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国际工程建筑行业市场发展与趋势分析

时间：2012年9月12日；作者：Chris Sleight

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国际工程项目管理信息与市场分析、海外投资项目国别风险、工程建筑项目咨询、数据、资料及工程项目管理咨询服务项目专业平台。（睿达博创工程项目管理网）

The 1960s were notable for one of the biggest building booms Europe has seen. One of the landmark projects of the era was the Forth Road Bridge in Scotland UK, a suspension bridge with a 1 km central span.

At the grand age of 50, iC is the longest running international construction magazine in the world. The hundreds of issues that have been published over the years have charted the ups and downs of the industry, featured numerous projects, profiled key personalities and reported on new equipment, techniques and processes.

1960s

iC was launched at a key time. The early 1960s saw global wealth and personal living standards start to rise steeply after the trauma of World War II. The same period saw huge cultural changes take place around the world - the 1960s will be remembered as a time of great creativity and artistic achievement as well as a time of political reform in many countries of the world.

There was a taste for the futuristic in popular culture, and the construction industry was not immune to this fad. Forming part of the 1964/5 World's Fair in New York, US, General Motors' Futurama exhibit included concept construction machines that could lay roads through a jungle in a single pass.

Today these models look terribly naive and dated, and needless to say they turned out to be little more than fairground attractions. But equally, the machines that were actually on use on sites around the world look out-dated, and possibly even primitive.

Boxy, basic designs were the order of the day, and operator comfort was an unheard-of concept - enclosed cabs were a rarity, and needless to say seats were hard and unforgiving, while controls were often crude and hard to use.

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As unsophisticated as these machines were, the 1960s saw arguably the most significant change in the history of construction equipment, with the widespread adoption of hydraulics in place of cable-operated equipment.

The creativity and ambition of the decade also saw some key buildings being constructed. The architecture of the 1960s is not without its critics, but this does not necessarily detract from the achievements of the decade.

Take for example the vehicle assembly building at Kennedy Space Center in Florida, US, which was completed in 1966. At 160 m high, it remains the tallest single-storey building in the world to this day, and it is still the tallest building in the US outside an urban area.

1970s

If the 1960s were an era of ambition and creativity, the 1970s were perhaps a harsher economic time, as the global oil crisis of 1973 and the 1979 energy crisis caused by the Arab oil embargo and Iranian revolution triggered weak economic growth, and high unemployment and inflation in many countries.

Indeed, two of the most iconic construction projects of the decade, the Sydney Opera House in Australia and the World Trade Center twin Towers in New York, US, were initiated much earlier.

The Twin Towers were completed in 1973, following ground-breaking in 1966 and stood just shy of 400 m when finished, overtaking the Empire State Building as the world's tallest building. However, they were topped less than a year later with the completion of the 422 m Sears Tower in Chicago, US.

The project was also notable for the way its construction techniques pushed the boundaries. Each tower was equipped with four Favco STD 2700 self-climbing luffing jib tower cranes. These were able to lift 22.5 tonnes each, which allowed three storeys to be completed every ten working days.

The Sydney Opera House meanwhile was more notable for its striking architecture than sheer size, although with a footprint of 1.8 hectares and a main auditorium containing 2679 seats, it is no minnow.

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As construction projects go, the scheme was famously long-winded and dogged with controversy. Construction began in 1959 with the building of the Opera House's podium, and the subsequent 15 years would see a string of problems, including the resignation of the original architect, Jørn Utzen in 1966. The final cost of the scheme was AU\$ 102 million - about AU\$ 1.11 billion (US\$ 1.13 billion) in today's money, compared to the 1957 estimate of AU\$ 7 million - AU\$ 138 million (US\$ 140 million) today. Some ten times over budget in other words.

In terms of technology, the 1970s started to see computers used in construction, and it was a trend that iC tracked. In 1971 the view was that it was hard to find any advantage in using computers in the industry - they were expensive, physically very large and not very powerful.

But by the end of the decade these issues were being overcome and specialist software for the construction industry was being developed. Computer Aided Design (CAD) packages were able to produce drawings quicker than a draftsman and the full potential of computers were starting to be realised as the first 3D modelling software was developed.

Technology was also playing a part in the world of equipment. High pressure hydraulics had become firmly established across many equipment types, and towards the end of the decade, on-board electronics first started to appear on machines. The 1979 ConExpo exhibition for example saw Dynapac unveil its 'Compactometer' to monitor compaction and alert the operator when the correct level had been achieved.

1980s

In economic terms the 1980s started badly, with the measures put in place to combat inflation from the 1970s oil and energy shocks leading to recession and high unemployment in many countries. In Europe and the US it was rising interest rates that did the damage to domestic economies, and there was a knock-on effect to indebted developing countries, which led to the Latin American debt crisis.

