

Special Gears Help Hatch a Summer Movie

Gear Technology's bimonthly aberration — gear trivia, humor, weirdness and oddments for the edification and amusement of our readers. Contributions are welcome.

Chicken Run—the summer movie that used stop-motion clay figures—is about a group of chickens laying a plan to escape from their farm before they're turned into chicken pies. Distributed by Steven Spielberg's DreamWorks, *Chicken Run* is also about a group of specially-made worms and wheels.

To make its movie, Aardman Animations needed special wormgear sets to help create the movie's special effect: chickens and people, made of clay, who walk and talk—and look natural doing so. The British movie company could create that effect by moving the clay figures in small increments as it shot a scene, but it needed a camera that could hold its exact position and repeat its exact motion in a scene as figures were slightly adjusted, again and again and again.

"That's what was critical," says Tom Barnes, the movie's technical director. "Because of the way we work, just about everything is a special effect."

"A simple shot may take weeks to film," he adds, explaining that a camera might move only 3 degrees or 4 degrees in one shot, but might move those few degrees over several weeks—perhaps 1 degree a week. "It was very important for a camera to hold a position accurately."

To get such cameras, Aardman needed new camera mounts. According to Barnes, the company's cameras were from the 1930s, with old, manual mounts that had been motorized.

"They were not particularly backlash free," he says. "They were not very stable mechanically overall."

Aardman arranged to buy new mounts made by Eimeldingen UK Ltd. of Bath. Eimeldingen produces precision rotary tables. Inside those mounts were specially-made wormgear sets from Holroyd, key parts in the mounts and the success of the movie.

"If there had been backlash problems, then we would not have been able to make the film the way that we wanted to," says Alan Gregory, Aardman's mechanical development engineer.

"The film is all about creating an illusion," Barnes says. "Anything that makes the film look awkward takes away from the audience's attention to the film."

Aardman needed gear sets that provided a gearbox ratio of 181:1, based on the camera's weight and the weights of various lenses that might be used. Holroyd provided those gear sets. Based in Milnrow, England, Holroyd makes precision gears—

including specialized wormgears.

The worm wheels were made of phosphor bronze, with 181 teeth, 13-millimeter face widths and 100-millimeter center distances. They were precision ground to have practically no eccentricity. The one-start worm shafts were case hardened and ground to profiles of 5 microns.

The wormgear sets had backlashes of 0.002–0.004 inches, so the cameras wouldn't vibrate. Eimeldingen reduced the backlash even more with a spring mechanism in the camera mount to maintain the gears' constant meshing and to compensate for wear.

Ray Butler, an Eimeldingen senior engineer, estimates the backlash became about 10 times smaller, making it virtually zero. "It becomes difficult to measure at that level," he says, "but about 10 times."

Barnes says the new wormgear sets improved the appearance of *Chicken Run* in two ways: "Any camera moves were smoother than they would have been otherwise" and "The repetition was more

accurate and consistent."

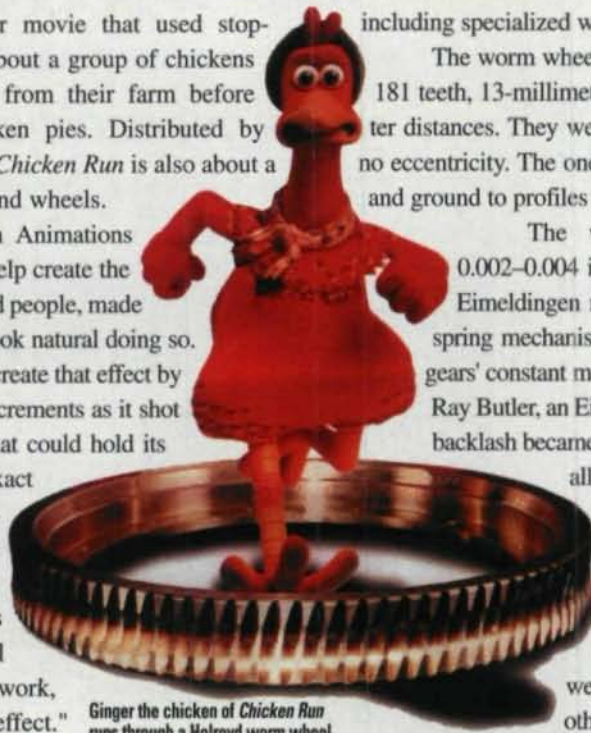
Each camera mount had two wormgear sets, one set for movement on the horizontal axis and one set for movement on the vertical axis. The sets provided 360 degrees of movement on both axes.

"We wanted the 360 degrees of movement to give us the flexibility we required," Barnes says.

With new mounts, the cameras could be moved to almost any angle and be remotely controlled by computer. The controls permitted movement in fine increments and with precise positioning, providing the required camera angles and distances.

With cameras able to repeat their moves more accurately and consistently, Aardman could reduce the number of scenes that had to be corrected or reshot after production. The new mounts, about 30, were used every day. Aardman needed a year and a half to make *Chicken Run*, which was shot in Bristol, England.

"They performed faultlessly," Barnes says of the gear sets, "I couldn't have wished them to be better." ⚙



Ginger the chicken of *Chicken Run* runs through a Holroyd worm wheel.

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