

# **Recent Field Experience with Steel Deck Installations**

# **Alternatives for Steel Deck Fastening**

## **1. Side Seam Connections**

- **Button punching**
- **Self-tapping screws**
- **Welded side seams**

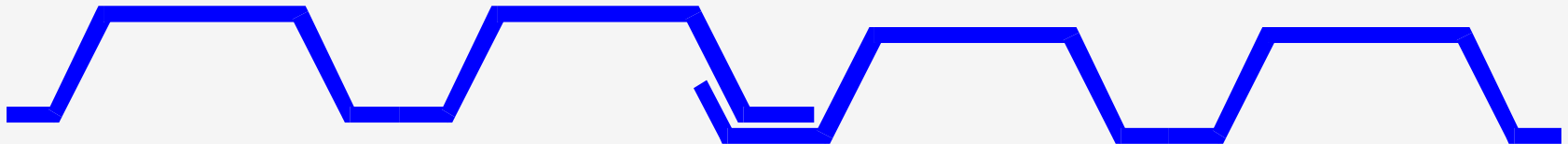
## **2. Frame Attachments**

- **Standard puddle welds**
- **Welds with washers**
- **Powder actuated drive pins**
- **Self-tapping screws**

## Deck Profile with Nested Side Seam



## Deck Profile with Lapped Side Seam



# Screwed Side Seam



- **Lapped side seam or “Cladding lap” with self-tapping screws**

# Standard Puddle Welds to Frame



# Weld with Washer



# Powder Actuated Drive Pins



# Drive Pins at Perimeter Angle



# Self-Tapping Screws



# Field Observations

# Side Seam Screws

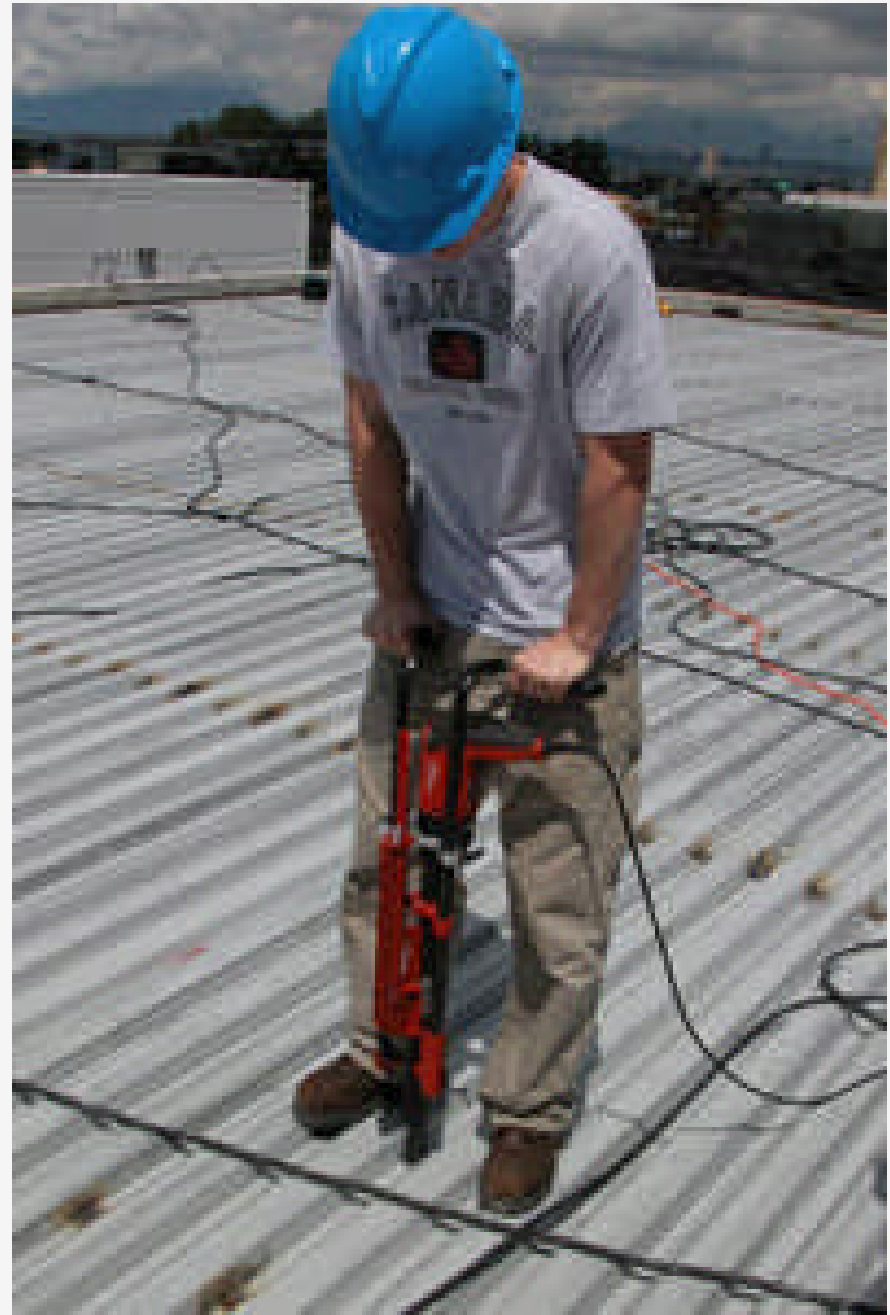
- **#12-14 x 1" long self-tapping screws with #1 drill point**
- **.212" thread diameter with .150" shaft and 0.40" integral washer**
- **Typical purchase cost – about 5 cents each**
- **Screwed side seams almost as fast as button punching**
- **Standup tools are easier on worker and speed up installation**
- **Standup tool cannot accommodate screws larger than #12 or screws with additional washers**
- **Screw fasteners easy to inspect with low rejection rate**



