The recent years have witnessed a reeling construction & architecture industry, struck by everything from mortgage meltdowns to the deep-rooted global recession. As the financial crisis has hit several nations, construction has slowed on both residential and commercial projects, leaving architects and builders to come up with creative ways to keep their firms afloat.

Thus the phrase 'Sky is the Limit' might soon feel faulty to use as the world's best engineers and architects are all set to break and push this limit further with an array of skyscrapers lined up, both in concept and action.

Under Construction: The Top 10 giants

Building data firm Emporis has compiled a list of the top 10 "future skyscrapers" ones currently under construction that will be among the world’s tallest when they are completed. Each of the ten newcomers will stand more than 500 meters tall, and they are all due to be finished by 2016. Only Burj Khalifa will remain in the 10 tallest buildings by 2016 - and 9 out of the top 10 structures will be in Asia.

While Burj Khalifa will remain the tallest building in the world (at 828m), the Middle East's cloud-touching clutch of giants will be overtaken by China, which is building six of the 10 tallest skyscrapers, followed by South Korea which has two buildings in the future list. If other proposed building plans are put into motion, there could soon be skyscrapers that dwarf the Burj in height. But for now, these buildings are the tallest under construction. Let us start from the shortest among the 'Tallest 10'!
10. Busan Lotte World Tower, Busan, South Korea

This 107 floor, 510.5 m (1,674 ft) supertall skyscraper project in Busan, South Korea is expected in 2016. The tower complex construction which began in 2009 is divided into 4 construction phases including a huge department store, cinema, luxury hotel, an observation deck, offices, and cultural facilities. The tower’s underground parking space will be able to accommodate over 2,400 cars owing to the 6 underground floors.

Concrete casting in the 4.0m thick, triangular (75m) mat foundation of the tower began in March 2012. A massive 24,840 cubic meter of low heat SCC - 40 Mpa grade was poured in the mat built from 2225 ton of re-bar. The structure has been designed well to tackle the wind and seismic loads owing to the extreme conditions this region faces. Busan Lotte World will have 45 elevators with a max speed of 10m/s to facilitate quick movement.

9. Pentominium, Dubai

This 122 floor marvel will touch the mark of 516m and will become the world’s tallest residential tower covering a total built up area of 163,720m2. The construction started in 2009 and the building was expected by 2013 before the construction was halted in August 2011 leaving mere 22 floors completed.

Each residential floor in this building will span an area of over 600 m² including 4-bedrooms apartments, swimming pool, an observation deck, a private cinema, a health club, a banqueting hall, a cigar lounge and a business centre. There are six basement levels and the structure is supported by a piled raft system comprising large-diameter bored piles cast in situ. The pile cut-off levels are founded about 24 m below existing ground level at an elevation of 19.4 m DMD. Approximately, 5,000 tones of rebar and 15,000 m³ of concrete were used in casting the pile raft foundation. This tower will harbor 23 elevators with a top speed of 8 m/s.

8. Dalian Greenland Center Dalian, Liaoning, China

Dalian Greenland Center is a skyscraper under construction in Dalian, Liaoning, China. It is expected to have 88 floors and be 518m tall. The anticipated completion date is 2016. The tower will host 265 residential apartments, 260 luxury hotel rooms and commercial workspaces with an observatory deck.

The tower's GFA is 247,000m² and the total development GFA is 287,000m². The complex will support 37 elevators with a top speed of 9m/s. It also includes
4 basement floors for parking and other service facilities. It uses state of the art technology to overcome the wind and seismic forces that pose a major challenge to this structure.

7. **CTF Tianjin Tower, Tianjin, China**

The 96-story CTF Tianjin Tower (530-meter) houses offices, 300 service apartments and a 350-room, 5-star hotel beneath its boldly arched top.

The gently curving glass skin conceals eight sloping columns that lie behind the primary bends of the elevation. Integral to resolving gravity and lateral loads, these sloping columns increase the structure’s stiffness in response to seismic concerns. Strategically placed, multi-story wind vents combined with the aerodynamic shape of the tower dramatically reduce wind forces by reducing vortex shedding.

The 4.2-million-square-feet project has been designed to LEED gold standards with a high performance envelope, optimized day lighting and landscaped green site areas among its sustainable strategies. Prior testing of 18 different schemes within a wind tunnel has led to a design with the least movement and quiet interior in comparison to other implemented skyscrapers.

6. **One World Trade Center, New York**

A memorable architectural landmark for New York City and America, the 105-story tower will soar to 541.3m in the sky and is expected by 2013.

The building includes some characteristic design elements intended to protect it from future terrorist attacks, such as a 185-foot windowless concrete base designed specifically to withstand truck bombs, three-foot reinforced concrete walls in all stairwells and elevator shafts, and a dedicated set of staircases for firefighters.

Above the concrete base, the building starts to take its shape after the 20th floor. As it rises, eight isosceles triangles built into the building’s façade come together to form a perfect octagon near the middle of the tower. The high rise is being constructed with two concrete cores and concrete on metal decks utilizing an innovative placing system.

