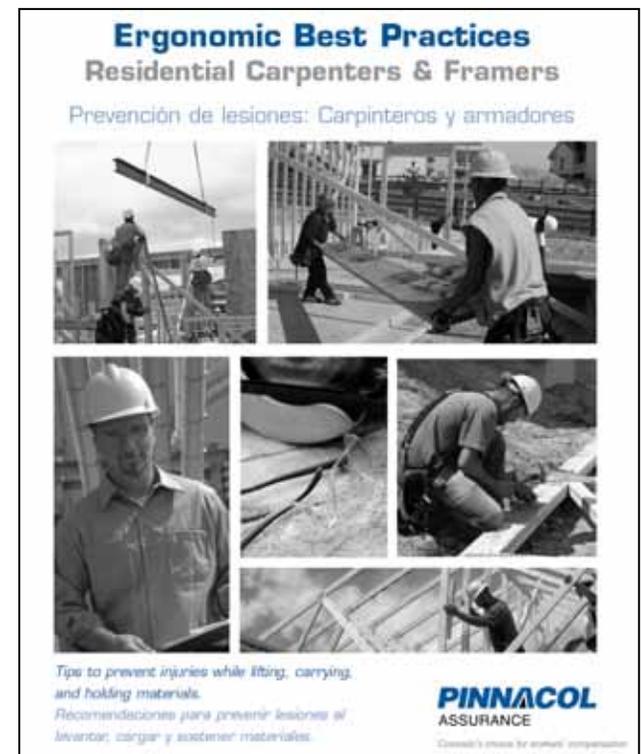


# Ergonomic Best Practices for the Residential Construction Framing Contractor

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*10<sup>th</sup> Annual Applied Ergonomics Conference*  
*Celebrating The Past..Shaping The Future*



# Loss Prevention Challenges for Controlling Musculoskeletal Disorders (MSDs)

- How do we identify those high risk individuals?
- How do we develop tools that those high risk individuals will use?
- How do we make recommendations that will result in lasting behavioral changes?

# Pinnacol Assurance

- Colorado's oldest and largest workers' compensation insurance carrier
- Provide guaranteed workers' compensation coverage to any CO based employer regardless of size or risk
- 60% market share in CO
- Provide coverage for over 60,000 businesses

# Identifying High Risk Policyholders

- Analysis of all Pinnacol Assurance claims from 2001 - 2004
- Analyzed claims by injury cause, nature, body part, cost, and risk class
- Analyzed a subset of data, those claims meeting the definition of a musculoskeletal disorder (MSD)
- By risk class, calculated and sorted by:
  - Frequency
  - Incidence rate (using payroll)
  - Gross incurred \$\$,
  - Premium amount