# Installing Side Seam Screws with Hand Tool



# Standup Tool for Side Seam Screws



# Frame Connections

# Welds with Washers

- **1.375" x 3/32" washer with 9/16" hole**
- **Weld completely fills hole**
- **Material cost, 5 cents each**
- **Good clamping action from washer**
- **Increased installation time over standard welding**
- **Difficult to weld with multiple layers of deck**
- **Difficult to locate on top of narrow joist chords**
- **Easy to inspect**



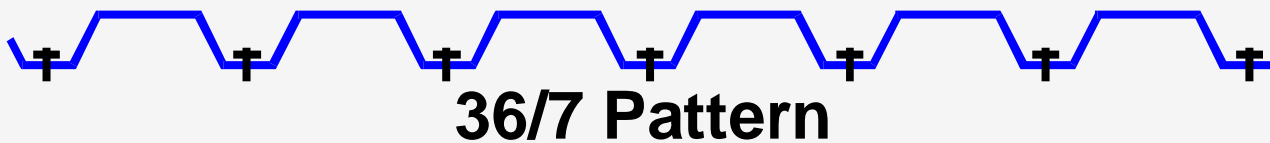
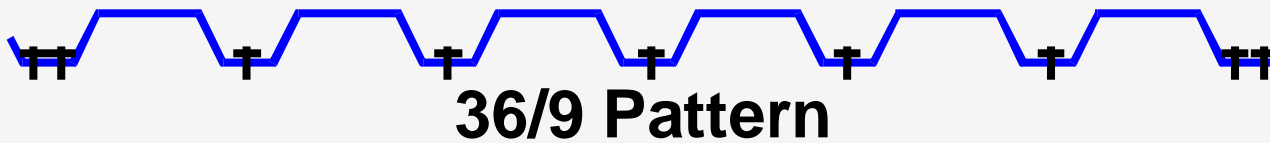
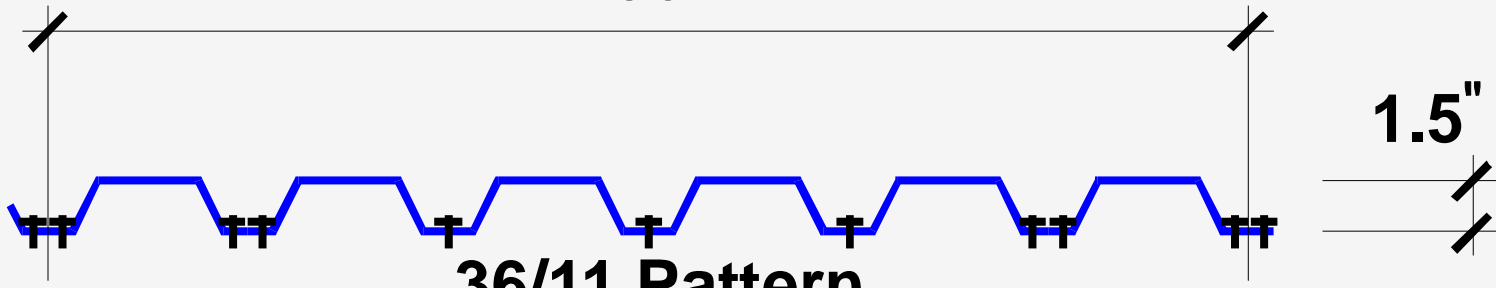
# Hilti Pins for Frame Attachments

- **Hilti X-EDN19 or X-EDNK22**
- **0.21” shank with 0.50” collar**
- **Applicable for frame thickness of 0.125” to .375”**
- **45 cents material cost per pin**
- **Installed with standup tool using continuous feed**
- **Faster than standard welding by almost 2 times**
- **Independent of weather**



# Deck Fastening Patterns

36"



# Standup Tool for Drive Pins



# Drive Pin Depth Gauge



# Hilti Pins for Frame Attachments

- **Special care required for decking layout and marking underlying joists**
- **Rebound problems with lighter gauge material**
- **Adjustments to driving power required for various thicknesses of base metal**
- **Small diameter head**
- **Cannot be used with separate washer**
- **Overdriving can result in deck metal fracture**
- **Difficult to inspect and higher rejection rate**
- **Problems with unskilled installers**

