

Metal Buildings for Speedy Construction

Mission: Make in India

**3rd Galvanizing Coating and Profiling Summit New
Delhi, India, April 10, 2015**

Kenneth M. de Souza – IZA India



Outline

- **India's Strong Steel Demand**
- *Galvanized Opportunities*
- *Metal Buildings – Speedy Construction*
- *Indian Sheet Steel Building Group (ISSBG)*
- *Future of India's Construction Market*



Finished Steel Usage World Rankings

Top 10 Countries in 2007 and 2014

TOP 10 (2007)	
Country	ASU [Mt]
China	418.4
United States	108.3
Japan	81.2
South Korea	55.2
India	51.5
Germany	42.7
Russia	40.4
Italy	35.9
Spain	24.5

TOP 10 (2014)	
Country	ASU [Mt]
China	720.7
United States	99.8
India	78.2
Japan	63.0
South Korea	52.9
Russia	45.6
Germany	38.1
Turkey	32.2
Brazil	27.0

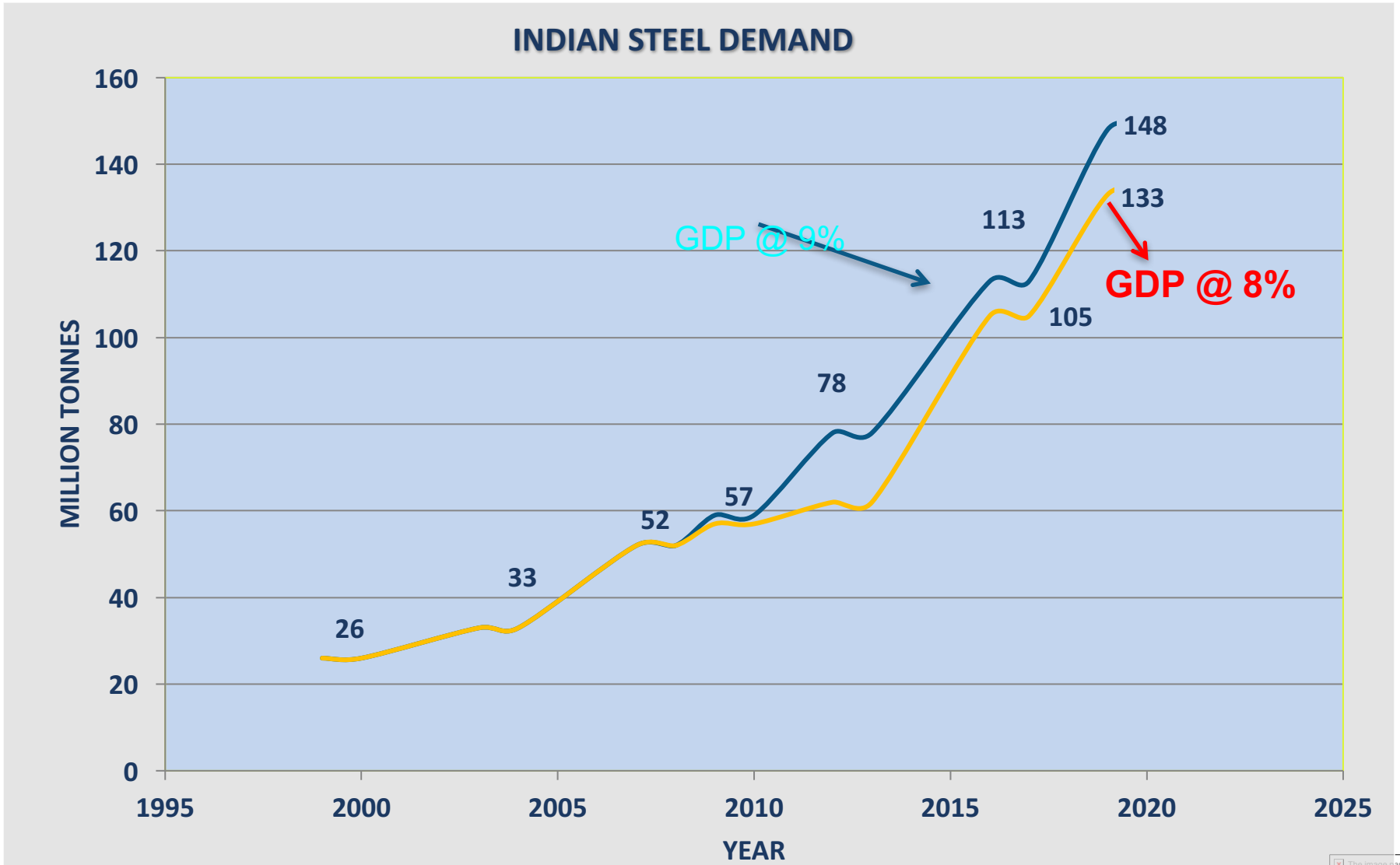
Top 10 accounts for 82.4% of world ASU in 2014

Expected Capacity Additions

Year-ending 31 March	Crude steel capacity (millions of tonnes)					
	2007	2008	2009	2010	2012	2015 F
Tata Steel (India)	5	5	6.8	6.8	6.8	12.7
Essar Steel (India)	4.6	4.6	4.6	4.6	9.2	9.2
Ispat	3.6	3.6	3.6	3.6	3.6	3.6
JSW Steel	3.8	3.8	3.8	7.8	11	11
RINL	3.5	3.5	3.5	3.5	3.5	6.3
JSPL	2.9	2.9	2.9	2.9	4.9	6.9
SAIL	13.8	13.8	13.8	13.8	15.9	24.7
Bhushan Steel	0.3	0.3	0.3	0.3	2.2	5.1
Bhushan Power & Steel	1.4	1.4	1.4	1.4	1.4	1.4
Others	17.9	20.9	25.6	28	28	31.6
Total crude Steel Capacity	56.8	59.8	66.3	72.8	86.6	112.5

