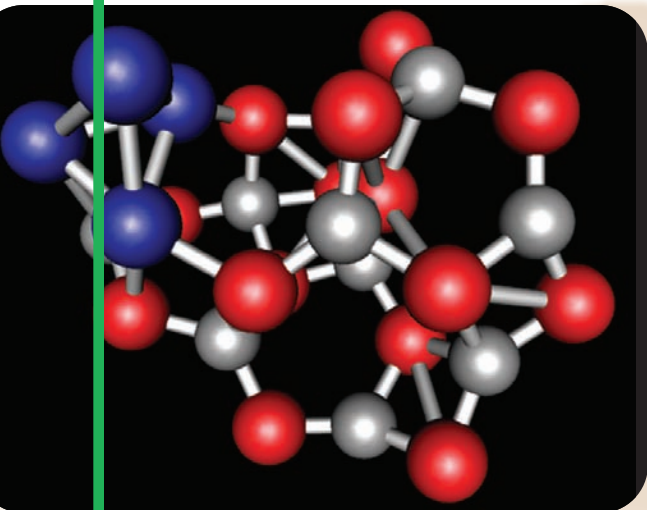


# Alternative Energy Applications with High Precision Syringe Pumps



## Biomass research applications using Isco pumps today:

- Successfully removing contaminants such as ammonia, sulfur, and tar from raw syngas, to dramatically extend catalyst life, and improve process efficiency
- Pumping biomass slurry into a bioreactor for breakdown and conversion into biofuel
- Precisely pumping aqueous solutions of polyoils into a bioreactor to produce hydrogen from biomass
- Simulating a recycle feed in a thermochemical conversion process where wood chips are converted into ethanol
- Producing synthetic fuel from fats, oils, and grease using Fischer-Tropsch process



This product was exhibited in booth #1322 at the American Chemical Society, National Exposition, Morial Convention Center, New Orleans, LA, April 7-9, 2008.

## R&D: Bench-Scale and Pilot Plant Systems

Developing cost-effective and efficient processes for the conversion of biomass into biofuels and chemicals is dependent upon precise laboratory modeling of real-world conditions. Steady, scalable proportioning and accurate flow rates are essential for bench-scale reactor testing of processes such as pyrolysis and gasification. System components must handle varying ranges of viscosities and particulate content when breaking down biomass materials.



## Pump Almost Anything

Since 1971, Teledyne Isco has provided customers in the energy, chemical and pharmaceutical industries with pumps that can handle a wide variety of fluids including:

- aqueous and organic liquids
- slurries and pastes
- corrosive solutions
- heated fluids
- liquefied gases
- viscous fluids

## Precision Fluid Delivery

- Continuous, pulseless feeds at precise flow rates from sub-microliter to 400 ml/min
- Accuracy of  $\pm 0.5\%$  or better
- High temperatures up to 200° C
- Pressures from atmospheric to 20,000 psi

**For guidance in selecting a pump to  
meet your needs, visit us on the web at:**

**[www.isco.com/pumpselector1](http://www.isco.com/pumpselector1)**

**More  
information on  
side two!**

## Reliable and Programmable

Isco's precision syringe pumps provide flow and pressure control with a remarkable operating range of flow rates and pressures. Easy-to-use, programmable flow or pressure, constant or ramping, offers new research opportunities. From single pumps for batch applications or dual pump systems for nonstop pumping, each system provides pulseless flows and reliable operation.



Conveyor belt depositing wood chips.

## Custom Pumps

For a perfect fit, Isco can provide a custom pump tailored to your needs with special features such as:

- Flow rates
- Pressures
- Port sizes
- Software

Simply contact your Isco representative and we will be happy to discuss your requirements.

## Control:

- Constant flow or pressure
- Flow or pressure programming
- Independent control of up to three pumps
- Continuous flow or pressure with dual pump
- Serial communication or analog/IO for external control/readout

### D-Series Single Pump Specifications

<b>Syringe pump model</b>	<b>1000D</b>	<b>500D</b>	<b>260D</b>	<b>100DM/DX</b>	<b>65D</b>
Nominal syringe capacity, ml	1,000	500	260	100	65
Maximum pressure, psi:	2,000	3,750	7,500	10,000	20,000
Flow rate: min settable, ml/min	0.1	0.001	0.001	0.00001	0.00001
maximum, ml/min	408	204	107	25/50	25



### D-Series Dual Pump Continuous Flow Systems

<b>Electric Valves</b>	<b>E1000</b>	<b>E500</b>	<b>E260</b>	<b>E100</b>	
<b>Pneumatic (Air) Valves</b>	<b>A1000</b>	<b>A500</b>	<b>A260</b>	<b>A100</b>	<b>A65</b>
Nominal syringe capacity, ml	1,000	500	260	100	65
Maximum pressure, psi:	2,000	3,750	7,500	10,000	20,000
Flow rate: min settable, ml/min	0.1	0.001	0.001	0.00001	.00001
maximum, ml/min	265	132	70	16/32	16



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