# Drive Pin Problems



# Screwed Frame Attachments

- **#12-14 x 1" long screw with #3 drill point**
- **.212" thread diameter with .150" shaft and 0.40" integral washer**
- **Available with 0.60" washer**
- **Applicable for .125" to .210" base metal thickness**
- **Suitable for cold rolled joist chords and thinner gauge hot rolled chords**
- **5 cents material cost per screw**
- **Can be installed with standup tools but not with washer**
- **Slower than drive pins to install**
- **Easy to inspect**



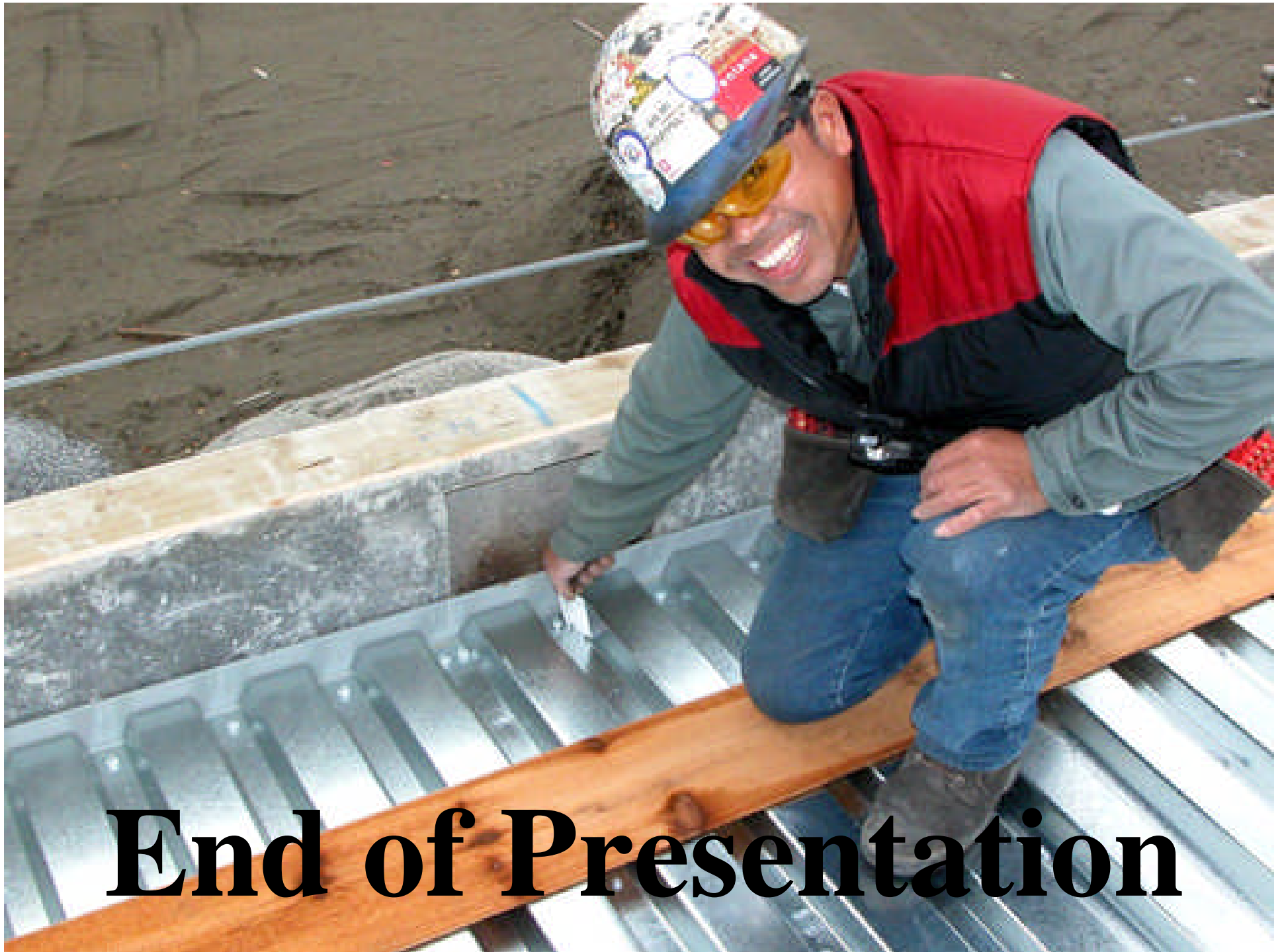
# **Self-Tapping Screws for Frame Attachments**

- **#12-24 Screw with #5 point for base metal thickness of .250" or more**
- **Machined drill point**
- **May require pre-drilling**
- **Can be used with separate washer**
- **40 cents per screw**
- **Suitable for connections to beam flanges, drag struts and perimeter chord angles**
- **Much slower than drive pins**

# Installation Costs Comparisons

Based on 1.5” x 22 gauge (.030”) standard roof decking. Same number of fasteners in all cases.

	Cost Factor
1. Standard welds to frame and button punched side seams	1.00
2. Standard welds and screwed side seams	1.05
3. Weld washers and screwed side seams	1.19
4. Hilti pins and screwed side seams	1.13
5. Hilti pins to perimeter angles, drag struts	1.14
• Screwed joists and screwed side seams	
5. Screws to all frame members and side seams	1.17



**End of Presentation**