiles aflame. Credit: NIST

Together, these small and large-scale findings will eventually lay the scientific foundation for new standards that will lead to more ember-resistant materials, treatments, barriers, and designs.

The firebrand research has sparked interest from home insurers — the Insurance Institute for Business & Home Safety (IBHS) cloned the NIST Dragon to rain firebrands in its own testing facility.

Researchers at NIST in Maryland are developing standard test methods and refining them as new materials, designs, and construction techniques are evaluated. For homeowners in the WUI, firebrand research holds material and invaluable importance. Incorporation of materials that meet the standards established by the firebrand testing could lead to reduced insurance premiums for homeowners that adopt them and also greater assurance that the flame-retardant materials and add-ons will protect them and their property better.

"For the first time, we can determine the vulnerabilities that cause homes to ignite from firebrand showers," says Sam Manzello, a mechanical engineer in the NIST lab's Fire Measurements Group and visiting researcher at Japan's Building Research Institute. "This allows us to develop cost-effective fire protection codes and standards based on science, not on mere guesswork as it was in the past."

Source: Materials provided by US Department of Homeland Security - Science and Technology

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