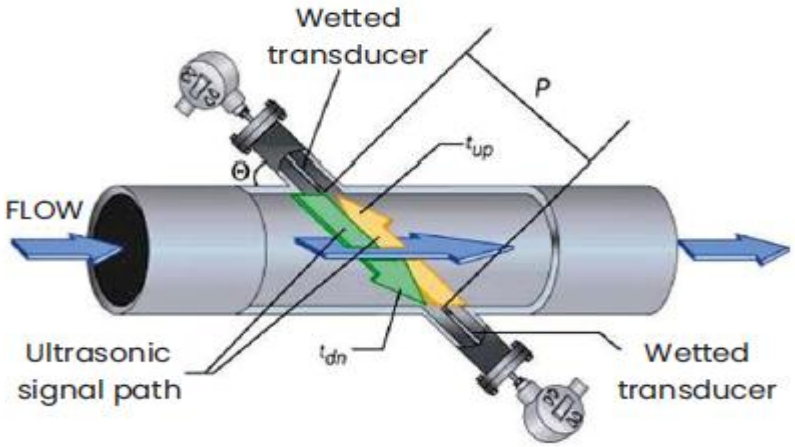
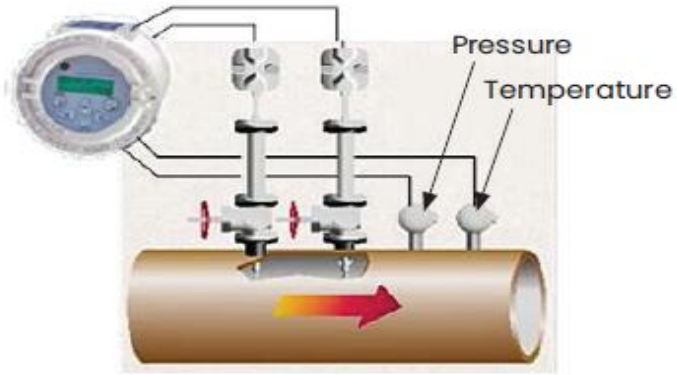
Case Study

Study Area:	**New flowmeter for Flare flow measurement**	
Job:	Flare flow meter selection.	
Date:	Q3- 2024	 **Working Principle of flow meter**
Location:	Middle East Client	 **Configuration of flow meter in pipeline for mass flow mesurement**
Project Background:	Middle East client awarded Flare Upgradation Project (Polypropylene Plant) to M/S ADEPT Oman which in turn selected M/S Elixir Consultants UK Ltd as Detailed Design Engineering Contractor. As part of project, the flow meter on the flare line was required to be replaced as existing flowmeter was not showing correct flowmeter due to the flow range issue. The engineering task was to find the correct flow meter with proper turndown covering the full flow rage. The flare flow variation was quite high.	
Engineering Challenge:	1. Collection of data for various scenarios. This was carried out by process team. 2. Selection of type of flowmeter for given application. 3. Choosing vendor for the same application with technical capabilities. 4. Confirming past track record of vendor for same application. 5. Vendor service support at client's location. 6. Installation of flowmeter in pipeline with vendor's recommendation. This was carried out by piping team.	

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Scope of Work:	• Selection of flow meter with preparation of data sheet. • Sizing and selection of flow meter with given accuracy and turndown condition. • Integrate new flow meter with existing DCS loop for central operational facility. • Preparation of installation diagram and piping isometric. **Note: Vendor Proposal attached as Annexure 1**
Key Findings:	• Existing flow meter was Thermal mass flow meter, which operate on the principle of convective heat transfer to measure the mass flow rate of gases. Flowmeter range was 40 T/Hr which was not sufficient for the flare gas flow during plant disturbances. • Existing flowmeter was having accuracy of ±1 % with turndown ratio of 1: 20. However this turndown was not enough to cover flow variation with low flow (only purge gas) and high flow (plant disturbances). • Considering constraints of existing flowmeter, Elixir proposed Ultra Sonic flow meter with dual sensor. One set of sensors will cater requirement of low flow where as other will cater requirement of high flow. Switching of sensor shall be automatic which is default function of meter. • Final recommended meter is having measuring range of 0 ~ 100 T/Hr with turndown ratio of 1: 400. This will cover requirement of normal operation and plant disturbance scenarios.
Engineering Recommendations:	1. **Data Collection** Most important part before proceeding to any change is collection of process data for various scenarios. This task was successfully handled by Process team **2. Analysing Requirement** Based on the data available for various operational scenarios and data sheet of existing flowmeter, requirement for the new flowmeter was confirmed and accordingly data sheet was prepared. **3. Vendor selection** After floating the enquiry to various flowmeter vendors, the preliminary responses from various vendors were analysed to meet the functional requirement. In close co-ordination with selected vendor, the final flowmeter model was selected. **4. Installation arrangement** Physical study was carried out during site survey visit at client's facility. Based on the existing arrangement and straight runs requirement of new flow meter, piping around the flowmeter was modified and prepared the installation drawing of new flowmeter.
Final Outcomes:	• Approved for Construction Drawings relevant to new Flowmeter were issued.
Key Lessons & Best Practices:	• Proper review of client input data at the start of the project is required to envisage the potential turndown issues.