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# Automated Composite Column Wrapping

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## AUTOMATED COMPOSITE COLUMN WRAPPING

### THE NEED

Recent earthquakes in urban areas such as Loma Prieta '89, Northridge'94, and Kobe '95, have repeatedly demonstrated the vulnerabilities of older reinforced concrete columns to seismic deformation demands. Particularly vulnerable are reinforced concrete bridge piers that were designed prior to the lessons learned from the 1971 San Fernando earthquake. These reinforced concrete columns with substandard reinforcement details and heavy corrosion problems, need to be strengthened using retrofit systems, consisting of concrete or steel jackets. Although effective, these systems are costly, installation is time consuming and some maintenance problem may arise. To increase the speed of installation, reduce maintenance and improve durability, different types of advanced composite column jacketing systems have been investigated and developed.

### THE TECHNOLOGY

The Automated Composite Column Wrapping is performed by a patented machine known as Robo-Wrapper.



FIGURE 1 ROBOWRAPPER



Currently there are three versions of the machine available for bridge retrofit work depending on the size of the columns being wrapped.



**FIGURE 2 CURING PROCESS**

The material used is manufactured by Thiokol Corporation and is designated "Akso Fortifil 50K/UF3325-90". It is made of carbon fibers pre-impregnated with epoxy resin under factory controlled conditions. Once installed on the column the material is cured with an oven at 310 ° F for one hour. The curing process converts the individual tows into a solid casing which is then coated with a textured paint to match the surrounding structure.



**FIGURE 3 CORROSION RETROFIT**

## **BENEFITS**

Composite column retrofit jacket systems can be structurally just as effective as conventional steel jacketing in improving the seismic response characteristics of substandard reinforced concrete columns.



Composite column retrofit system is less costly (About 10%) than Steel Jackets. Its installation can be performed in less time, and its uniform application and curing considerably reduces maintenance costs.

## **STATUS**

XXSys Technologies manufactures the equipment needed to perform the Automated Composite Column Wrapping. Several projects have been done up to date, most of them in California, where the existence of high seismic risk and old concrete structure has opened a big market for this concrete column retrofit system.

## **BARRIERS**

Concrete structures with not uniform surface might need to be treated and fixed before applying the composite wrapping. Since the process is automatic, uneven surfaces can cause poor quality retrofit.

## **POINT OF CONTACT**

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## **REFERENCES**

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## **REVIEWERS**

Peer reviewed as an emerging construction technology

## **DISCLAIMER**

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## **PUBLISHER**

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