# Pinnacol Assurance Claims, 2001-2004

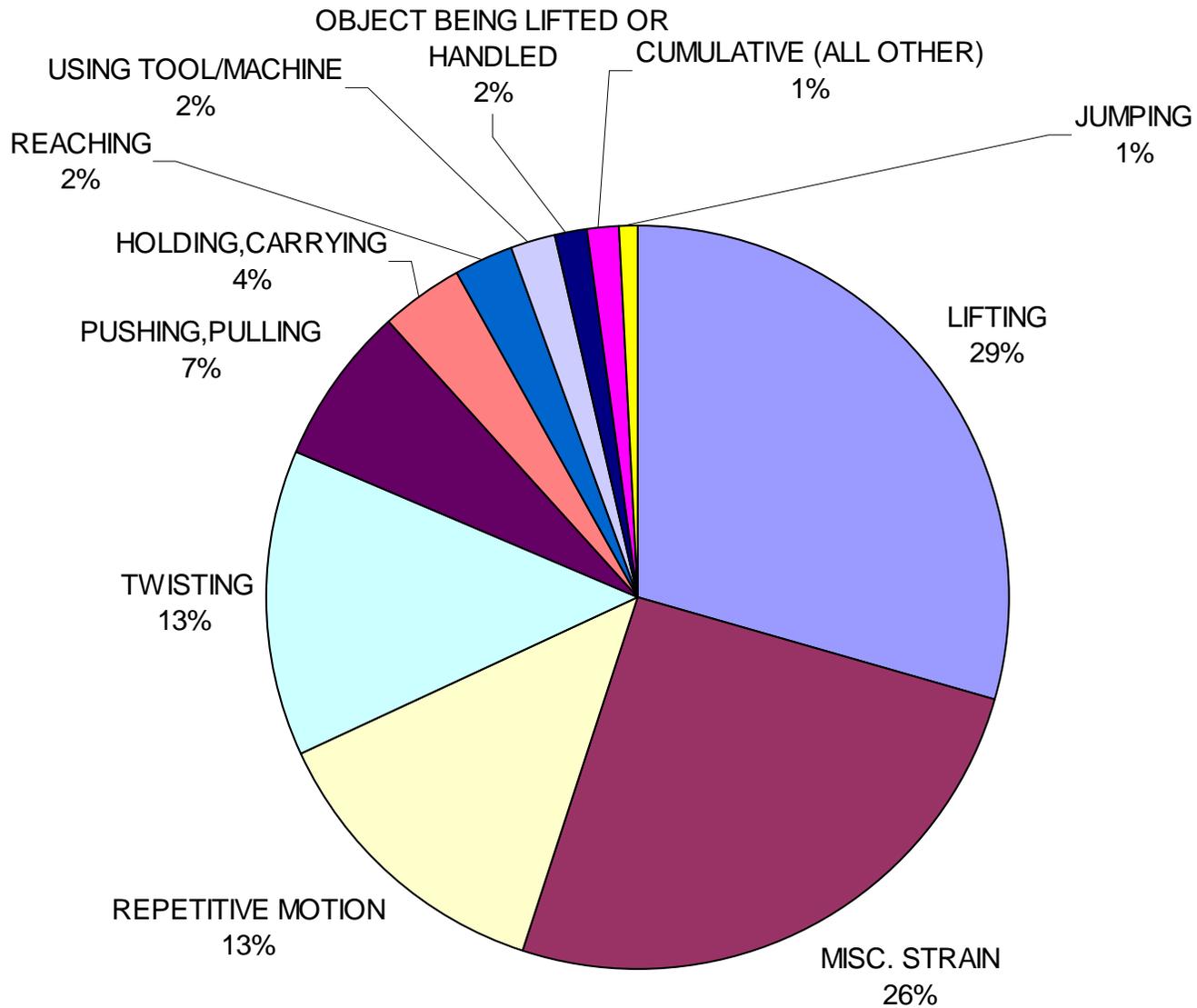
- 218,026 total claims of which 63,080 met the MSD definition\*, or 29% of all claims
- Incurred cost of all claims = \$1,180,593,125  
Incurred cost of MSD claims = \$423,792,083 or 36% of total costs
- Average cost of all claims = \$5415  
Average cost of a MSD claim = \$6718
- Strains related to lifting = #1 injury cause resulting in 18,693 claims or 8.6% of all claims and 11.6% of costs

***\*MSD = Strains, sprains, joint inflammation, hernia, carpal tunnel syndrome, VDT related disease, and all other cumulative injuries due to lifting, pushing, pulling, carrying, holding, reaching, using tools/machines, and repetitive motion***

# Top Five MSD Claims by Body Part

Body Part	Number of Claims	Gross Incurred Amount	Average Cost	% of Count	% of Cost
Low Back	21,678	\$188,460,109	\$8,694	34.4%	44.5%
Shoulder	6,975	\$64,688,110	\$9,274	11.1%	15.3%
Knee	5,707	\$40,641,235	\$7,121	9.0%	9.6%
Wrist	4,628	\$19,486,731	\$4,211	7.3%	4.6%
Abdomen (groin) hernia	2,843	\$13,114,288	\$4,613	4.5%	3.1%

