Fueling on the Go

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Situation

. Congested petrol stations all around Dubai with infinite queues .
. Fuel and time wasted while waiting in the infinite queues .
. High cost of new petrol stations.

Safety and pollution

Problem

. Explosions and Fires are one of the main concerns for this project.
. Leakages caused to any damage to the wall of the tanks causing spills.
. Air pollution cause from the smell of the diffused petrol out of the tank .

Solutions

. Swelling safety foam placed inside the tank to control spark ignition causing explosions. (figure 1)
. Using multiple layers of polymers (Kevlar®,Twaron® or Dyneema®) as in Protectank fuel tanks to prevent leakages. (Figure 1)
. Coating the delivery hose with adsorbents such as carbon to prevent the foul smell of petrol to diffuse out.

Figure 1. Protectank fuel tank
(www.protectank.com)

Efficiency

Problem

. Controlling the volume flow rate and the pressure of the petrol being pumped.
. Maintaining pressure build up with in the tank and avoiding the hazard of an explosion.

Solutions

. Utilizing an electric motor which is designed to achieve the optimum mass flow rate and pressure to avoid air bubbles formation and wariness of the hose.[1]
. The hose material should be rubber as it has a long life span and it relatively cheap. Also proper length, diameter and thickness are taken into consideration.
. Automotive fuel tank pressure control valve is used in the tank to monitor the vapor pressure and reduces this pressure if it exceeds a certain limit by condensing the vapor.

Installation

Problem

. Selecting the most appropriate site on highways and with in the city.
. Accessibility of vehicles to the portable petrol station.

Figure 2. Petrol Stations in the UAE
(www.maps.google.com)

Solutions

. Highway: interval of 50-70 km long based on the average distance a vehicle could move once the fuel indicator is On.[2]
. Emirates road without any petrol stations. (Figure 2)
. Sheikh Mohamed ben Zayid road without any petrol stations extending from end of Sharjah to RAK. (Figure 2)
. Cities: Quality function deployment strategy.
1-Considering the requirements. (Demands of a region)
2-Building up the quality function strategy, with all alternatives.
3-Analyzing and determining the optimal locations.
. With the help of road transportation authority, side road extensions

Evaluation

	Petrol station	Portable Petrol Station	
Cost in Dirhams	2,500,000	Truck	250,000
		Tank	300,000
		Pump	50,000
		Road Extension	100,000
		Total	700,000*

Table 1. Cost analysis between petrol station and our project

. Portable petrol station with reduced effect on pollution, explosion, fire and leakage free.
. Efficient equipment using less costly material to reduce its cost.

References

M. Al Serkal and A Lowe, " Drivers fume amid fuel shortages in Sharjah
" *gulfnew.com.* para. 1June 6, 2011. [Online]. Availablehttp://gulfnews.com/business/oil-gas/drivers-fume-amid-fuel-shortages-in-sharjah-1.817923/a-long-queue-forms-at-a-petrol-station-in-dubai-1.818063. [Accessed: March. 1, 2013].
"Guidelines for service / petrol stations meeting dangerous Goods Regulations requirements for emergency planning"Feb. 13, 2013. [Online]. Available: http://www.cfa.vic.gov.au/fm_files/attachments/plan_and_prepare/cfa-dg-glines-servicestations.pdf [Accessed March. 1, 2014].

[1]Fratarsangeli, E.C. , " Study of fuel pump performance testing and it's implications on product acceptability" May 6, 2001. [Online].
Available: http://dspace.mit.edu/bitstream/handle/1721.1/37737/31369689.pdf?. [Accessed: March. 14, 2014].

[2]T. L. L. Qingsong and Z. Xuejin, "Research on Site Selection for Urban Compressed Natural Gas Station," *Intelligent Computation Technology and Automation (ICICTA), 2010 International Conference on* , vol.3, no., pp.116,119,2010. [Online]. Available: IEEE Xplore, http://www.ieee.org. [Accessed: March. 1, 2014].

* Estimated cost of equipment from the market.