Software and Service Solutions for 4D Acquisition & Reservoir Monitoring

Time-lapse, 4D imaging is a proven technology for unlocking enhanced production from oil & gas reservoirs. With over 50 projects successfully completed, Concept Systems is a leader in providing 4D software and service solutions to major oil & gas companies and acquisition contractors. Our software and service solutions cover the entire 4D cycle from feasibility through survey design and planning to acquisition and processing.

A 4D program is created to image subtle changes in the reservoir. The key to delivering these imaging objectives is to maximize repeatability. In marine streamer acquisition, the combination of the towed streamers and the differences in source/receiver positions between successive surveys is a major source of error that can adversely affect repeatability. In order to minimize these positional differences and ensure repeatability, it is necessary to measure them and understand what factors impact them. In 2001, Concept Systems began a research project in partnership with Shell Expro to develop software to measure positional errors in 4D surveys and correlate them with the processed seismic data. The resulting repeatability technology was used successfully in Shell’s 2002 North Sea 4D program to QC/optimize the acquisition and to choose 4D infill.

In the design and planning phase of a 4D project, Concept Systems develops software to measure 4D repeatability and analyse multiple acquisition scenarios, providing insight on the best compromise between repeatability and acquisition costs. Used by our 4D services team, Concept Systems’ 4D repeatability software is the core tool in a range of in-house developed software technologies that provide our clients with a 4D solution to meet their needs. In the acquisition phase, Concept Systems offers consulting services and software for in-field 4D acquisition that optimizes the quality of repeatability and ensures smooth operation of the 4D acquisition.

Unlike towed streamer acquisition, seabed imaging allows for the full seismic wavefield to be sampled. Coupled with 4D imaging, the image quality greatly improves and you have an enhanced image of the subsurface over time. For permanent OBC (POBC) 4D installations, such as that deployed at BP’s Valhall field, the challenges are different from streamer acquisition because geometric repeatability is less critical in the overall 4D quality. This environment provides opportunities to increase repeatability on non-geometric parameters and to streamline the acquisition and processing flow. For example, a suitable POBC Data Management system can increase repeatability by monitoring tidal height, background noise, water temperature and source directivity resulting in superior image quality. Concept Systems offers integrated IT solutions which provide command and control, navigation, automated seismic QC and full volume data management for Permanent OBC (POBC) projects. Our solutions are based on proven technology, Fast Track IT development, engineering consultancy and field support.
New York City, – Visionary Italian architect Dr. David Fisher today announced the launch of the revolutionary Dynamic Tower, the world's first building in motion, to be constructed in Dubai and Moscow with other locations planned worldwide.

Rotating Tower Dubai Development Ltd headed by the Dynamic Group, announced the opening on June 24 of the reservations list for the first Dynamic Tower in Dubai. The company has also revealed the design and floor plans of the rotating building which will have 80 floors and be 420 meters (1,380 feet) tall. Apartments will range in size from 124 square meters (1,334 SF), to Villas of 1,200 SM (12,916 SF) complete with a parking space inside the apartment.

Dr. Fisher also announced that the second Dynamic Tower planned for Moscow is now in the advanced design phase, with preassembling of the units to start soon and completion scheduled for 2010. The developer is the Mirax Group, headed by leading international developer Sergei Polonsky, The Moscow tower, which will have 70 floors and be 400 meters (1,310 feet) tall, will be located in Moscow City area, the new prestigious part of the Russian capital. “Our intention is to build the third Rotating Skyscraper in New York,” Dr. Fisher stated. “Additional Dynamic Towers will be built around the world, following an expression of interest from developers, governments, and public officials to construct a Dynamic Tower in Canada, Germany, Italy, Korea and Switzerland”. The Dynamic Tower offers infinite design possibilities, as each floor rotates independently to create a building that constantly changes shape, resulting in a unique and ever evolving architectural structure.

“The Dynamic Tower is environmentally friendly and the first building designed to be self-powered, with the ability to generate its own electricity, as well as for other nearby buildings, it achieves this feat with wind turbines fitted between each rotating floor, An 80-story building will have up to 79 wind turbines, making it a true green power plant,” Dr. Fisher stated. The Dynamic Tower is also the first skyscraper to be built entirely from prefabricated parts that are custom made in a workshop, resulting in cost savings, this approach known as the Fisher Method, also requires far fewer workers on the construction site, thereby dramatically lowering construction costs.

“Each floor of the building can be completed in only seven days. From now on, buildings will be made in a factory,” Dr. Fisher said. By combining motion, green energy and efficient construction, the Dynamic Tower will change architecture as we know it, and herald a new era of Dynamic Living. Renowned Italian architect Dr. David Fisher is the creator of the Dynamic Tower, a building in motion. He has spent more than 30 years working to redefine the technical and technological extremes of buildings in cities like London, New York, Moscow, Hong Kong, Paris and Dubai.
REINVENTING THE WHEEL

As Dubai developers race to build the world's first rotating tower, a group of architects from Brazil and the US are claiming the race is over and has been for the last four years. Bahrain editor Benjamin Millington looks at how they did it.

There's been a lot of hype in Dubai this year about building the world's first rotating tower with two towers runningg yer for the title due to start construction in the coming months. But apparently it's already been done. The 11-storey Suite Villard was built in 2004 in the Brazilian city of Curitiba and says claim to being the world's first tower to have independently rotating apartments.

The tower was designed by Brazilian architect Oscar de la Renta and mechanical engineer Alan Holzman with the assistance of several American architects, including Demetrio Mitchell.

