

Case study

Retrofit at L.A. Dye and Print

Garment and fabric dyeing machines produce big savings

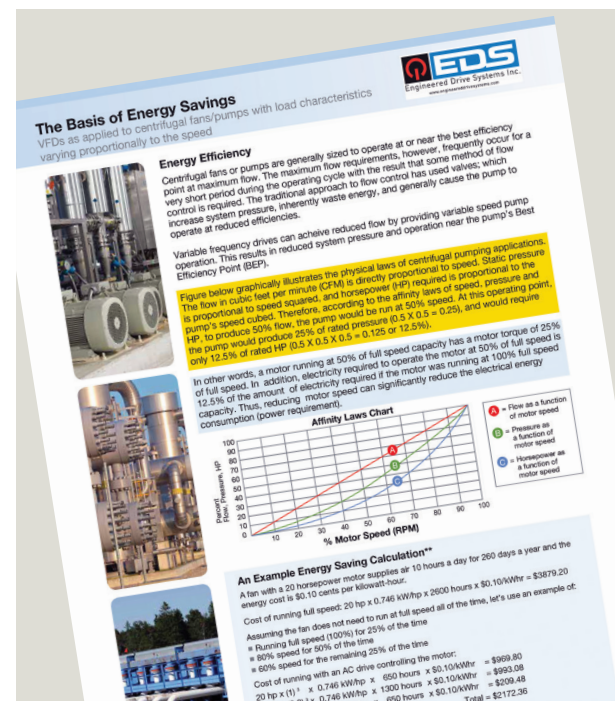
Sinamics variable frequency drives supplied by Engineered Drive Systems replace old equipment on 12 machines, with annual savings over \$36,000

Engineered Drive Systems Inc. (EDS) of Commerce, Calif. had a customer, L.A. Dye and Print in Gardena, Calif., who was seeking to participate in the Los Angeles Department of Water and Power's (LADWP's) Energy Efficiency Technical Assistance Program (EETAP), as part of an overall improvement in the company's utility usage. The company is a major supplier of new, environmentally safe fabric and garment dyeing and printing. As EDS had core competence in this area, owing to the significant amounts of water and wastewater involved, they worked with L.A. Dye and Print on 12 garment and fabric dyeing machines, producing a retrofit that has resulted in more than \$36,000 in power usage savings annually.



Left: Enclosed drive systems built by Siemens Solution Partner EDS of Commerce, Calif. and provided to L.A. Dye and Print, as part of a 12-machine retrofit project.

Right: Owing to the use of VFD technology to control the machine pumps, and in accordance with the L.A. Department of Water and Power's Energy Efficiency Technical Assistance Program (EETAP), the end-user realized substantial rebates on the cost of the engineering services, owing to the demonstrated energy-savings.





Typical installation on the fabric and garment dyeing machines at L.A. Dye and Print, located in Gardena, CA



Some of the myriad fabric colors and patterns produced and printed by the end-user



Robert Karkafi, EDS president (left) with George Chaghouri, owner of LA Dye and Print (right)

Prior to EDS approaching the customer, pumps on their dyeing machines were running across the line, either on or off, with no mechanism to vary the speed for the physical laws of centrifugal pumping applications.

According to EDS General Manager, Robert Karkafi, "We proposed using Sinamics G120 variable frequency drives (VFDs) from Siemens in this application, due to this line's ability to cover the entire range of ratings required, namely 15-75 hp. The drive program parameters were copied onto a micro memory card (MMC) that simplified the commissioning process on the multiple machines involved on this project." He further noted that the VFDs can achieve reduced flow by providing variable speed pump operation, which results in reduced system pressure and consistent operation at or near the pump's Best Efficiency Point (BEP). By calculating the specifics of this application, using the Laws of Affinity and other power cost calculations, EDS was able to demonstrate the typical annual savings to L.A. Dye and Print in real dollars. The payback period using this proposed VFD solution was substantially better than other flow control methods investigated.

As a result, 12 Sinamics G120 drive assemblies were designed, built and commissioned at L.A. Dye and Print's facility by EDS, a Siemens Solution Partner, meaning the company provided full application engineering, build and startup services to the end-user.

Following the restart of the dyeing machines equipped with these new drive assemblies, according to Karkafi, the L.A. Water Department audit services tracked and reported the actual savings. Below are the results:

Measure/equipment description and model number (if applicable)	Unit count	Size (hp)	Annual kWh savings	Annual kW savings
Hyundai, model #HA522, Serial # 96M27H	1	75	76,896	18
Westinghouse, Model #TBT-C, Serial # 6808104G47	1	75	81,057	19
Hyo Sung, Model HK, Serial # 001755-2	1	50	52,126	12
Hyundai, Model HK-50, Serial # 203SR9ERA	4	40	166,803	38
Hyundai, Model #HK, Serial # Not known	5	15	80,616	19
	12	TOTAL	457,498	106
Potential Incentive: \$ 36,599.84 at \$ 0.08 per kWh				

Karkafi further credits Al Esparza from Siemens Industry, Inc., who worked with EDS during the seven months required to design and implement this system, for helping effect the best solution for the application.

EDS is a manufacturer of enclosed VFD systems, serving a wide range of industries including water and wastewater, mining, cement and aggregate processing, oil and gas pumping, as well as various machine builders in the packaging and other market segments. Typical customers include municipal and county public works departments, electrical and mechanical contracting firms and other industrial plant facilities using VFD technology on pumps, fans and compressors on-site.

The EETAP rebate allowance is offered by the LADWP to assist companies with some financial offset when they engage an engineering company to perform an energy or water usage audit.

As a technical refresher on the example in this story —

- Remember the flow in cubic feet per minute (CFM) is directly proportional to the speed.
- Static pressure is proportional to speed squared and horsepower (hp) required is proportional to the pump speed cubed. Therefore, according to the affinity laws of speed, pressure and hp, to produce a 50% flow, the pump would be run at 50% speed.
- At this operating point, the pump would produce 25% of rated pressure and would require only 12.5% of rated hp.
- That is, a motor running at 50% of full speed capacity has motor torque of 25% of full speed. In addition, the electricity required to operate the motor at 50% of full speed is 12.5% of the amount of electricity required if the motor is running at 100% of full speed.
- Thus, reducing motor speed can significantly reduce the electric energy consumed, as evidenced in this article, where the application involves fluid pump control via variable frequency drives (VFDs).

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