# MSD Claims by Injury Cause



# Top 10 Risk Classes by Frequency

<b>Risk Class Code</b>	<b>Risk Class Description</b>	<b>Claim Count</b>	<b>Gross Incurred Claims Cost</b>	<b>Incidence Rate (per \$100 million payroll)</b>
8810	Exclusively Office	5,769	\$25,779,934	.34
9101	Colleges/School All other employee	2,784	\$14,732,020	5.91
8868	Colleges/School Prof.	2,557	\$10,370,031	.45
8829	Convalescent/Nursing Home	1,585	\$7,369,449	4.42
8832	Physicians & Clerical	1,534	\$8,497,868	.36
7720	Police Officers & Drivers	1,448	\$8,442,652	2.79
8380	Auto Service or Repair & Drivers	1,302	\$12,091,932	.93
9082	Restaurant, NOC	1,111	\$5,779,586	.75
7380	Drivers	1,048	\$5,394,807	2.05
9015	Building – Oper. by Owner	1,027	\$8,458,467	1.54

# Top 10 Risk Classes According to Composite Score\*

Rank by Composite Score (Composite Score)	Risk Class Code	Risk Class Description	Frequency Rank	Incidence Rank	Gross Incurred Rank	Premium Rank
1 (6.5)	9101	COLLEGES/SCHOOLS: ALL OTHER EMPLOYEES	2	1	2	21
2 (10.5)	8810	EXCLUSIVELY OFFICE	1	38	1	2
3 (11)	5645	CARPENTRY RESIDENTIAL	12	23	8	1
4 (11)	8380	AUTO SERVICE OR REPAIR & DRIVERS	7	31	3	3
5 (13.25)	5183	PLUMBING, NOC	16	26	7	4
6 (13.5)	5506	STREET/ROAD CONSTRUCTION	13	7	4	30
7 (13.75)	8829	CONVALESCENT/NURSING HOMES	4	4	12	35
8 (14)	9015	BLDG-OPER BY OWNER	10	18	10	18
9 (14.25)	7380	DRIVERS	9	13	19	16
10 (16.25)	0042	LANDSCAPE & GARDENING	17	14	15	19

\*Composite score = Category rank/4

# Developing Useful Tools

- Review of existing materials for best practices
- Cal-OSHA already developed “Ergo Survival Guide for Residential Carpenters”
- Met with key stakeholders to identify useful tools
- Expand on the Cal-OSHA publication

