



Dan Farabaugh calibrating the sensors before beginning the tests.



Roof Huggers in place on an old roof.



New panels being installed over Roof Huggers on an old roof (above).

# NO DOUBT



Dale Nelson, president of Roof Hugger (left), with Red McConnohie, the product's inventor.

## Testing Confirms Significant Secondary Benefit Of Using Innovative Sub-purlin System To Facilitate Adding New Metal Roofs Over The Top Of Old

By D.V. "Red Mc-1" McConnohie, Inventor/Director Roof Hugger, Inc.

Adding additional dead loads to an existing roof support structure has been and continues to be a legitimate and prime concern of architects, engineers, specifiers and roof consultants whose professional careers are on-the-line by their recommendations.

The introduction of the notched Z sub-purlin in the mid-'90s made retrofitting so fast and easy that the practice rapidly accelerated as did the questions about added dead loads.

It's obvious that the nesting design and secure structural connection that resulted therefrom added strength to the existing support system. The question was, how much?

In 2004, Roof Hugger Inc. underwrote an extensive test series to answer that question. Farabaugh Engineering and Test Labs of Turtle Creek, PA, was the chosen facility. It in turn contacted Tom Shingler, P.E., president of Design Dynamics of Dallas, TX, to establish the test platform assembly, protocol, supervision and certification of results.

Within the variety of methods used to attach a new metal roof over an existing metal roof, the unique design of the notched sub-purlin was revolutionary to the trade. The objective of the test procedure was to determine positive load moment capacity and flexural stiffness enhancement realized by utilizing new roof panels in combination with the nesting Z sub-purlin as an integral part of the existing structural system.

The huge market of roof-overs required proof of suspected increased load capacities to allow the practice to grow ever more rapidly and without the nagging questions about overloading. The certified test results have given the retrofit industry the answers needed. Yes, the notched and nesting sub-purlin did indeed enhance existing capacities by averages of 1.2 to 1.46 of the rated capacity of 35 lbs. per sq. ft. of roof.

In sum, the average added dead load of a new roof-over is 1-1/4 to 2 lbs. p.s.f whereas the data indicated an increased capacity of 7 to 15 lbs. psf depending on the standard web height of notched sub-purlins

used in the tests.

The increase in stiffness of the existing purlin supports was even greater at 1.33 to 2.10 ratios. The gain in moment capacity and flexural stiffness derives directly from the fastening connection occurring through the pan section of existing roof panels, into the purlin support, in effect, locking down the existing panel and adding to the web height of the underlying purlin by the web height of the selected notched sub-purlin.

A further important connection to achieve the test results indicated, was the installation of two #10, pancake head fasteners in the overlapping ends of the sub-purlins top flange, creating a continuity in resistance to tension, compression and flexure.

The component manufacturers, metal contractors and erectors, as well as the professionals designing and specifying reroof projects, can now attest to the safety as well as the cost savings of retrofitting to aid the growth of this relatively new mass market.

A further implied benefit derived from the tests is added torsional and lateral stability of the structure, not solely by the

sub-purlin component but additionally by the double roof diaphragm assembly resting on the now locked down original roof panels and supports.

To add validity to that implied benefit, the result of four hurricanes in Florida and Alabama, plus a super typhoon of 170 mph. on the Island of Guam, numerous Roof Hugger, double roof structures in their path suffered zero roof damage while all around them, severe damage was inflicted. Further proof of the superiority of the notched sub-purlin system for retrofitting.

For a complete review or download of the entire test protocol and details, go to [www.roofhugger.com](http://www.roofhugger.com). In addition you will find many retrofit projects under way, erection details, allowable uplift load charts and other helpful details of the notched sub-purlin system.

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