Source : "India Steel Sector:India-An outperformer in Steel" , BNP Paribas Securities via Thomson research, 19 October 2010

India's Future Steel Demand



Data Source: OECD Paris Meeting, May 2011

International Zinc Association

Production capacity will lag demand – Imports will continue

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The Galvanized Opportunity

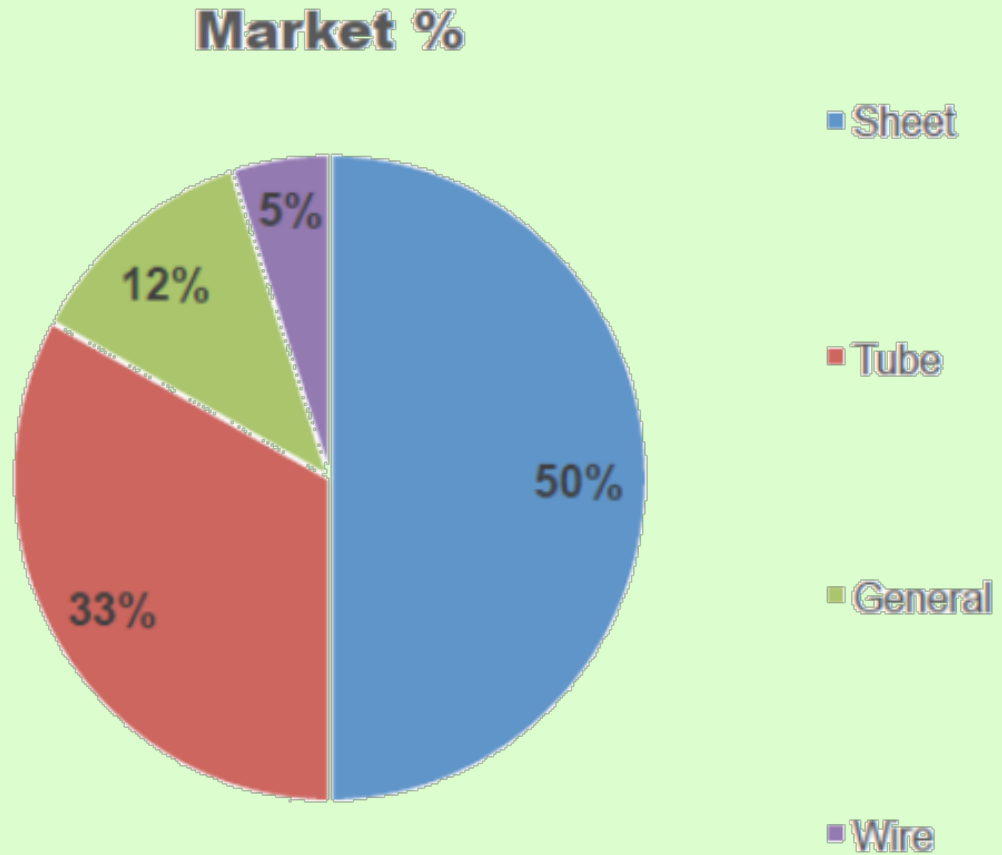
Very favourable climate for growth

- Stable government with priority on infrastructure spending
- Consistent GDP growth of > 8% (except since 2013)
- Strong domestic steel demand (10% annual growth) and increasing steel capacity
- Very low per capita steel consumption (58 kg versus 225 kg world average)
- Among the lowest zinc consumption per capita (0.5kg) in the world
- Construction, Manufacturing & Automotive markets are all growing

