Image courtesy of redchillies.vfx

Bollywood's superpowered blockbuster

Extraordinary CGI/VFX in *Krrish 3*

When Bollywood fans watch *Krrish 3*, they will experience a visual effects extravaganza. There are highly complex sequences involving the entire Mumbai skyline, gripping aerial combat, a villain in a melting metal suit, 10 stories from atop a landmark Mumbai skyscraper crashing down onto the street, and human mutants that can turn into jelly or attack with an elongated frog-like tongue—these are just some of the effects sure to amaze audiences in the world's largest movie-going market.

Krrish 3, released in November 2013, is the latest sequel in the highly popular Krrish series. The story follows Rohit Mehra, a scientist, and Krishna "Krrish" Mehra, his superhero son, as they face an elaborate conspiracy orchestrated by the evil genius Kaal and his henchwoman Kaya. In the process, Krishna's pregnant wife Priya is kidnapped by Kaal and the form-changing Kaya takes her place at the Mehra home and eventually falls in love with Krishna.

The film was written, produced, and directed by famed Indian director/producer Rakash Roshan. *Krrish 3* also stars his son Hrithik Roshan in the title role along with a supporting cast of other well-known Bollywood actors.

Enter redchillies.vfx

What makes *Krrish 3* a breakthrough for Bollywood is the visual sophistication of the CG effects that surpasses anything seen in Indian films before. To achieve these new levels of imaginative realism, FilmKRAFT Productions Ltd, the producers of *Krrish 3*, enlisted the talented design team at redchillies.vfx to create CGI/VFX for the movie. Based in the heart of the showbiz district of Mumbai, redchillies.vfx, owned by Shah Rukh Khan, is an independent post-production studio specializing in visual effects for feature films and commercials. redchillies.vfx has established itself as one of India's top visual effects studios with a portfolio of award-winning Bollywood films. Their state-of-the-art facility houses some of the best talent and equipment in the country, and a proprietary production pipeline enables redchillies.vfx to handle numerous complex projects simultaneously.


Keitan Yadav

Challenging visuals

"One of the main challenges we faced on this film was the vast requirement for digital environments," says Keitan Yadav, COO and VFX producer, redchillies.vfx. "So we broke down every shot to understand the best approach to increase our productivity. A combination of live-action footage; digital matte-painted extensions; 2D, 2.5D, and 3D projections; and full CGI techniques were applied." All told, it took the redchillies.vfx team of 300 artists and animators 18 months to complete the *Krrish 3* effects, 65 percent of which were primarily CG with the balance involving some degree of live action.

The VFX work began by building a library of reference assets for creating the film's massive real-world-scale environments. Haresh Hingorani, CCO and VFX supervisor at redchillies.vfx, shot extensive helicopter footage of Mumbai for background plates, and supervised the assembly of thousands of textures, high dynamic range imaging, and reference images of various locations in Mumbai. The redchillies.vfx team also created thousands of 3D assets of buildings, props, and vehicles using various photographic references. To add authenticity, the assets were positioned according to an aerial map of Mumbai. The designers even added fine details like phone lines, clothes lines from windows, and rooftop props. "We took great care to make sure that the scale of the buildings adhered to real-world Mumbai and that we portrayed that world in exacting detail," Hingorani added.

Among the film's most challenging visual effects were those found in the Airbus A380 scene. Here the superhero Krrish is seen clinging to a landing gear


Haresh Hingorani

strut as the huge jet comes in for a landing at Mumbai airport. What's remarkable about the sequence is the photorealism of the aircraft, seen in close-up throughout the sequence, and the aerial background of modern day Mumbai, which was recognizable to many moviegoers. Due to security regulations, the producers were unable to shoot live footage at Mumbai airport, so those scenes involving the runways and terminals had to be done entirely in CGI. To create a completely accurate and realistic A380 in flight, the redchillies.vfx artists collected technical documentation and footage of a giant Airbus. These assets enabled the team to thoroughly study the aircraft's functions, flight characteristics, and textures, and provided an exact reference for all the A380 scenes.

As Haresh Hingorani noted, the A380 scene was complex to create, but truly satisfying for his team when done. "The main plate with the actor was shot against green screen and the rest was all CG. The challenges in the sequence were to get the camera moves correct, to have all the buildings

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look real, to make the sky beautiful with the sun flaring out on the left side, and to have the jumbo jet's shadow fall realistically over the ground and buildings. We also replaced the cloth cape on the actor with a CG cape and the finished aesthetics of that had to look real as well as dramatic. It took a lot of work but it ended up as one of the most stunning scenes in the film."

Another memorable effects sequence was the scene involving the character Kaal's metal suit. The evil Kaal uses his super telekinetic power to rip off shreds of metal pieces and plates from the environment around him to form his suit of armor, which subsequently melts during exposure to sudden heat. The complex suit was comprised of 233 parts, all of which had be shown melting. Each metal piece was manually animated using vortex animation with the help of deformers in Autodesk® Maya® software. The primary pieces had to be painstakingly animated to match the flow and timing of the shot to avoid the interpenetrations of the polygons. "We modeled the suit entirely in 3D with Maya and generated immense detail in the design," said Yadav. "We then match-moved the whole thing on top of the plate. By using a lot of scripting and manual animation we could show the suit melt and we also could see liquid metal dripping off the villain's body. Our R&D team did a lot of tests to come up with a perfect solution that worked nicely to create this melting effect."

Familiar, but powerful tools

Playing a central role in the creative process were two software tools that Hingorani describes as "the backbone of our 3D pipeline": Autodesk Maya and Autodesk® 3ds Max® software. As already noted, Kaal's metal suit was created—and melted—in Maya, and 3ds Max was used to depict the crashing Mumbai skyscraper and composite the smoke and debris seen in the numerous destruction effects. The modeling and texturing of the falling skyscraper alone involved 8.5 million polygons with over 20 layers of debris,

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sparks, explosions, and other elements composited within 3ds Max to create the final effect. "We used Maya extensively for character animation and 3ds Max to show heavy-duty destruction in many sequences," Hingorani elaborated. "Maya was used where Kaal tears apart the set and turns it into the metal shards that form his suit. Maya was also our key tool for previsualizing all the critical VFX sequences. These Autodesk tools enabled us to use digital doubles to perform unbelievable stunts."

Making the comparison

With *Krrish 3* setting new standards for CGI effects in a Bollywood film, it's only natural to make the "Bollywood vs. Hollywood" comparison. For Keitan, a gap still remains, though it's closing fast: "Bollywood has made giant strides in the VFX space in recent years," he noted. "If you look at Bollywood films made over the past few years you will notice a huge growth in the quantity and quality of the VFX. There have been big releases in Bollywood in recent years that had enormous budgets for VFX. This points to the fact that the gap is closing."

When it comes to the box office, it appears that Bollywood has already matched, if not exceeded, the excitement and viewership of a Hollywood blockbuster. Since its domestic release, *Krrish 3* has already generated revenue and audience numbers that have earned the "blockbuster" rating from Box Office India. With that kind of success, it's likely that even bigger superhero blockbusters are on the way from Bollywood, featuring even more elaborate VFX that will leave audiences gasping and asking for more.

Image courtesy of redchillies.vfx