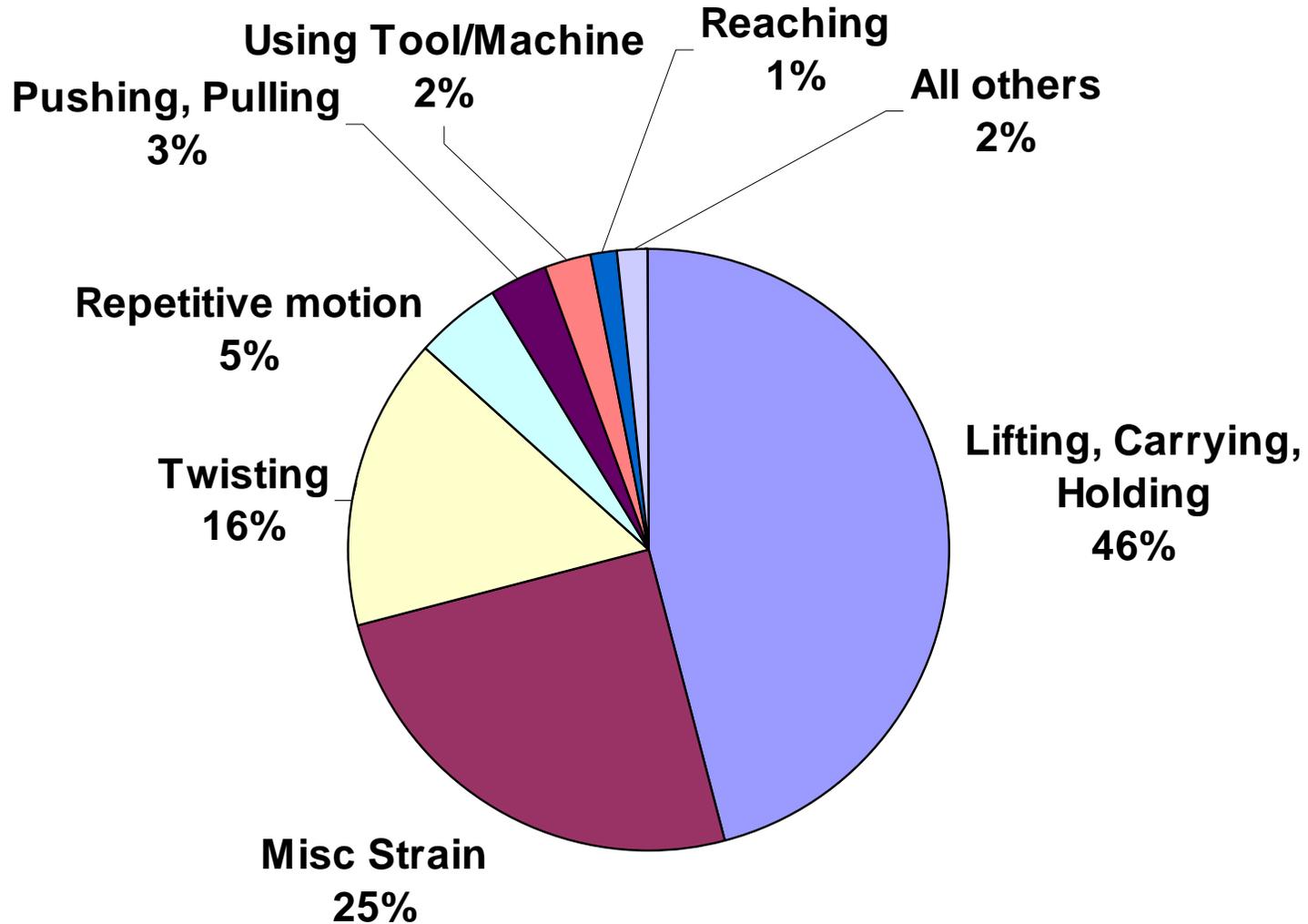
# Essential Elements of a Best Practices Tool

- Handout materials for foreman and employees to include toolbox talks
- Real-world solutions currently in use by contractors in CO
- CO specific data on injuries, cost, lost-time that will grab contractors and employees attention
- English and Spanish text in simple concise language
- Use of many photos to convey message without the need for word comprehension