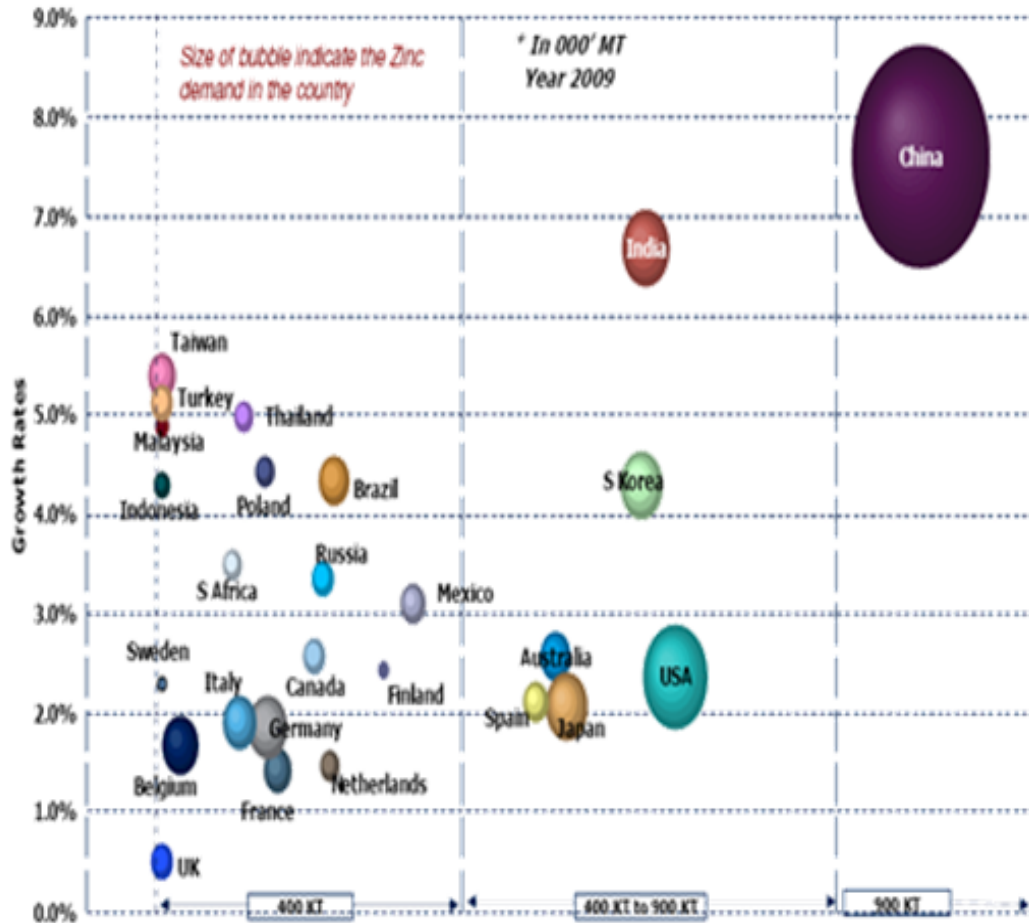


India's Galvanizing Market

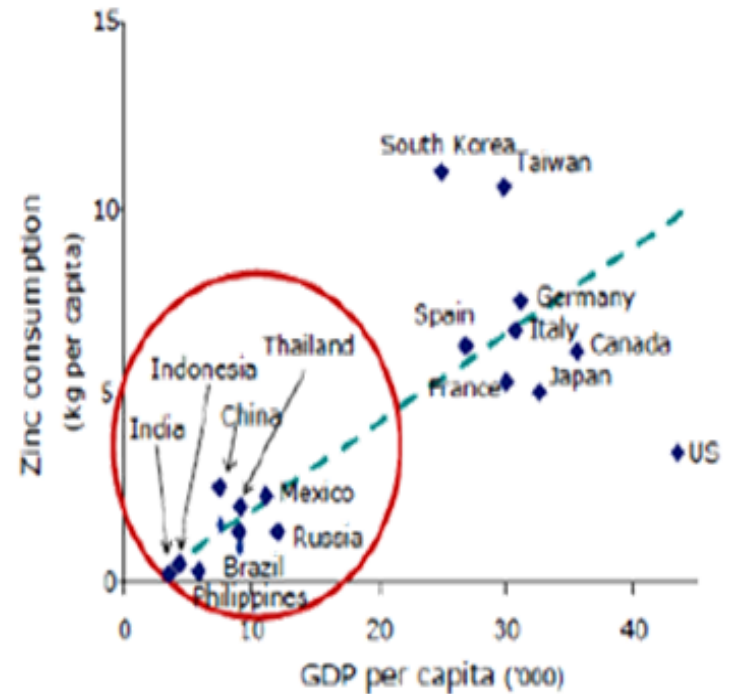
7,000,000 Tons



Indian Zinc Market



Per Capita Zinc Consumption, 2009



Source: Hindustan Zinc Limited

India: High Growth, High Demand Market, but almost the Lowest Country in Per Capita Zinc Consumption

International Zinc Association

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History of Metal Buildings



- 1909 - First commercial building systems designed and fabricated.
- 1940 - Rigid frame research began
- Mid 1940s - Quonset style buildings used in the war.
- 1950-1960 - Rapid growth of steel building systems (pre-engineered).
- 1970's - Standing seam roof technology with floating clips introduced into the market
- Today - Continued advancements in coating technology, codes and testing.

