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Building Product Trends: Internal & External Changes Effect Building Materials Usage in the Home Building Industry

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The NAHB Research Center's annual survey of home builders has documented the effect that these changes have had on construction materials usage.

The past five years have brought some unprecedented changes to the home building industry. New home starts have been at record levels in the past few years, outpacing even the most optimistic forecasts. Economic prosperity has caused the labor market to tighten and then loosen a bit after the recession. Construction materials prices have been both down and up, sending home builders looking for alternatives. For instance, new concrete and steel framing systems have gained a lot of attention. The NAHB Research Center's annual survey of home builders has documented the effect of these changes on construction materials usage.

Each year, the NAHB Research Center conducts the Annual Builder Practices Survey, a study of building materials usage in new home construction. More than 2,000 home builders responded to this year's Survey, each detailing their 2002 building materials purchases. A comparison of the results from the 2002 and 1997 studies reveals that some areas of home design and materials usage changed over time, while others did not. For example, while wall heights have increased substantially, structural wall materials usage has changed little. Roof framing has changed little, but the choice of flooring materials has changed dramatically. The following is a comparison of structural wall, floor and roof characteristics in 1997 and 2002. Where applicable, data from the 2003 ITC Report Summary for the years between 1997 and 2001 has been added for the purpose of year-by-year analysis.

STRUCTURAL WALL SYSTEMS

Wood wall framing continues to be the primary choice for above-grade walls throughout the United States with the exception of central and south Florida markets. Wood usage has declined only slightly at the national level since 1997, while concrete wall construction has gained a small amount. Light gauge steel, on balance, saw no change from 1997 to 2002. Looking deeper into the steel wall framing trend, the NAHB Research Center documented that steel's exterior wall share did reach about 1.6 percent share in 2000, but fell the following year when steel prices rose.

	1997	1998	1999	2000	2001	2002
Wood	89%	88%	88%	90%	88%	88%
Masonry or Concrete	10%	12%	11%	8%	12%	11%
Steel	1%	1%	1%	2%	1%	1%

Figure 1. Above-Grade Wall Material, New U.S. Home Construction.

Site-framed walls are still the industry standard, but wall panels command a respectable share. Usage of pre-fabricated wall panels fell from 11 percent in 1997 to about five percent in 1999 after a couple major home builders closed their panel shops. Since 1999, however, wall panel share has grown to about 11 percent in 2002 and appears to be poised for future gains. Builder usage of modular construction has increased over the past several years, but still remains a small minority of new home starts.

	1997	1998	1999	2000	2001	2002
Site-built	87%	89%	92%	86%	86%	86%
Panelized	11%	9%	5%	12%	10%	11%
Modular	1%	1%	1%	1%	2%	2%
Other	1%	1%	1%	1%	2%	1%

Figure 2. Above-Grade Frame-wall Const Systems, New U.S. Home Construction.

Only a moderate change occurred in the specifications of exterior stud-wall framing. Presently, about 95 percent of exterior wall stud spacing is 16" on-center, up from 90 percent just five years earlier. Two-by-six wall construction was also up mildly, from 22 percent in 1997 to 25 percent in 2002, related in part to more stringent energy codes.

	1997	2002
2 x 4, 16" o.c.	72%	72%
2 x 4, 24" o.c.	6%	2%
2 x 6, 16" o.c.	18%	21%
2 x 6, 24" o.c.	4%	4%
Other	0%	1%

Figure 3. Exterior Wood Wall Stud Depth & Spacing, New U.S. Home Construction.

Figure 4 shows that the vast majority of interior wall framing (94 percent) is wood. Wood usage for interior walls, however, has declined slightly in the past five years, losing share to both steel and masonry. Similar to exterior walls, spacing at 16" has continued to increase. While usage of steel interior studs showed an overall increase in the past five years, its usage has declined a percentage point since 2000, likely a response to the increase in steel prices in 2001.

	1997	2002
Wood, 2 x 3, all spacing	1%	1%
Wood, 2 x 4, 16" o.c.	72%	72%
Wood, 2 x 4, 24" o.c.	19%	15%
Wood, 2 x 6, 16" o.c.	3%	4%
Wood, 2 x 6, 24" o.c.	1%	1%
Steel, all	3%	5%
Masonry	0%	1%

Figure 4. Type & Spacing of Interior Walls, New U.S. Home Construction.

Some remarkable changes have occurred in the wall heights of new homes in the United States. As shown in Figure 5, the share of walls eight feet and shorter fell 14 percentage points in only five years. While both ten and 12-foot walls grew in popularity, the nine-foot wall saw the greatest increase by far—a total of 12 percentage points during this period.

	1997	2002
Less than 8 feet	2%	1%
8 feet	63%	50%
8 ½ feet	3%	1%
9 feet	24%	36%
10 feet	6%	9%
12 feet or more	2%	3%

Figure 5. Wall Heights, New U.S. Home Construction.

STRUCTURAL FLOOR SYSTEMS

While wall materials remained relatively constant, some major changes occurred in structural floor materials usage. For example, concrete made some substantial gains as a structural floor material (see Figure 6). However, concrete's gain does not necessarily signal that wood-frame floors are falling out of favor with builders or homebuyers. A disproportionate increase in new home construction in the South and West—areas where slab-on-grade foundations are the local practice—is responsible for a portion of the gain.