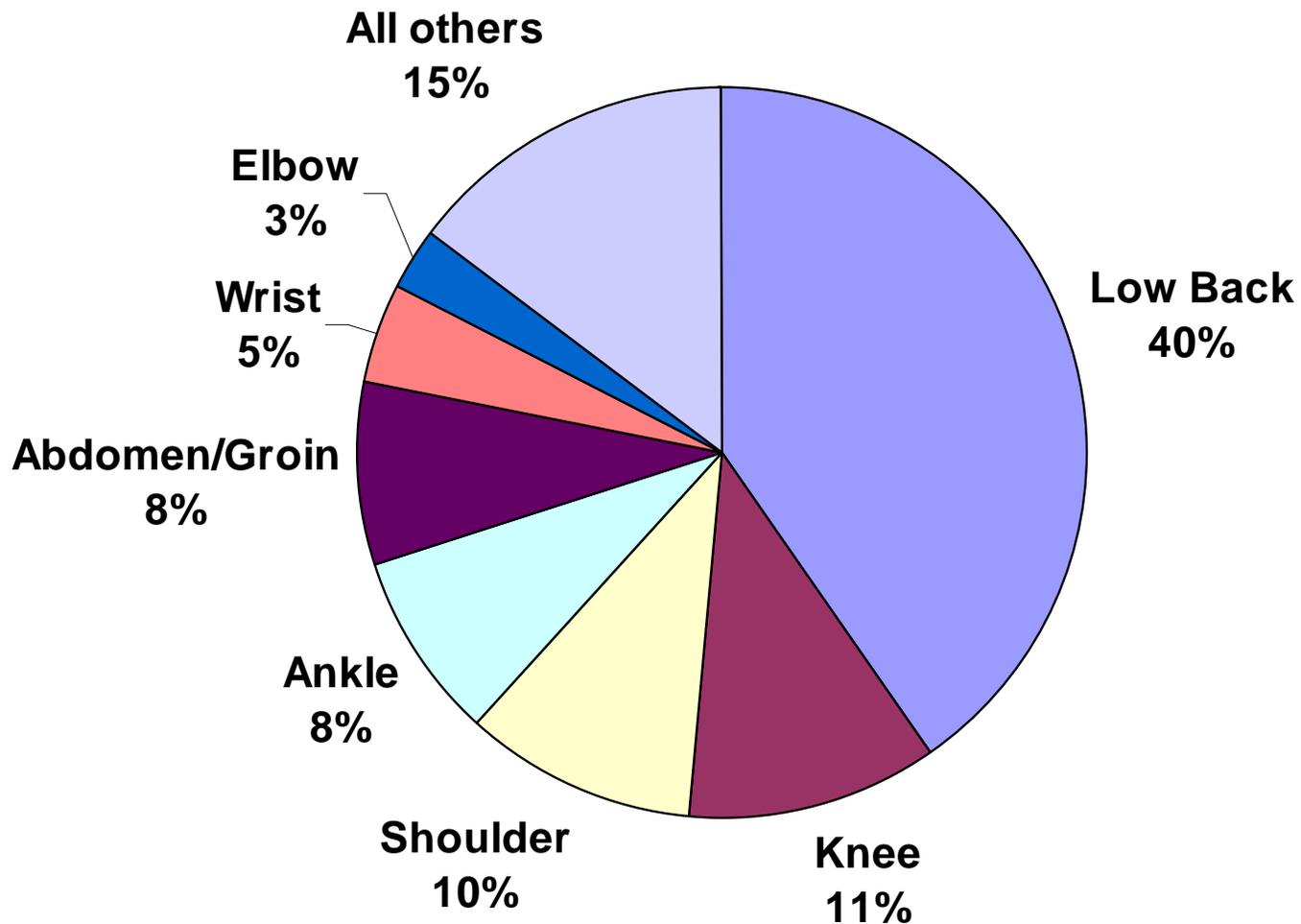
# Ergonomic Best Practices for Residential Carpenters and Framers

- Clearly labeled “superintendent suggestions” (10 pages) and “toolbox talks” (11 talks)
- Organized by building stages making it easy to incorporate training and practices
- Claims data analysis showing impact on business owners and employees
  - Average cost of MSD claim = \$9636
  - Average no. of lost time days = 57
- Spanish translation on the same page as English
- 47 photos with graphics and side by side examples of proper and improper technique

# Residential Carpenter MSD Claims by Injury Cause



# Residential Carpenter MSD Claims by Body Part



# Job site exposure and hazard analysis

- Partnered with 2 large general contractors and 3 subcontractors for job site assessments
- Conducted 11 site visits over the course of 1 year
- Dozens of interviews with owners, safety managers, superintendents, foreman, and employees
- Videotape, photography, and observational analysis

# Four Key MSD Risk Factors

Frequent, lifting of heavy, awkward materials



Trunk flexion, static posture



Working with the hands above the shoulder



Carrying heavy awkward materials over uneven, sloped ground



# Superintendent Suggestion Pre-Planning



Avoid moving materials twice. Don't allow suppliers to drop off materials away from the foundation or stacked on top of each other.