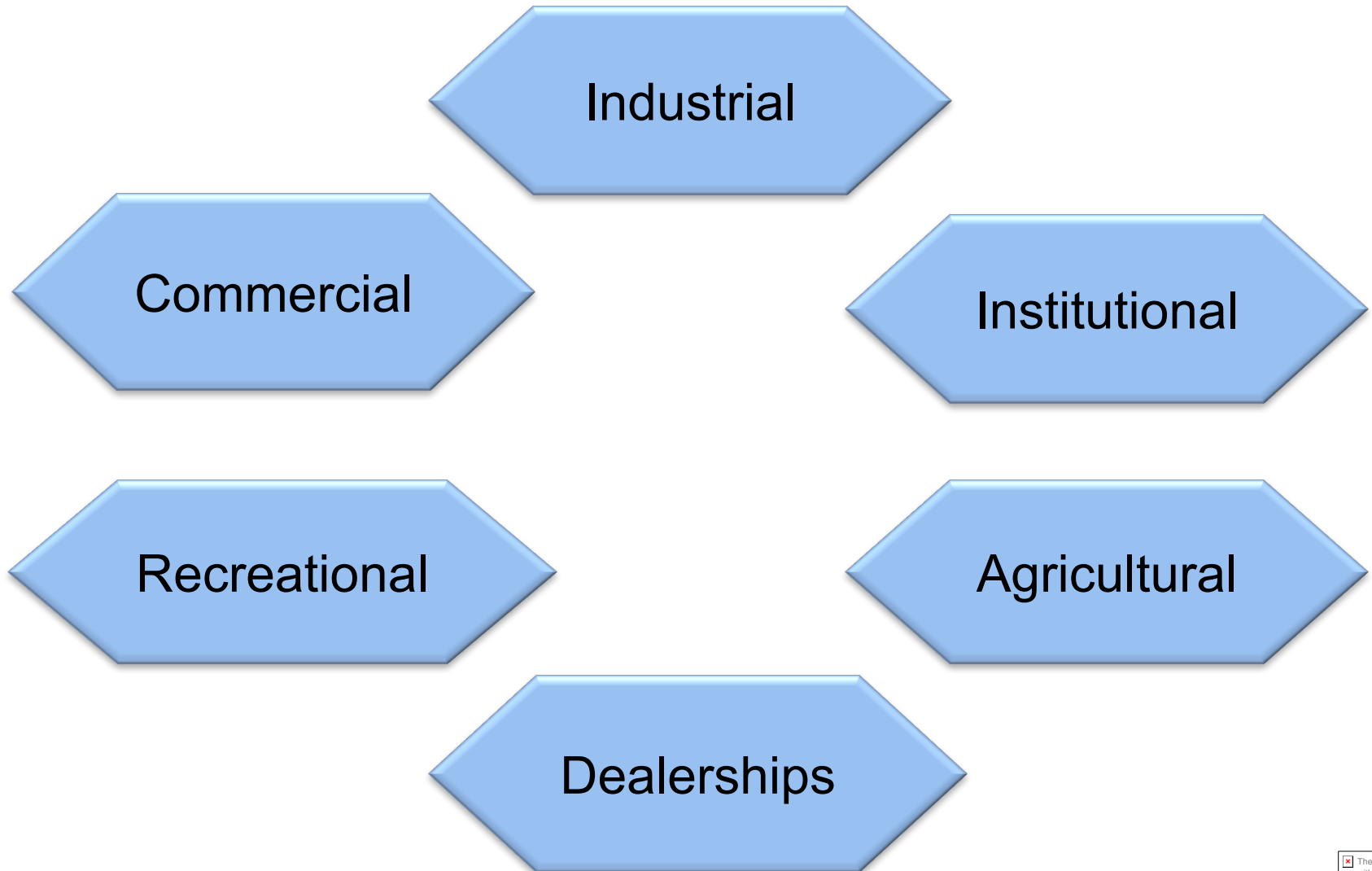
Yesterday



Today



Metal Building Applications



Industrial



Agricultural



Industrial



Agricultural



Institutional



Institutional



Recreational



Car Dealership

What is a Steel Building System

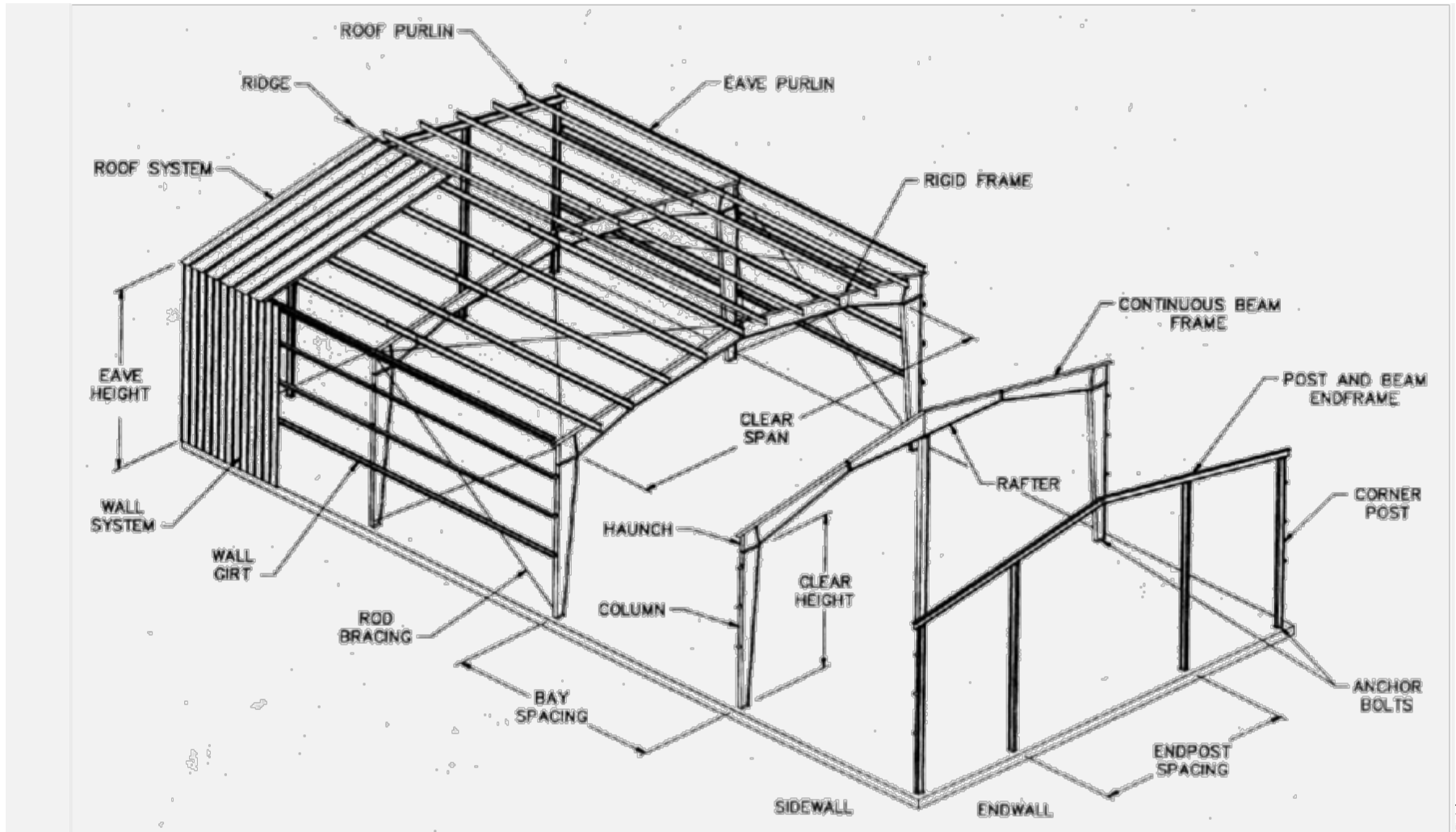
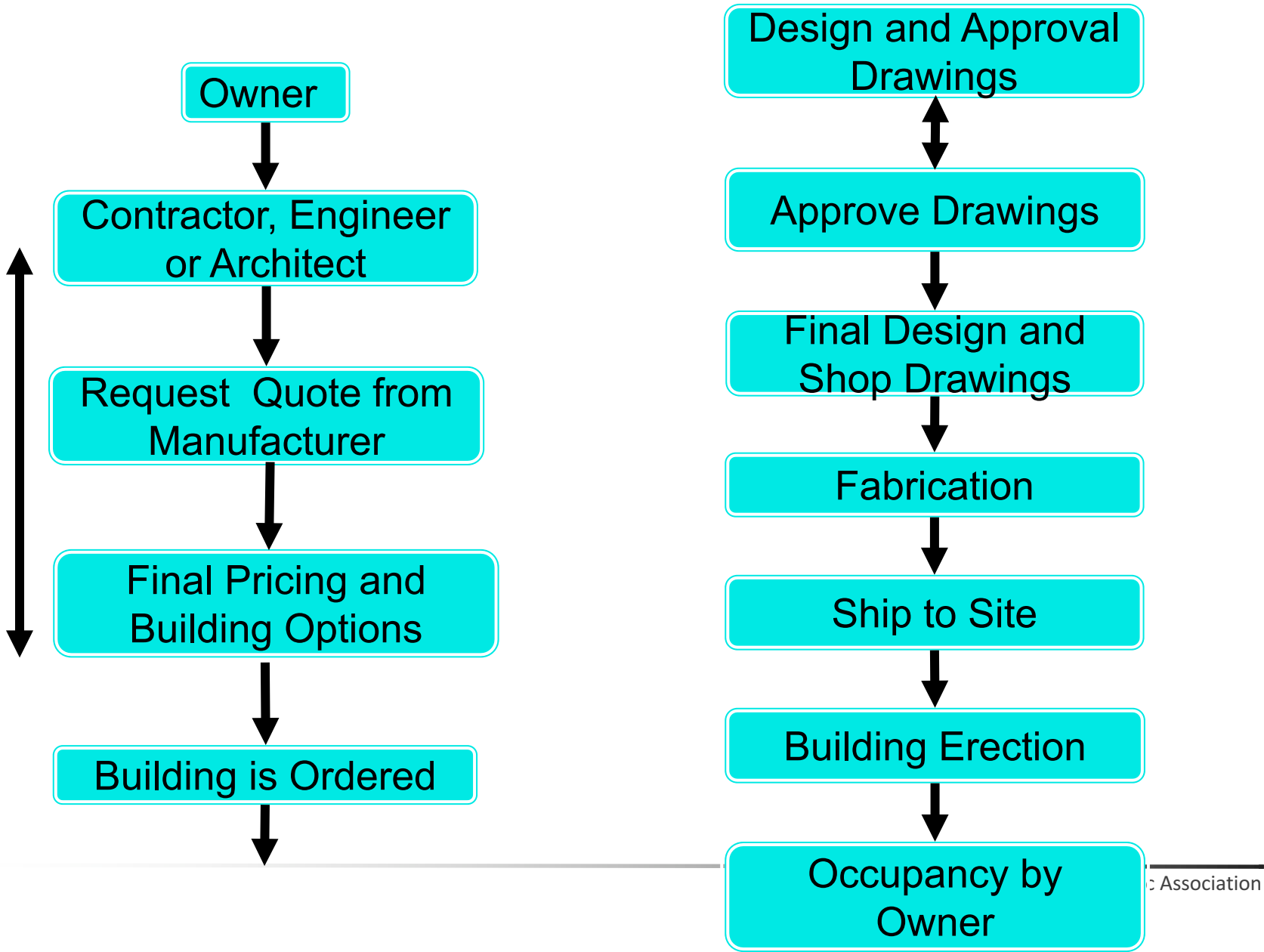