	1997	1998	1999	2000	2001	2002
Concrete	29%	29%	31%	35%	34%	35%
Steel (all types)	1%	0%	1%	1%	0%	1%
Lumber Joists	40%	39%	35%	31%	29%	26%
Wood I-joists	20%	22%	23%	23%	26%	27%
Open-web Wood Truss	10%	9%	10%	9%	10%	10%
Others	1%	1%	1%	1%	1%	1%

Figure 6. Structural Floor Materials, New U.S. Construction.

In 2002, wood I-joist usage in new construction surpassed dimensional lumber usage for the first time. In just five years, lumber's share of structural floors dropped a total of 14 percentage points. On the other hand, wood I-joists have gained seven percentage points, from about 20 percent to 27 percent share despite wood's overall decline as a flooring material. Floor trusses have maintained nine to ten percent share nationally. While steel floor joist usage appears to be stable, it actually grew to about 1.3 percent in 2000 but declined the following year and climbed back to about one percent share by 2002.

STRUCTURAL ROOF SYSTEMS

Materials usage in roof systems has remained remarkably stable throughout the past five years, but roof pitch and style have experienced mild to moderate changes. Roof truss share dropped from about 67 percent in 1997 to about 62 percent in 1998 and has been increasing market share since. Rafter usage, overall, has declined about one percentage point during this period, and "other" roof structural systems, which include beam-and-purlin roofs and structural insulated panels (SIPS), increased by a point.

	1997	1998	1999	2000	2001	2002
Rafters	32%	37%	35%	35%	36%	31%
Trusses	67%	62%	63%	63%	63%	67%
Others	1%	1%	1%	2%	2%	2%

Figure 7. Roof Framing Shares of Total Roofed Area, New U.S. Home Construction.

As a framing material, dimensional lumber dominates and has remained fairly stable, ranging from about 96 percent to 99 percent during this period. Usage of other engineered lumber materials such as wood I-joist, glulam and LVL has increased only a small amount in structural roofs over the five-year period.

	1997	1998	1999	2000	2001	2002
Dimensional Lumber	98%	97%	97%	96%	99%	97%
Engineered Wood	2%	3%	3%	3%	1%	3%
Others	0%	0%	0%	1%	0%	0%

Figure 8. Roof Framing Materials, New U.S. Construction.

Among single-family homes, the average roof pitch of new homes in the United States has grown from 6.9 in 12 for 1997 to about seven in 12 for 2002. In 1997, about 36 percent of roof area was hip and 63 percent was gable. In 2002, hip roof area increased its share to 43 percent of all new single-family homes while gable roof area declined to 55 percent. Cathedral ceilings remained at about 32 percent of all ceilings during this period.

	1997	2002
4/12 and less	7%	7%
5/12 to 6/12	43%	40%
7/12 to 8/12	30%	31%
9/12 to 10/12	14%	15%
11/12 and greater	6%	7%

Figure 9. Roof Pitch in Single Family Homes, New U.S. Construction.

WHAT'S AHEAD?

Over the past five years, many changes in structural systems in new homes have reflected general building trends in improving quality and performance and enhancing architectural appeal. Other changes reflect shifts in demographics and the increase in new home starts in certain regions. But can we conclude that the trends we've experienced will continue into the next five years? Not necessarily.

Some of the five-year trends were related to the change in the mix of houses by price-point. For example, the share of luxury homes steadily increased from about 13 percent of all single-family homes in 1997 to 22 percent in 2001. This increase was largely fueled by the baby boomer generation moving into their peak income earning years, combined with a strong rise in both income and wealth during this period. In 2002, after the technology sector declined and the effects of the recession took hold, luxury home share fell to about 18 percent. If interest rates had not dropped to record lows over the past couple years, the luxury home market would most likely have taken a greater loss. The future of high-end home features will be strongly influenced by whether the luxury home market plateaus or returns to growth.

Another factor influencing trends in structural materials usage is the geographic concentration of new housing starts. In the late

1990's through 2001, the tech boom fostered job creation in the "high-tech" states, concentrated primarily in the South and West. Job creation is a major determinant of housing starts, and as starts increased in the South and West, construction materials usage began to increase, favoring materials popular in these regions—supporting the market share growth of wood I-joists and concrete slab floors, for example. At the national level, future materials usage will be influenced by where, geographically, economic expansion is occurring.

Finally, changes in materials usage can arise out of industry efforts to solve problems or create new opportunities in new home construction. The widespread acceptance of OSB, for example, developed out of the opportunity for cost-savings it provided. The success of high-performance OSB subflooring came as manufacturers addressed performance issues associated with commodity OSB. Issues related to structural materials that are attracting a lot of attention today are builder liability, mold, labor shortage, and construction quality. Much of the future of building materials usage will depend on how well materials suppliers can address these issues.

Data provided by the NAHB Research Center and reported in the U.S. International Trade Commission Publication 3596, "Conditions of Competition in the U.S. market for Wood Structural Building Components" from ITC Investigation No. 332-445, April 2003.

The Annual Builder Practices Survey reports present data on building material purchases based on about 2,200 U.S. home builders who report on the 60,000+ homes they built in 2002. The Annual Consumer Practices Survey reports are based on an annual survey of about 40,000 households in the United States. They detail consumers' home remodeling, repair, and maintenance activities. The survey gathers information on material style, type and quantity purchased, and indicates if the material was professionally installed or a do-it-yourself project. For information on the Annual Builder and Consumer Practices Survey reports, contact Ed Hudson at 800/638-8556, ext. 6305 or ehudson@nahbrc.org.

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