But as these problems started to recede, interest rate cuts, tax cuts and the deregulation of many industries and labour markets around the world led to a surge in economic growth and what is often referred to as the building boom of the 1980s.

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In some parts of the world this had started earlier - the high oil prices of the 1970s helped drive construction in the Middle East and other oil exporting nations. However, this boom faded in the 1980s, even as other countries were seeing activity pick up, due to the fall in oil prices.

The upswing in land and real estate prices re-ignited the appetite for high-rise construction in many major cities. In Europe this saw the construction from the mid-1980s to the early 1990s of many major business centres such as the docklands in London, UK, La Défense in Paris, France and Frankfurt, Germany's financial district.

The boom was also seen in Asia, where key countries were building infrastructure to serve their increasingly high-rise cities. Singapore for example completed work on its new Changi Airport in 1981, which has since gone on to become a major Asian hub.

But perhaps Japan typifies the booming 1980s more than any other country, where speculative real estate projects saw construction activity accelerate, but which also created a huge bubble in the sector. By 1989, property prices in downtown Tokyo were as high as US\$ 1.5 million per square metre, and the subsequent bursting of that bubble is something Japan is yet to fully recover from.

In terms of iconic schemes, the Channel Tunnel between France and the UK stands out as one of the most ambitious projects of the decade. At 50.5 km long and with a 37.9 km undersea section, it remains the longest sub-sea tunnel in the world.

Construction ran from 1988 to 1994, employing 15000 people at the peak and using 11 tunnel boring machines (TBMs). The final cost was UK£ 4.65 billion in 1985 terms - about UK£ 11.8 billion (US\$ 18.4 billion) in today's money, which represented about an 80% cost over-run.

Despite this, in 1999 it was voted the greatest construction achievement of the 20th century by readers of construction magazines around the world, in a poll conceived by the organisers of that year's ConExpo/Con-Agg exhibition in Las Vegas, US.

Watchers of the equipment sector will probably remember the 1980s best for the IBH scandal. Founded in the 1970s by young German entrepreneur Horst-Dieter Esch, the company was built on a string of acquisitions including Terex, Hanomag (since acquired by Komatsu), Zettelmeyer (now Volvo) and Hamm (now Wirtgen), among many others.

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At its height in the early 1980s, revenues hit DM 2 billion - about US\$ 3 billion in today's money, and the company was reckoned to be the third largest player in the industry after Caterpillar and Komatsu.

However, heavy borrowing and weak economic conditions saw the group disintegrate into insolvency in late 1983, triggering something of a banking crisis in Germany. In 1984, Mr Esch was convicted of fraud and subsequently served four years in prison.

On his release in 1988, he and his family moved to the US, and in what must surely be one of the strangest career changes in history, he invested in, and became a manager of Wilhelmina Models, one of the largest agencies in the global fashion industry.

1990s

Like the 1980s, the 1990s began with a recession triggered by 'Black Monday', the October 1987 stock market crash, and which was perpetuated by the spike in oil prices that came with the 1990 Gulf War.

But it was a decade that also saw the 'Tiger Economies' of South East Asia flourish, led by Hong Kong, Singapore, South Korea and Taiwan, even though the over-borrowing that went along with this boom led to the 1997 Asian Financial Crisis.

It was period that saw many Asian countries assert themselves on the world stage, and construction schemes like the 452 m high Petronas Twin Towers in Kuala Lumpur, Malaysia - the tallest building in the world from 1998 to 2004 - are testament to this.

In Europe meanwhile the formation of the European Union in 1993 paved the way for the Trans European Transport Network (TEN-T) initiative. This ambitious project was designed to ease the bottlenecks in Europe's transport network - many of which existed at national borders - and lead to the development of a region-wide network.

As such it paved the way for the construction of many of Europe's high-speed railway lines as well as iconic cross-border corridors like the 16 km Øresund road/rail link between Sweden and Denmark, completed in July 2000.

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Also worthy of note as a TEN-T project is the Gotthard Base Tunnel under the Alps in Switzerland. At 57 km long, it has overtaken the Seikan Tunnel in Japan as the world's longest rail tunnel, and is due to open in 2016 after a 20-year construction and fit-out period.

The 1990s were also notable for the reunification of Germany, following the fall of the Berlin Wall in November 1989. In construction terms, this led to a revitalisation of the capital, Berlin, in the former East. But the building boom in the first half of the 1990s was to be followed by a recession in German construction that would last more than a decade. It was a downturn that would take Philipp Holzmann - Europe's second largest contractor at the height of the reunification boom - into bankruptcy in 1999, and arguably sowed the seeds of Walter Bau's 2005 insolvency.

And there would be other ramifications from the crumbling of the Eastern Bloc, with numerous countries in central and Eastern Europe freeing themselves from communist control. The collapse of the USSR meanwhile saw 15 countries - the likes of Belarus and Ukraine in Europe and Uzbekistan and Kazakhstan in Asia - being reborn.

