

# Fasteners: holding communities in Kansas together

**K**AN STEP is a community development program sponsored by the Kansas Department of Commerce designed to help communities with an acknowledged community improvement problem. A minimum of 40 percent savings of typical "retail costs" must be shown through this self-help process. Types of facilities that qualify include improvements to water or sewer systems and buildings. Examples of eligible buildings may include, community buildings and fire stations. The program is designed to benefit low and moderate income people.

The KAN STEP program continues to expand and improve. Most people in smaller towns and

rural areas will invest of themselves with sweat equity, volunteering to help sustain their communities. Everywhere you look there is progress being made by someone improving his or her community. In

all cases, whether buildings are funded by the Kansas Department of Commerce, by local donations, or some other form of financing, one thing that will be used on any and all of these projects is a "fastener."

The definition of a fastener is a hardware device that mechanically joins or affixes two or more objects together. Items like rope, string, cables, chains or plastic wrap may be used to mechanically join

objects. These are not generally categorized as fasteners because they have additional common uses. Other alternative methods of joining materials include crimping,

I went to the Internet recently and searched for information on the theory of fasteners. I found an excellent Web site by Karl Kruszelnicki, an Australian author

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welding, soldering, brazing, taping, gluing, cementing or the use of adhesives. The use of force may also be used such as magnets, vacuum or even friction.

There are several different types of fasteners used in construction. While this may seem to be an odd topic for an article in

and science commentator on radio and television. He is a Fellow at the University of Sydney, in the Science Foundation of the Physics Department. Mr. Kruszelnicki's Web site provided the following information:

*"Fasteners include everything from nails to rivets and bolts. A phone is held together with about*



Shane Holthaus  
KAN STEP Tech



This photo shows a wall pour in progress. Many different fasteners are required to hold forms together in order to pour a concrete wall.

KRWA's magazine, I am fascinated with the history of 'fasteners' and would like to pass on some of the information I've found.

75 fasteners, a car with 3,500, and a jet plane with 1,500,000. The SR-71 Mach 3 spy plane is built of titanium, with titanium nuts and

bolts. The sockets also have to be made from titanium, because the nickel in standard sockets corrodes the titanium bolts. In the US, about 600 different companies make fasteners. According to labor statistics, those companies employ about 60,000 workers; they produce about 250 billion fasteners each year. In your average product, about 50% of the total production time is spent fastening parts together. Fasteners cost about 5% of the total cost of a product, but when you add the cost of assembly, fasteners take up about 30% of the final cost of a product. Fasteners are found in nearly every aspect of life not just construction but the invention of bolts, nails and screws sure have helped in the efficient manner of today's construction.

*"The Romans invented the first screws for attaching pieces of wood. The wood screws were bronze or silver. They made the threads by filing them, or by soldering a wire wound in a spiral. The first written reference to a*

*screw is in the early 1400's. In the late 1400's, John Guttenberg used screws in his invention of the printing press. Apparently nobody noticed Leonardo Da Vinci's designs from the late 1400's for screw-cutting machines, because the first machine to cut screws was built in 1568 by a French mathematician, Jaques Besson. The first nuts and bolts appeared in the middle 1400's. The bolts were just screws with straight sides and a blunt end. The nuts were hand-made, and very crude. When a match was found between a nut and a bolt, they were kept together until they were finally assembled.*

*"In the Industrial Revolution, it soon became obvious that threaded*

*fasteners made it easier to assemble products, and they also meant more reliable products.*

*"The next big step came in 1801, with Eli Whitney, the inventor of the cotton gin. The*



Self-tapping screws are commonly used for metal buildings to ensure penetration into the main frame of the building and solid placement.

*lathe had been recently improved. Batches of bolts could now be cut on different lathes, and they would all fit the same nut.*



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*“The next invention was by Henry Maudsley, an English inventor. He built a lathe that could cut screws of any diameter and pitch. Between 1800 and 1810, his invention dragged the art of*

finishing nails, bolts and screws for metal buildings, nail clips for a pneumatic air gun, and even glue (Liquid Nails) are all classified as fasteners. In the construction world, a day doesn't go by

to relate. During the basement wall foundation project phase alone, there were several different types of fasteners used. While setting wall forms, pins and wedges were used to fasten forms together and in turn hold wall ties in place and finally hold the two sides of the forms together. This scenario was just for the aluminum forms.

With two more types of forms used, this basement foundation wall set took quite a bit of ingenuity. The second type of form was an all steel form that was bolted together using a 5/16" x 1" nut and bolt. The nuts and bolts took the place of the pins and wedges used on the aluminum forms.

Because not all the necessary forms were available to the city through the rental company, Paul Froelich and other Enterprise volunteers were innovative and constructed what was needed out of plywood and angle iron. Filler forms were needed for the upper form set. Plywood and angle iron

*Nuts and bolts are used to fasten the roof purlins to the main beams of the steel building. This photo is from the new fire station in Asherville, Kan., located in Mitchell County.*



*making threads into modern engineering practice.”*

So that's some history on fasteners. Anything from hurricane straps to 6-penny

without needing to fasten materials together.

As an example, the use of fasteners with the KAN STEP Project in Enterprise is a good one

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were cut to predetermined sizes and fastened together with carriage bolts. Then the forms were installed in their correct place and then fastened together with bolts much like the process with the steel forms.

There was one more type of fastening used to accomplish setting forms in the Enterprise KAN STEP combination library, fire station project. A welder was used to fasten wall ties to supports for a one sided wall as well as patch holes on the steel forms. The concrete used to fill the forms helped fasten the steel reinforcement together and also the anchor bolts, which would in turn provide support for the steel structure. So just on this one project during this one phase of construction there were multiple uses of fasteners.

KAN STEP is a highly successful program that continues to help numerous communities across the state. From McDonald to Whiting to Burns and

Enterprise, local volunteers are proving that working together pays off – saving money and building communities, both physically and psychologically.

I encourage you to attend the KRWA Annual Conference held in Wichita at Century II on March 28-30.

If your community has a potential project and if the community has the capacity to utilize volunteers in the project's construction, I encourage you to learn more about KAN STEP. A KAN STEP session will be held at the conference on Wednesday, March 29 in Room 210 A.

For more information contact CDBG Compliance Officer Salih Doughramaji at the Kansas Department of Commerce by calling 785/296-3610; or visit the Department's Web site at: <http://kdoch.state.ks.us>.



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