Pressure Relief Valves: The Last Defense Anya Patwa^{1,3} Vishwa Kalyanasundaram², Katherine Si², Emile Tezzo², Chunming Wu² Lawrence E. Elkins High School, Missouri City, TX Emerson Automation Solutions, Stafford, TX² Gifted and Talented Mentorship Program, Fort Bend ISD, TX[°] RESULTS

ENERSON INTRODUCTION

A pressure relief valve is a type of safety device used to control or limit the amount of pressure for optimal functionality of a system. Before the mid-1800s when relief valves became of better quality, a simple weigh-lever system was used in pressurized systems. Unfortunately, this design posed many destructive issues, leading to new designs and specifications. Two hundred years later, a pressure relief valve was made for steam locomotives. In the locomotive's system, the water in the boiler expands as it's heated and turned into gas which pushes the pistons connected to the driving wheels, thus putting the locomotive in motion. Today, variations of relief valves are used in homes and buildings and operating gas and power plants, but the vast majority of citizens may be unaware of their use and caliber to keep areas safe when utilized in engineering industries. The object of this endeavor is to assess the general public's knowledge of pressure relief valves and their relationship with safety.

METHODOLOGY

Data for this endeavor was collected via Google Forms survey where a randomized pool answered a combination of multiple ⁸⁰ responses choice, Likert scale, and free response questions. Questions were formatted so survey-takers could relate the engineering concept of pressure relief valves on a scale of daily applications. More specifically, the questions gave examples or answers that the survey-taker would most likely be familiar with (ie. a pressure cooker, volcano, or geyser).



Relief valves are designed to control or limit pressure in a system. How familiar are you with pressure relief (or relief) valves?

30 How crucial do you believe relief valves are to safety?

80 responses







If a relief device were to malfunction and does not open as designed, what could happen to the vessel on which it is located 0 responses





Pressure relief valve

Vessel increases in size Supervisor notes the malfunction in his Nothing

Explosion

Holistically, the data received by the public via the online survey shows that the majority of respondents have a very basic understanding of the use and need for pressure relief valves, more so in daily applications rather than the field of engineering. This indicates that there may not be enough education or knowledge surrounding the topic of pressure relief valves and their ability to keep people safe. Since relief valves are known to release some sort of liquid or gas, the researcher also wanted to identify the public's view/understanding of how impactful relief valve failure can be to surrounding areas, especially those where power and gas plants are commonly found. The data exhibits that though the overall idea of a pressure relief valve in the engineering field may not be commonly known, there is a finite understanding of how catastrophic relief device malfunction is. Overall, the data provided somewhat positive results indicating a lower educational significance of pressure relief valves.

Pressure relief devices, in and out of the engineering field are vital to the safety and 'flow' of our everyday lives. One success of the research conducted was the hypothesized consensus to further educate people of the Houston area on the vitality of pressure relief valves, from homes and buildings to the engineering field. If the experiment were to be conducted again, it would be beneficial to expand the pool of survey takers beyond city limits to receive more accurate results on the public's knowledge of pressure relief valves and other relief devices. Overall, the researcher's hypothesis was proven true, indicating that most people are unaware of relief devices, especially those in the engineering field and that the public advocates for an increased amount of education surrounding the topic.



FINDINGS

DISCUSSION