Materials  
dropped off  
next to  
foundation

OR

If planning to  
boom walls,  
pre-plan to use  
a crane to  
move the pack  
closer to the  
house



# Toolbox Talk – 1<sup>st</sup> floor



Avoid lifting OSB sheets directly off the pack

1. Instead tip sheet up on one end



2. Walk it up until reaching the center of the sheet



3. Bend your knees and lift slowly



4. Let some of the weight rest on your shoulder



# Toolbox Talk – 1<sup>st</sup> floor



Attach your top plate before setting steel. You'll reduce your risk of a fall by not performing the task on a ladder and you'll eliminate working above shoulder height.



Always have one employee at each end to maneuver and secure the beam.

# Toolbox Talk – 1<sup>st</sup> floor



Good Practice: Manually raising balloon walls. Always calculate the weight of the wall to ensure you have enough employees to raise it safely. For example, a 9' x 15' wall with two 3' windows made from 2" x 4"s weighs 465 lbs.



Best Practice: Use a crane. Booming walls using a crane is safer, faster, and uses less labor than manually raising walls.

# Supervisor Suggestions – 2<sup>nd</sup> floor



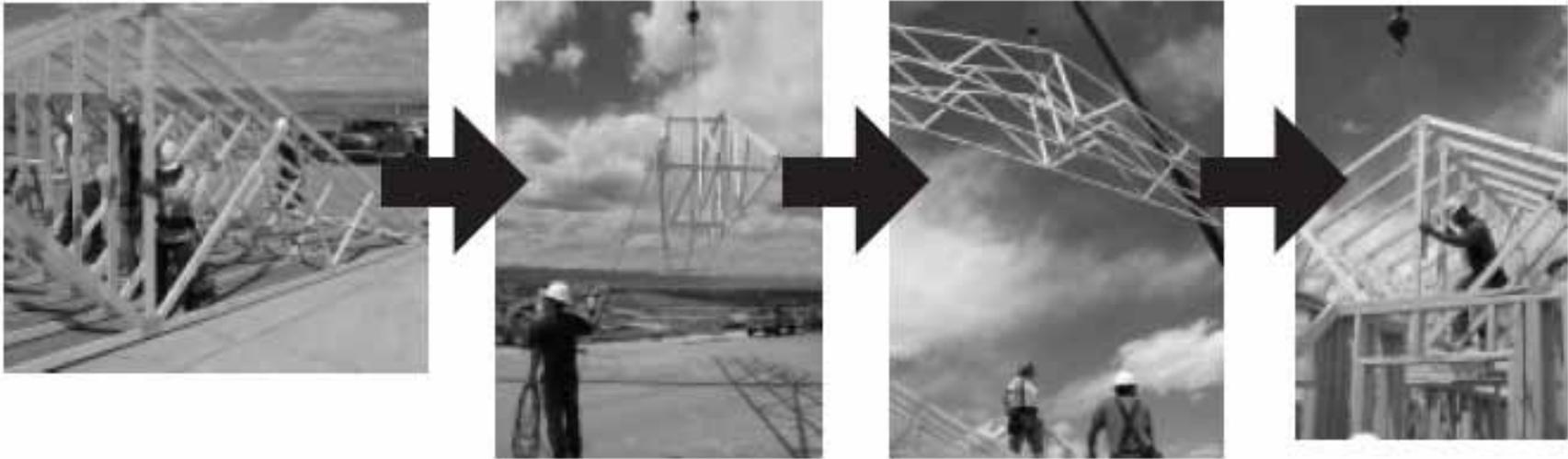
Floor section build off site

Section is transported to job site via flatbed trailer

Floor is boomed into place with a crane



# Supervisor Suggestions – Roof



Pre-assemble trusses on the ground.

Boom trusses into place using a crane. This makes rolling trusses faster and reduces the amount of time working at heights and work above shoulder height.

# Toolbox Talk – Exterior Detail



Avoid installing siding above shoulder height



Keep the siding installation between waist and mid-chest height by making regular adjustments to the scaffolding plank height.