Figure 1.2, pg. 6, Metal Building Systems by Alexander Newman - 1997

The Steel Building Process



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Association

Advantages of Steel Buildings

➤ Faster Occupancy

Since entire structure is bolted together in the field, erection time is reduced.

➤ Cost Efficiency

Less construction trades are required to erect buildings. Faster erection means less labour costs.

Each structural member is designed for a near total efficiency, minimizing wasted material.

➤ Flexibility of Expansion

Metal Building Systems are relatively easy to expand by lengthening. Endwalls can often be re-used in a new location.

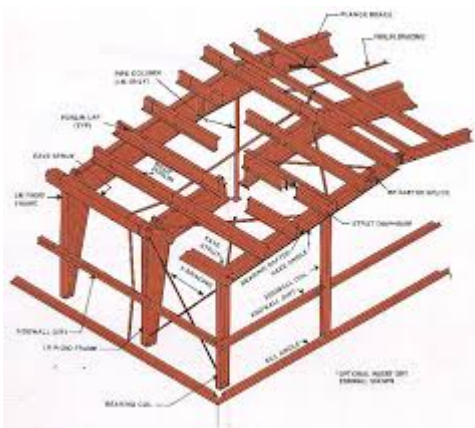
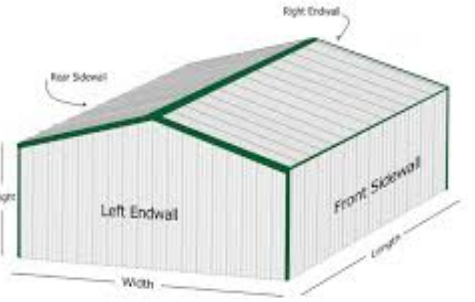
➤ Low Maintenance

Modern metal finishes offer a superb resistance against corrosion and fading.