Financial aid and development bank loans, combined with the countries' own economic growth saw a long building boom established in Eastern Europe - one which in some countries, like Poland, continues to this day, as aging infrastructure continues to be replaced.

But one of the most remarkable projects of the decade was Chek Lap Kok airport in Hong Kong, which opened in 1988 to replace the over-stretch Kai Tak Airport with its famously hair-raising approach.

Building Chek Lap Kok involved levelling two high rocky islands totalling 3.02 km² in the mouth of the Pearl River and using the spoil, along with reclaimed material to create the 12.5 km² airport site. A total of 347 million m³ of material was moved in the project and the entire scheme - including the construction of the airport buildings - took just seven years.

Like the Channel Tunnel, Sydney Opera House and World Trade Centre Twin Towers, Chek Lap Kok was voted one of the ten greatest construction achievements of the 20th Century.



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The 1990s was also a period when the construction industry began to become more globalised. In the equipment sector consolidators like Volvo, Komatsu and Caterpillar were growing their portfolios by buying-up mid-sized regional specialists, while in the US, Terex had come back from the brink of bankruptcy and started a string of acquisitions that would see it add some 50 brands to its portfolio over the course of the next decade.

Contractors also started to merge in the early 1990s, both to consolidate regional markets, and in the case of the likes of Hochtief and Skanska, to branch out into new continents.

The 1990s was also a period when the emergence of Public Private Partnerships (PPPs) saw construction companies start to not only build infrastructure, but to own and operate them too, particularly toll roads, bridges and airports.

2000s

Like the previous three decades, the first ten years of the 21st century began with a recession, although this time the trigger was the shock of the 9/11 attacks on the US, which saw terrorists destroy the Twin Towers of the New York, US World Trade Center.

But the 2003 to 2008 period was one of the most remarkable periods of growth the construction industry has ever seen, with all regions of the world seeing economic growth. It will be remembered as a decade that China emerged onto the world stage as a major construction market. By the end of the decade its ambitious infrastructure building programme and rapid development had seen it overtake Japan to sit behind the US as the second largest construction market in the world.

It was also a decade during which China's construction equipment manufacturers started to emerge as genuine global contenders, like the Koreans and Japanese before them. Indeed, the Chinese government's huge stimulus spending plan at the end of the decade, when the rest of the world was in recession in the wake of the Lehman Bros. collapse, saw the country's construction equipment market swell to over 0.45 million machines per year - more than any other country has ever seen, and at the time, more than the rest of the world put together.

The equipment sector itself saw more and more sophistication creep in over the course of the decade. Machines became much cleaner, following the introduction of exhaust emission laws in the US and Europe in the late 1990s. Laws which continue to get more stringent even now, and which have since spread to other parts of the world.

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Electronic control became an every-day part of construction equipment design, and the advent of GPS technology, sophisticated instruments from the surveying industry and high-speed communications opened the door for millimetre-accurate automatic machine control.

In terms of construction projects, the decade will be best remembered for skyscrapers. The title of the world's tallest tower block changed hands twice in the decade, with the Petronas Towers being overtaken by first the 510 m Taipei 101 in Taiwan, before the Burj Khalifa in Dubai, UAE smashed all records in 2010 when it reached 823 m. This made it not only the tallest habitable building in the world, but also took it past records held for other man-made structures such as transmission masts and observation towers.

The completion of the Petronas Towers in 1998 saw the record for the tallest building in the world move away from the US for the first time, and it may be permanent. From the inception of the skyscraper in the end of the 19th century up until 1998, the record had always been held in the US.

But since the completion of the Petronas Towers, the record has moved around Asia, and looks like it will stay in the Middle East for the foreseeable future at least. Constriction of the 1 km high Kingdom Tower in Jeddah, Saudi Arabia is expected to see the UAE lose the title on its completion in 2018.

And this typifies another key trend of the last decade, with the balance of economic power starting to flow away from 'old economies' like Europe, Japan and the US to large, high-growth developing countries including Brazil, Russia, China and India - the so-called BRICs.

The next 50 years?

Looking a few weeks into the future can be difficult enough, so predicting how the construction industry will look in 2062 is a near impossible task.

But consider today's trends. The world population is growing, and is likely to be in the region of 10 billion people by 2062, although it is expected to have levelled-off by then. The trend towards urbanisation looks set to continue. From 35% in 1980, now more than half the people in the world live in cities. If that trend continues, the equivalent of today's entire population - more than 7 billion people - could be urbanised by 2062.

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The implications for the construction industry are massive. The need for transport, energy, water and sanitation infrastructure will be huge, and the drain on the world's resources will mean that sustainability and conservation will become more and more important.

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