

# Beam structures to be made quake-resistant

By Vikas Bhargava/TNN

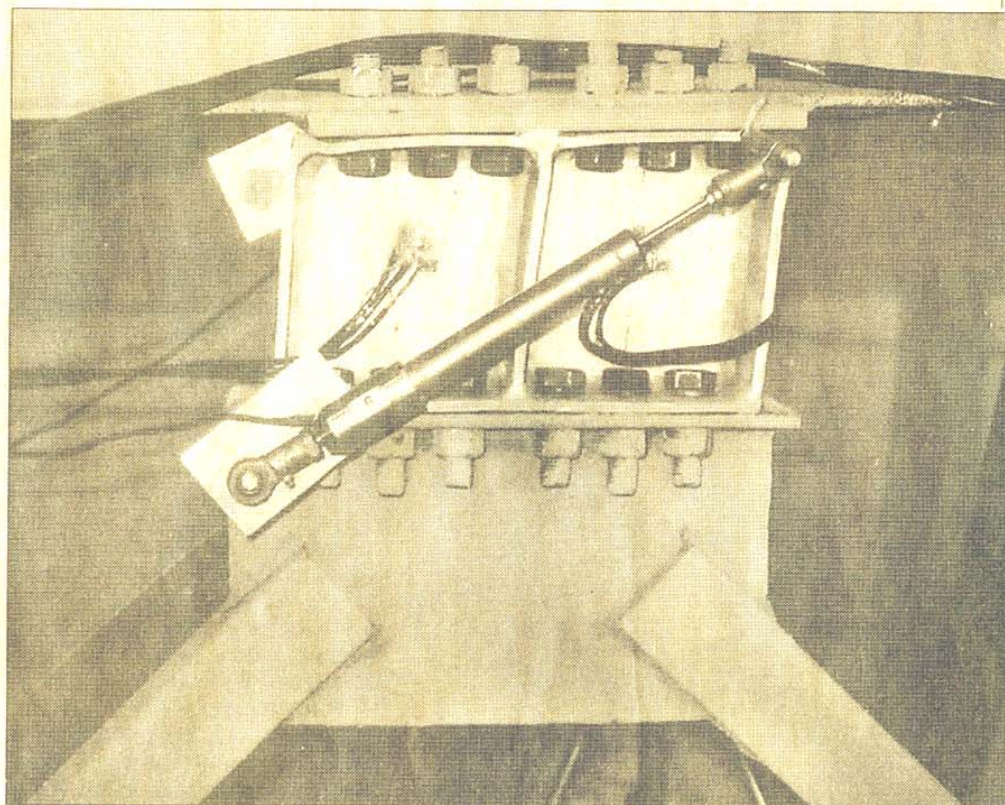
**Kanpur:** In a major technological breakthrough, a unique model has been developed at the Indian Institute of Technology, Kanpur (IIT-K) to retrofit the columns and beam structures in the parking area of a skyscraper in order to make them earthquake resistant.

A need was being felt to remodel the network of beam structures in the parking area of the ground floor of multi-storey buildings, as the entire load rests on this framework. "The columns and beams of ground floor develop cracks initially due to extra load leading to collapse during an earthquake," said Prof Durgesh C Rai.

"The first of its kind, the model uses a specialised aluminium device, capable of absorbing drifts up to 3.5 metres in a 100-metre tall buildings in case of seismic disturbances in the event of an earthquake," Rai added.

Prof Rai of the civil engineering department has been working on the development of the model to strengthen the framework of beams and columns for the last 15 years. He is the guiding force for a Ph.D student, who has developed the novel aluminium gizmo fitted in model, said to be at par with international standards.

Results of the experiments conducted on the model have proved that framework of columns and beams can be strengthened



The unique aluminium shear yielding device developed at IIT-K.

with ease, said Rai, adding, "Although my counterparts in the US were apprehensive

over the feasibility of using the aluminium gizmo named as 'Aluminium shear yielding

device.'

The model made of bolt fitted iron frames and braces with a special soft aluminium device placed in the middle has shown fabulous results, he declared on Wednesday evening after the trials that lasted for more than two years.

"It's the sheer hard work of Deepti Ranjan Sahu, a PhD scholar in structural engineering here that for the first time the application of aluminium shear yielding device has been successfully done in order to make the multi-storey buildings earthquake resistant," said project supervisor.

"The column strengthening system adopted in the model is highly efficient and effective. It has the capacity to sustain drifts that is beyond the average prescribed limits of 1.5 and 2.5 per cent," project supervisor added. The model has been tested successfully as per the testing protocol defined by the American Concrete Institute (ACI).

The model was tested to sustain 3.5 per cent drift and in the process barely a few mild cracks developed on the beam structure on putting external pressures that are equivalent to strains/forces exerted in the event of an earthquake, the research team said.

Deepti Ranjan Sahu said, "It's for the first time in the world that a device made of aluminium is being used in a building structure, so that it could be saved from crumbling during an earthquake."