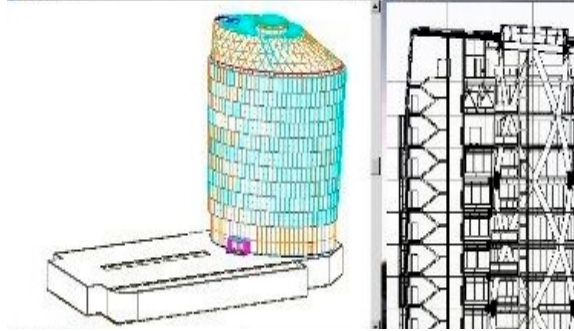
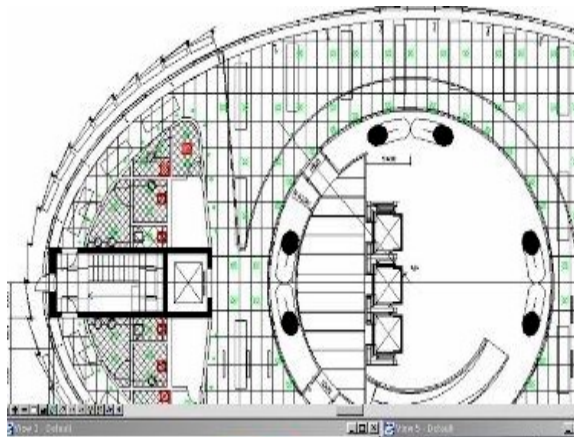
International Zinc Association

System Capabilities

- Clear spans up to 91.5 m (300 ft.)
- Unlimited building widths with multi-span (interior columns) rigid frames
- Eave heights up to 18.3 m (60 ft.) are possible.
- Roof slopes from 20:1000 ($\frac{1}{4}$:12) to 833:1000 (10:12)
- Typical bay spacing from 6.1 m (20 ft.) to 10.7 m (35 ft.) with purlins (longer bays possible with open web steel joist systems)
- Various wall profiles, colours and systems available (block, pre-cast, insulated steel panels)
- Any combination of frame types, bay spacing and eave heights can be designed



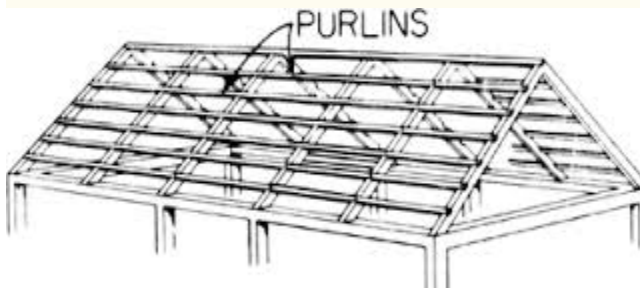
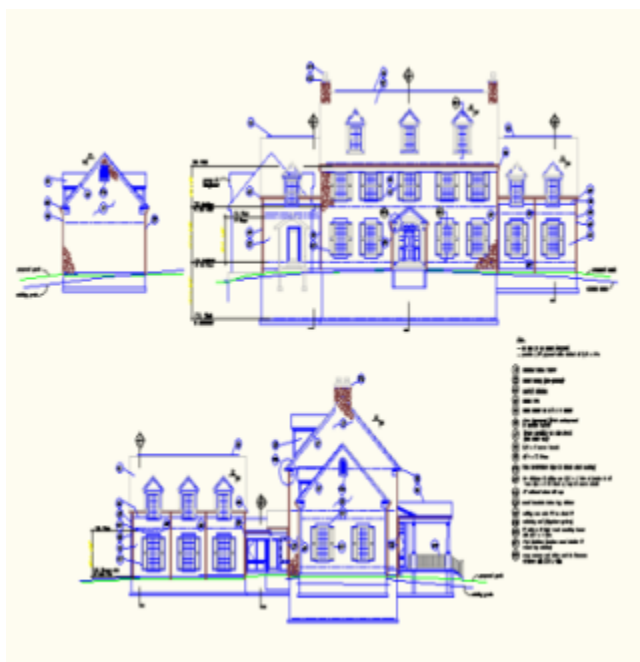
Design and Detailing



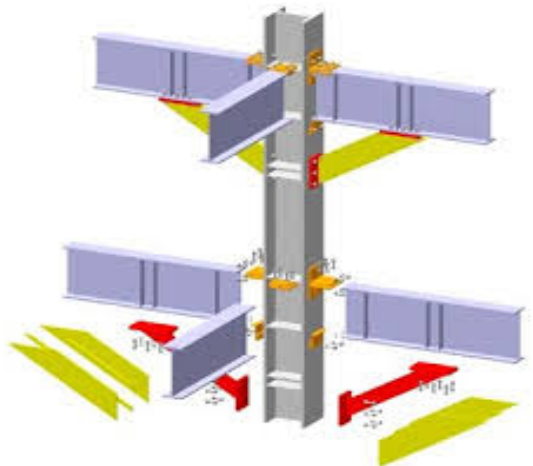
- Computer software designs and prices building systems
- All building components are designed for optimum use of materials.
- Building drawings and reactions are automatically generated by software.
- Shop drawings and shipping lists are also generated by software.
- Basic drawings are edited in ACAD for special conditions.
- Files created by software for automatic transfer to fabrication equipment.

Fabrication

- Bar lengths and hole locations automatically transferred to flange line controller.
- Web drawings transferred from 1:1 scale ACAD drawings to plasma cutter
- Purlin / girt lengths and hole locations are transferred from drafting to mill controller.
- Cladding lengths are transferred from shipping list directly to mill controller.



In Summary



- Continuous member design is used to maximize member capacities.
- Tapered three plate sections are used to reduce material waste and maximize strength.
- Many components are used to brace other structural members, utilizing a “systems” design approach.
- Building design and detailing is accurate and efficient using specialized computer software.
- Component fabrication is automated and efficient.

