

Even in forensic engineering, codes and standards can be used to determine the outcome of a civil or criminal court case.

Murder or Suicide?

The field of forensic engineering is one of the most challenging for an engineer to enter. For a plumbing/mechanical engineer, one is often asked to determine the cause of a failure or establish whether a crime was committed. The first is typically associated with civil law; the latter is criminal law. It should be noted, however, that many forensic investigations do not involve litigation, and are merely attempts to solve a problem.

When you enter the field of forensic engineering, you find that the codes and standards are extremely important in completing any investigation. Quite often, the cause of a failure is due to the deficiency on someone's part to follow the code(s) and/or standard(s). Part of the analysis is to determine who that someone is.

In December 2002, I was involved in my first criminal case in forensic engineering. A husband stood accused of murdering his wife. The husband claimed that his wife was distraught and had committed suicide.

You may be asking, "What is a plumbing/mechanical engineer doing in a murder trial?"

The district attorney claimed that the husband drowned his wife in the toilet (water closet). The husband claimed that she committed suicide by taking a drug overdose, then vomited in the toilet and drowned. During initial testimony, the husband claimed he found his wife dead, with her head in the toilet.

The job of the engineer is to determine whether the husband's story is more plausible than the district attorney's. The important question is, "Can an adult pass out while vomiting and drown in a water closet?"

When first asked this question, my answer was, "No way!" However, the district attorney went on further. He said that if I could prove that the husband's story might be possible, he would drop the murder charges against the husband.

In a case like this, an engineer has to work with other experts in piecing the puzzle together. When retained, the engineer must

not be an advocate for the client. A forensic engineer must be an advocate for the truth. Sometimes that is contrary to the client's position. Hence, the request from the DA was appropriate: "Tell me if this is possible."

In forensic engineering, the first thing you do is ask for all of the information you can possibly obtain. This would include police reports, autopsy reports, coroner's report, interviews, medical information, crime scene photographs, autopsy photographs, etc. If you are going to testify in court, the worst thing you can do is not review an important piece of information. A good attorney will discover your lack of proper review and attack your credibility.

The water closet in question was a Mansfield 3.5-gallon-per-flush, round-front bowl. The date of manufacture was 1979. This means that the bowl was manufactured to the 1978 edition of the ANSI/ASME A112.19.2 standard. While the actual bowl is important, what is more important is the understanding of the dimensions in the standard. Can an adult drown, unassisted, in any 3.5-gpf, round-front bowl?

In my many years in the profession, I had never heard of any adult drowning, unassisted, in a 3.5-gpf water closet. Of course, there are movies depicting this, and folklore, but no credible documentation that could be referenced.

I called many of my colleagues in the profession, including many of the engineers that work for water closet manufacturers. All had heard of the folklore; however, none had any documented cases. I continued with a literature search. There have been many deaths in a bathroom or toilet room, but none by drowning with the head still in the bowl.

It is also important to note that the victim was an adult. There have been many documented cases of unassisted drowning by children in a water closet, especially small babies. The difference is in the size of the body.

ANSI/ASME A112.19.2 has dimensional requirements for a round-front bowl. The

width of the bowl is 14 inches. The length of the bowl from the seat bolt holes to the front is 16-1/2 inches. The width of the rim is typically 1 to 1-1/2 inches. Thus, the largest inside opening of a round front water closet bowl would be 12 inches by 14 inches.

The smaller body frame is that of women. The average shoulder width is 16 inches. Hence, it is not possible to extend the body into a water closet bowl beyond the limits of the shoulders. Only the head can enter the bowl, especially if one passes out.

Another important dimension is the distance below the top of the rim to the water level. This distance typically varies from five to six inches. While the dimension is not specifically regulated, the distance to the water level was based on two factors: the splash factor when defecating or urinating, and the length of the male anatomy. When using a water closet in the seated position, one does not want to have the water splash so that it hits the body. The distance of six to seven inches below the water closet seat (add one inch for the seat) greatly reduces the possibility of the splashing water hitting the body.

The distance is also designed to prevent a penis from hitting the water in a sitting position. Rather than using average sizes, the distance assumes a longer than average penis. Although, it should be noted that not every larger size can be considered in the design of the bowl.

With the water five to six inches below the rim, an adult would have to extend his/her neck to submerge both the mouth and the nose when placing the head in the bowl. With the muscles at rest (dead or passed out), the mouth and nose cannot be simultaneously submerged. The average distance between the mouth and the shoulders is four inches. The mouth would be above the water level in the bowl.

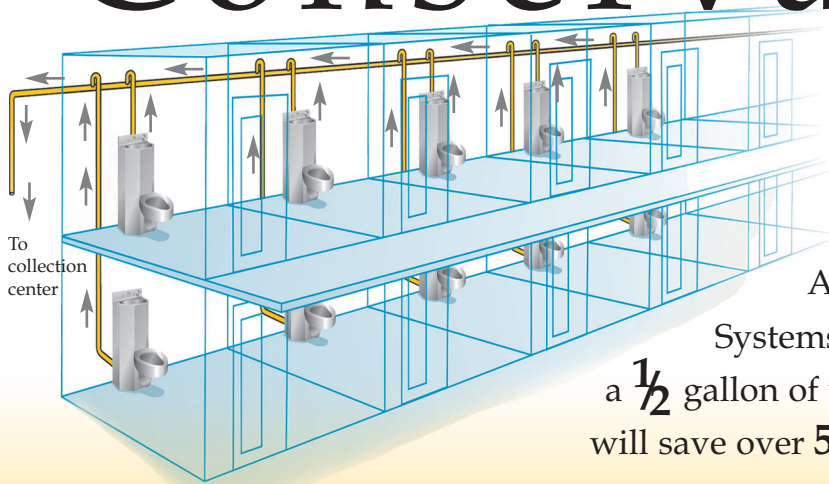
Upon testing these findings on a water closet, it was possible to submerge the mouth and nose by extending the neck. However, with the head just falling into the water, the mouth could not be submerged. For certain water closets, neither the mouth nor the nose could be submerged at rest.

The use of the standard and these dimensions made the husband's account appear impossible. But this is only the start of the investigation. Next month, I will continue with the information from the autopsy, the crime scene photographs, my last-minute realization, the trial, and the jury's verdict. **PME**

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