Superintendent suggestion: Evaluate lighter weight building materials such as wood engineered siding which is 30% lighter (per 16' x 3/8" board) than fiber cement siding.

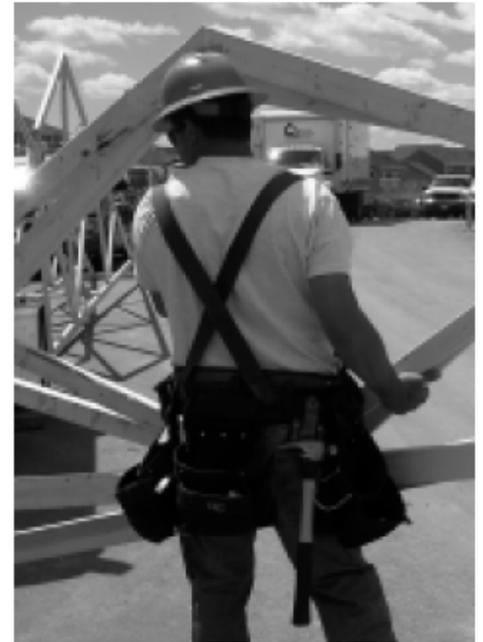
# Misc. Best Practices – Tool belt Tips



Wear a quality tool belt with suspenders.

Balance the belt evenly by distributing the weight of tools on both sides.

Keep only tools used on a daily basis in your tool belt.



Not wearing suspenders increases the stress on the low back and hips.

# Best Work Practices Checklist

Superintendent  
 tool to evaluate  
 training  
 effectiveness and  
 compliance with  
 best practices

## Make Safety a Priority

### Best Work Practices Checklist

Is your company using industry best practices? If you answer "Yes" to every question, you are. Congratulations!

#### Framing

##### Manual materials handling

- |   | Yes | No |
|---|-----|----|
| 1. Are sheets of siding, OSB, etc., handled using the tip and walk-up method (see page 6 for description)<br><i>If no, review proper technique with employee(s).</i>  |     |    |
| 2. Are no more than six 2" x 4"s handled at one time by one employee?<br><i>If no, review the limit on the number of boards that can be handled alone.</i>  |     |    |
| 3. Are employees using a cut table or saw horse to saw lumber?<br><i>If no, make sure a table is available and review its use with employees.</i>   |     |    |
| 4. Are employees team lifting when carrying microlams (11 7/8" wide) over 10' long?<br><i>If no, review the size/weight restrictions for solo lifts with employees.</i>   |     |    |
| 5. Are enough employees available when manually raising walls?<br><i>If no, stop the work immediately and wait until enough employees are available to assist.</i>  |     |    |
| 6. If a crane is used to boom walls, are all other materials, such as steel, and the materials pack also boomed into place?<br><i>If no, review with the supervisor the importance of pre-planning so all materials can be moved using the crane.</i> |     |    |
| 7. Are stickers placed under the steel?<br><i>If no, review with employees the need for stickers.</i>   |     |    |
| 8. Was a section of the second floor pre-built and a crane used to boom the materials pack for easy access?<br><i>If no, review the proper procedure with the supervisor.</i>   |     |    |
| 9. Are stickers placed under the stairs?<br><i>If no, review with the proper procedure with the supervisor.</i>   |     |    |
| 10. Was a crane used to set the stairs?<br><i>If no, review the proper procedure with the supervisor.</i>   |     |    |

##### Static, bent-forward posture

- |   |  |  |
|---|--|--|
| 1. Are employees using a cut table or saw horse to saw lumber?<br><i>If no, make sure a table is available and review its use with employees.</i> |  |  |
|---|--|--|

# Marketing and Evaluating Best Practices Effectiveness

- Approx. 1000 copies distributed to policyholders
- Meetings with various stakeholders (e.g., Homebuilders Association, Hispanic Contractors)
- Phone and zoomerang surveys in six months to evaluate use and implementation
- Track and trend risk class MSD claims