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Thermoplastic Polymer Membranes such as HDPE are welded or seamed together in the field with the use of heat and pressure. During this process the material is heated at the surface to a temperature where the structure begins to melt. External pressure is then applied and the result is a stable, uniform connection. Controlled seam velocity (speed) assures that the resulting weld is consistent along the entire length of the seam. It is these three critical parameters: Temperature, pressure and speed that must be determined and monitored to assure consistent welding performance and produce high seam quality.

Hot wedge welding utilizes a hot wedge that is passed between the two layers of geomembrane to be joined together. The surface area of the two membranes is melted by the wedge and then immediately pressed together by a set of Pressure rollers that apply a predetermined pressure based on material composition and site conditions. These pressure rollers usually also act as a drive system and are controlled by a drive motor to adjust the speed of the welding process.

Hot wedge welding machines currently allow for operators to pre-set welding parameters. However, these systems may not be able to adjust to changing site conditions (ex. voltage variance) or allow for monitoring of welding pressure. Closed circuit technology makes it possible for machines to self-regulate and maintain pre-determined values with changing site conditions. These systems can also be capable of monitoring pre-defined ranges (hi-low) of all critical welding parameters and provide real time alerts to the operator when there is a deviation in any of these fields.

Finally, this new generation of smart welding technology can be equipped with data acquisition, which continuously records and stores all three critical parameters, Speed, Temperature and Pressure. This data is then easily transferred on-site (via on-board LAN) to a smart phone, tablet or computer to allow operators and inspectors immediate evaluation in easy to read graphs and tables. The operator can also easily transfer this data (via cloud) to other team members in remote locations. This data can then be downloaded in .csv format for further processing or can be utilized in pre-formatted pdf reports.

Case studies and examples will be presented that illustrate the overall technology platform and demonstrates how this innovative technology allows installers, design engineers, inspectors and owners to benefit from:

- Control over higher quality installation standards
- Minimized weld seam failures and re-work time
- Machine generated welding quality data that can be accessed on-site
- Detailed data and position to immediately identify potential areas of concern along welded seams
- Automatic documentation with details and summary of all welding parameters
- Investment protection through Documentation of quality controls

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