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Indian Sheet Steel Building Group (ISSBG)

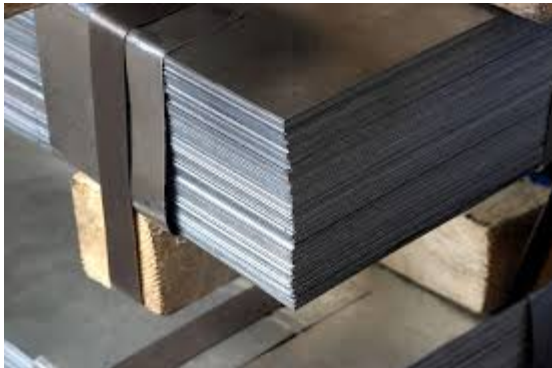


ISSBG

ISSBG

Indian Sheet Steel Building Group

India's foremost authority on sheet steel,
its products, and its many applications



- Created in June 2013
- Membership made up of steel mills, building product manufacturers, PEMB companies, fastener manufacturers
- Mission is to increase use of sheet steel in construction
- IZA India acts as the Secretariat

ISSBG Focus



- Building Codes & Standards development



- Research to develop engineering data for new products and applications
- Develop technical fact sheets and provide technical support to architects, engineers, code officials and building inspectors
- Technical market development, case studies, and trade show promotion



Standards & Building Code Development



- **Bureau of Indian Standards (BIS)**
 - *IZA India is Committee member*
 - *Rewrote anew Standards and new metallic coatings for automotive*



- **Building & Construction Code**
 - *Commercial, Industrial, Institutional buildings*
 - *Residential buildings*
 - *Fire & Structural Design*

Corrosion Testing Program

- Need for fresh performance data on hot dip zinc and zinc-alloy coated steel in India
- Samples prepared and exposed at 5 exposure locations across India
- Statistical results ($W = kT^N$) within 3 more years
- All stakeholders support this exposure testing program



Five Product Areas

- Steel Building Products (roofing, cladding, decking)
- Lightweight Steel Cladding (agricultural)
- Pre Eng Metal Buildings (PEMB) < 3 storey buildings
- Lightweight Steel Framing

Steel Building Products

Roofing, Cladding & Decking



Lightweight Steel Cladding

Agricultural



Pre Eng Metal Buildings

Commercial, Institutional & Architectural



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Lightweight Steel Framing

Commercial Wall Framing



Roof Framing



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ISSBG Publications

- Technical Notes on:
 - *Fire & Acoustic Performance*
 - *Materials in Contact with Galvanized*
 - *Enhanced Paint Systems*
 - *White Rust Prevention*
 - *and many more*

ISSBG

Indian Sheet Steel Building Group

STEEL BUILDING SYSTEMS

www.zinc.org.in/issbg

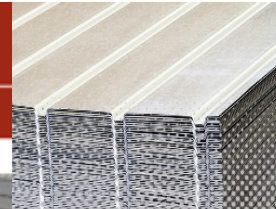
CONSTRUCTION MADE EASY WITH SBS

Steel Building Systems (SBS) are custom engineered by a manufacturer and shipped to local erectors for the construction of large or small buildings.

These systems allow engineers, builders, or architects to control and manipulate the shape, size, and configuration of structures. SBS can work singly or in combination with other systems, and conveniently allow for future expansions.

In general, SBS can accommodate a variety of occupancies and feature structural steel framing members, sheet steel cladding components, and other building materials.

FAST, ECONOMICAL CONSTRUCTION



Pre-Engineered Buildings: Low Environmental Footprint

Introduction

Pre-Engineered Metal Buildings (PEMB) are breaking new ground and helping architects and builders construct more eco-friendly buildings for today's environmentally conscious world. Pre-engineered building systems are completely customized to meet the needs of specific projects, regardless of size. The systems involve many

Sustainability Information

Technical Fact Sheets on:

- ***Recycled Content***
- ***Embodied Energy***
- ***Steel & GHG Emissions***
- ***Cool Roofing and Cladding***



The screenshot displays the website for the International Zinc Association India. The header includes the Zinc logo with the tagline 'essential for life' and the text 'international zinc association India'. A search bar is located in the top right corner. The navigation menu contains the following items: Home, IZA India, Crops, Health, Technical Uses, Sustainability, Zinc Basics, Publications, and Zinc is ... Below the navigation menu is a large image of a modern industrial building with a dark green facade and a white entrance. The text 'Indian Sheet Steel Building Group' is prominently displayed below the image. At the bottom of the page, the text reads 'INDIAN SHEET STEEL BUILDING GROUP (ISSBG) - INDIA'S PREMIER RESOURCE ON SHEET STEEL'. A small error message in the bottom right corner states: 'The image part with relationship ID r1d7 was not found in the file.'

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ISSBG Website

www.zinc.org.in/issbg



international zinc association India

Home

IZA India ▾

Crops

Health

Technical Uses ▾

Sustainability ▾

Zinc Basics ▾

Publications

Zinc is ... ▾



Indian Sheet Steel Building Group

INDIAN SHEET STEEL BUILDING GROUP (ISSBG) – INDIA'S PREMIER RESOURCE ON SHEET STEEL

The INDIAN SHEET STEEL BUILDING GROUP (ISSBG) is part of the International Zinc Association India, an industry association with its registered office in New Delhi. The ISSBG was officially launched in June 2013 to bring together steel manufacturers, fabricators of building products, and engineering professionals

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ISSBG Technical Library

Technical Library

One-Stop Support Materials Resource



FACT SHEETS

[Pre-Engineered Buildings](#)

[Materials in Contact with Galvanized Coated Steel Sheet](#)

[Reflectivity of Pre-finished Steel Sheet](#)

[Steel Clad Building vs. Fabric Covered Structures](#)

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Anticipated Business Results



- Increased shipments of zinc coated steel for building construction and infrastructure projects
- Upto 5 Million Tonnes per annum of new coated steel shipments to Construction and Infrastructure in the next 5 years