"There are all these people in Dubai talking about rotating this and that - we've done it!" said Mitchell. "After we started marketing our product in Dubai that's when everybody began talking about rotating this and that, but I don't think anybody else can do it.

Mitchell said the Suite Villard was built as a prototype and research vehicle to test their patented rotating technology and ensure their engineering concept worked in practice.

Exceeding expectations

Four years after construction, Mitchell said the rotating mechanism has far exceeded their expectations and there has not been a single malfunction.

The marketing arm of the venture, Carroso Real Estate Technology, is now seeking developers to build more ambitious rotating towers in several locations around the world, particularly Dubai.

While the project has received acclaim from investors, they do have one distinct advantage over the competition: they can point to the Suite Villard and say - look at us.

Mitchell said there is nothing unique about the structure of the Suite Villard and that it uses standard building technology.

"We have a single concrete core of a large diameter and from that we have a concrete frame that comes out and counterweights the floors and provides as a platform," he said.

"On that platform we've devised an extremely simple mechanism that allows us to rotate the floor, walls and ceiling around the core.

"At the level of the tower similar to that of a revolving restaurant, which has the plumbing in the core and is surrounded by a turning floor.

"The difference is that the Suite Villard also rotates the walls and ceiling, but more significantly, the floor support and rotating mechanism only takes up 45 percent.

"(Standard mechanisms in revolving restaurants such as the space needle in Seattle - they have a fairly deep structure of several feet to rotate one single floor - we can do it in 15 inches," said Mitchell. "That's the beauty of the technology is that you have very normal spanning between the floors.

"It could be even smaller. But some of the thickness is due to the fact that we need to have the ability for maintenance to crawl into the structure in the event that there are any mechanical problems.

With each apartment taking up an entire floor, each tenant has independent control of the speed and direction of their own floor.

The Suite Villard (main photo) in the Brazilian city of Curitiba was built in 2004 and claims to be the first tower with independently rotating apartments.

The tower, with a single core that rotates around a central core and is supported by a stationary balcony on the outside. All plumbing for the apartments (left) is located in the stationary core.

The building is rotating around a touch screen.

Mitchell said their implementing mechanism achieves very smooth rotation and is almost completely undetectable, but he would not disclose many details.

"The simplicity of the system is taken to such a degree that if I were to mention any component at all, you'd be able to say what it is," he said. "But the beauty of this thing is it's anything needs replacing, especially (the main component that drives the rotation). The dollar value would be incredibly large.

"It's not enough to worry about even for a poor Stone Age man, but especially for the type of people buying these apartments."

Mitchell said the system requires very little floor space and is installed to "maintaining a simple, common household item."

And estimates the lifetime of the mechanism could be between 40 and 50 years. He also said the amount of energy needed to rotate a floor is similar to "what you might use to run a washing machine.

"Everybody has seen in terms of other rotating buildings, they're light years behind us," he said. "They're dealing with a tremendous amount of weight and mass trying to rotate a whole level or the entire building.

"We're taking the floor, walls and ceilings and rotating it - it's a much easier task.

To supply electricity from the core to the rotating area of the apartment Mitchell said they used a standard bus bar system on each floor, similar to technology used in subway systems.

As the apartment rotates, bus bar picks up electricity from capacitor modules around the stationary core of the building.

Supplying plumbing to rotating building is not as easy and the Suite Villard developers to keep all bathrooms and kitchens in the stationary core of the building.

But Mitchell said they have since developed a type of rotary joint which will allow them to put the plumbing in the turning area of the apartment.

"In a sense this is necessary anyway because of fire protection issues and things like that," he said. "The writing is also on the wall for our future with the world's first rotating building.

If I'm going to give us more freedom in design of the apartments."

Looking to the future

As the Suite Villard building technology reaches for investors to back a new project, the tower's architects have been working on a range of new designs for larger and more aesthetically pleasing towers.

These include 40-storey residential towers and even a floating hotel with eight decks of rotating hotel units.

Mitchell said he believes when it comes in building another tower or tower because there is a definite market for people who want a rotating apartment.

"If that wasn't true we wouldn't be hearing so many people talking about rotating a building," he said. "I also think that there's another factor as well in certain parts of the world. Dubai, in particular, where people just want to have something that you don't know, and we're happy to provide that for them."

But given the current global economic climate and slowdown in the construction industry, the group may struggle to attract the investors that were throwing money at the "novelty factor" projects in Dubai just six months ago.

The Suite Villard may be the world's first rotating tower, but it may have just missed the boat of Dubai's construction boom.

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The Schedule Performance Index is a measure of project efficiency given by Project Management to gauge the progress and efficiency. A Schedule Performance Index score of 1 or greater is an optimum goal since it shows the Project Management that the project is on track and has favorable conditions of meeting the required goals. However, a Schedule Performance Index less than 1 is to be avoided since that shows the project is not meeting goals and is showing unfavorable conditions that could lead to project failure if the current course of action is allowed to continue. If the Schedule Performance Index showing a trend that is at or approaching 1, the Project Management will re-evaluate the current conditions of the project and begin an analysis of the current project trends and begin corrective actions. Schedule Performance Index trend is rising, the Project Management will analyze the goals and the current favorable conditions to possibly re-assess the project’s short term goals. The Schedule Performance Index is a ratio of Earned Value (EV) to the Planned Value (PV). Earned Value is the value of the project at its current timeframe. Planned Value is the overall projected value of the project at the same time as the Earned Value. To determine the project’s Schedule Performance Index the Project Management divides the EV by the PV. This can also be shown as a simple formula; SPI = EV/PV.