5. **Goldin Finance 117, Tianjin, China**

Located in Tianjin, this 117-storey tower will become the tallest building in the city upon completion, soaring to 600m. The upper portion will house a luxurious hotel and the lower portion will contain office space.

Construction began in 2008, and the building was scheduled to be completed in 2014, becoming the second tallest building in China, surpassing the Shanghai World Financial Center. In late January 2010 it was announced that...
construction had been suspended. Construction resumed in 2011, with completion estimated in 2015.

Sustainability is high on the builder’s agenda as a LEED platinum target had been set for the design team.

4. Makkah Clock Royal Tower, Mecca, Saudi Arabia

This tower is a building complex in Mecca owned by Fairmont Hotels and Resorts. The complex holds several world records, such as the tallest hotel in the world (601m), the tallest clock tower in the world, the world’s largest clock face and the building with the world’s largest floor area (15,00,000 m²). Even the concrete section of the Mecca Royal Clock Tower would be taller than the current second-tallest building in the world.

The complex includes 96 elevators with a top speed of 6m/sec. The new clock tower, standing approx. 1,969 feet, is six times the height of Big Ben’s clock tower in London and features four clock faces, each 43 meters in diameter, legible from up to 10 kilometers away.

3. Shanghai Tower, Shanghai, China

Standing at 632-meters, the mixed-use Shanghai Tower began in 2009 and the construction is estimated to get completed by 2014. The tower will have 121 floors, with a total floor area of 380,000 meter square.

The steel structure will rise to 632m wrapped around a 565.6 metre tall central concrete core. The design is tiered into 8 levels above ground with floor-plates, approximately the shape of triangles, creating the base of each tier that in front has an outer glass façade wrapped around it rather like a burrito that gently tapers in and out creating a subtle zoomorphic appearance.

Recessed deeply from the external façade are the main floors, creating an area in between that contains huge atriums. These will have their space used to turn it into a bioclimatic tower, complete with trees as much as ten meters tall that can help naturally regulate the cooling of the building between its double skin.

The façade’s taper, texture and asymmetry work in partnership to reduce wind loads on the building by 24%, offering considerable savings overall in both building materials and construction costs. In addition, the building’s spiraling parapet collects rainwater, which is used for the tower’s heating and air conditioning systems. Wind turbines located directly beneath the parapet generate on-site power.

BASF’s concrete admixture Rheoplus 325 helped facilitate the project’s objective to continuously pour 61,000 m³ concrete for the foundation slab in a period of 60 hours. This has resulted in a new world record.

2. Pingan International Finance Center Shenzhen, Guangdong, China

The Pingan International Finance Center is a 115-storey supertall skyscraper that is expected to be completed in 2015, and will be the tallest building in China, standing a total of 660m high.

The building has a total gross floor area of 378,600 m² plus a basement area of 90,000 m². The project will consist of offices, supporting facilities, a conference center, and parking. It will seek LEED certification.

The selected structural system consists of a composite concrete core with steel outriggers connecting to eight super-columns. The exterior frame is
composed of seven double layer belt trusses located at the mechanical and refugee floors. The exterior belt trusses are interconnected with a super diagonal at each exterior face of the building. The project also includes a steel-framed 11-story podium with high-end shopping arcades, restaurants and roof-top cafes. Thornton Tomasetti has performed extensive nonlinear dynamic time history seismic analysis.

1. India Tower, Mumbai, India

India Tower is a super-tall skyscraper under construction in the city of Mumbai in Maharashtra, India. If completed as proposed, the 125-storey tower would stand 720m high, and would become the world's second-tallest skyscraper, after the Burj.

The project has gone through many evolutions over the last few years. The project was first proposed by the Dynamix Balwas realtor group in 2008 as a more modest 85-story, 988 feet-tall tower.

Construction began on the latest iteration, designed by Fosters + Partners, in 2010, but was put on hold the following year with no word about changes to the projected completion date, or whether the project will continue at all.

Construction is challenging and will consist of three cast in-situ concrete cores which continually taper. This means that the formwork will need to be re-adjusted on every storey. If construction re-starts Doka (temporary works specialist) will be using 2,785m² of large area formwork, with 173 automatic climbers to help erect it.

The future is vertical

With the number of people living on earth growing exponentially (7 billion in the last 100 years), there is no room for cities to expand on the ground, especially in the big overcrowded areas, and that is why architects are planning many ways of expanding through the air.

It was always pretty obvious what the future was going to look like. Gleaming glass and steel skyscrapers would puncture the atmosphere like silver needles in a pincushion. Architects' vertical leapfrogging, however, isn't likely to stop at the Burj Khalifa. While the tower will be a tough one to beat, it is likely to remain at the pinnacle for only about another half-dozen years.

Developers around the world have proposed numerous new skyscrapers. Some projects have leap off the drawing boards, though plans for many record-breaking towers have been scuttled because of the global economic spasms of the past couple years. But thankfully we have witnessed a shift from glamour towards functionality in high rise construction. The future will see many more amazing and insane designs as the human race moves towards a rapidly transforming era!