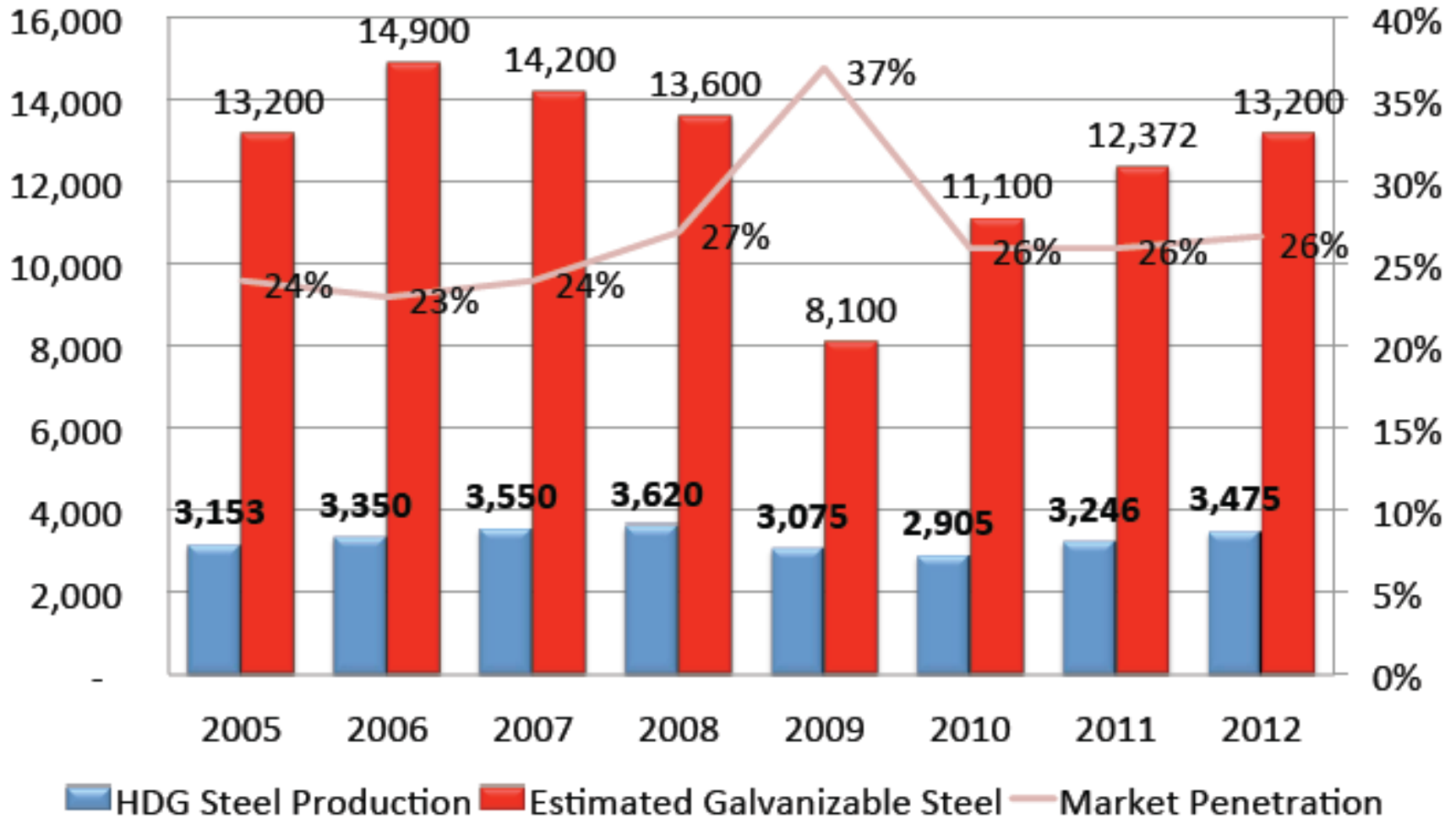
ZINC
ZINC

Thank You

Namasté

North American Market Penetration

Tons



Zinc Consumption per Capita

	2013 Zinc Usage 1000 tonnes	2013 Population millions	Zinc Usage annual kg/person
Korea	559	50	11.18
Taiwan	201	23	8.74
Australia	176	23	7.65
China	5748	1365	4.21
EU 28	2000	505	3.96
Japan	498	127	3.92
Turkey	234	76	3.08
USA	935	318	2.94
Thailand	137	64	2.14
Mexico	210	119	1.76
Russia	250	143	1.75
Brazil	276	202	1.37
India	655	1245	0.53
Indonesia	119	247	0.48
Africa	164	1000	0.16
World	12982	7170	1.81

Galvanized growth is tied to Steel Consumption

REGION / YEAR	2012	2013	2014	12/11	13/12	14/13	2014 as % of 2007
World	1.412,6	1.453,9	1.500,3	1,2	2,9	3,2	123,0
European Union (27)	140,1	139,5	144,1	-9,3	-0,5	3,3	71,8
Other Europe	34,7	36,9	38,4	4,1	6,1	4,1	122,0
CIS	56,5	57,6	59,8	3,3	2,0	3,8	106,2
NAFTA	131,2	135,0	139,0	7,8	2,9	3,0	98,1
Central & South America	46,9	49,8	52,0	2,6	6,2	4,3	126,8
Brazil	25,2	26,2	27,2	0,8	4,0	3,8	123,1
Africa	26,6	28,8	31,0	6,8	8,3	7,6	136,8
Middle East	48,9	49,3	52,3	-1,2	0,8	6,1	127,7
Asia & Oceania	927,6	957,1	983,8	1,8	3,2	2,8	143,8
Japan	64,0	62,6	62,2	-0,2	-2,2	-0,6	79,8
China	646,2	668,8	685,5	1,9	3,5	2,5	153,4
India	71,6	74,0	78,2	2,6	3,4	5,6	151,8

Apparent steel consumption (million tonnes)

Worldsteel

Standing Seam Roof Testing



➤ Tests For Uplift Resistance of Roof Assemblies, UL 580 test method (UL-90).

➤ ASTM E 1592 (U.S. Army Corp. of Engineers Uplift Test).

➤ FM 4477 (Factory Mutual Uplift Testing).

➤ ASTM E 1680 (Air Infiltration Testing).

➤ ASTM E 1645 (Water Leakage).

