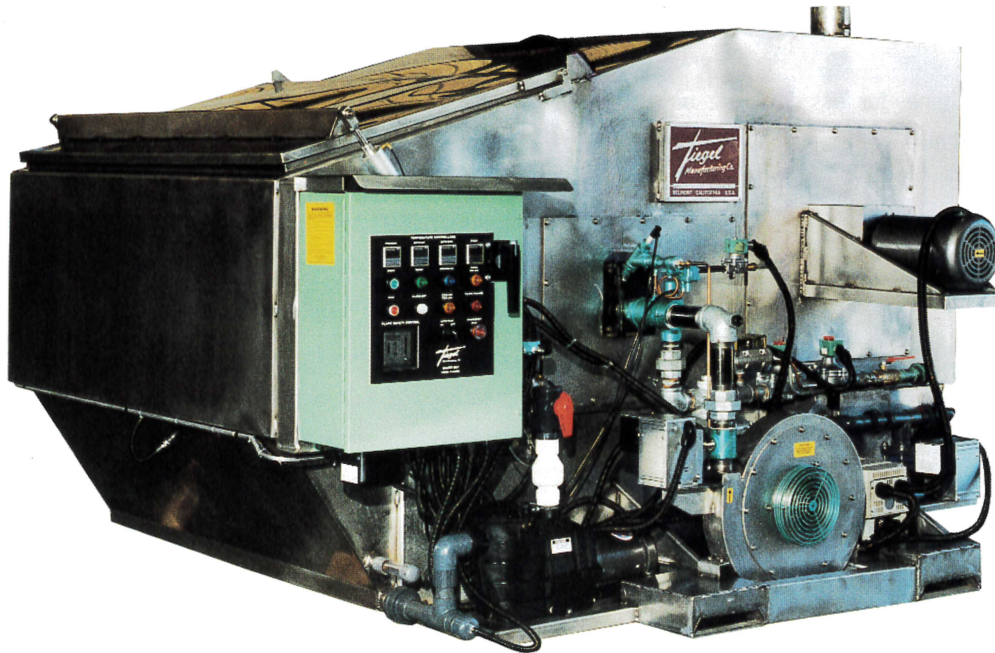


# SMARTDRY®

DRY CHARGE PROCESSOR



The most

efficient,

reliable and

fastest

dry charge ever.

## THE TIEGEL SMARTDRY ADVANTAGE

- **Improved product quality.** SmartDry produces drier plates with no oxygen present.
- **Huge energy cost savings and increased productivity.** An improved basket design, new blower configuration and insulated firebox ensure faster drying times.
- **User friendly.** Automatic start-up functions and easy maintenance make running SmartDry a cinch.
- **Advanced safety features.** A large, fail-safe load/purge door; quiet operation; and other safety features make SmartDry not only a smart choice but a safe one too.

Tiegel's SmartDry revolutionizes the way negative and positive plates are dried—producing higher quality plates in half the time. SmartDry's AutoDry and AutoCool features work together to accurately determine when plates are dry. This way, plates are dried “just enough” every time, eliminating the guesswork of drying. While at the same time, SmartDry's insulated firebox and other design improvements speed up the drying process. The result is more efficient, faster drying; better quality; and dramatic cost savings.



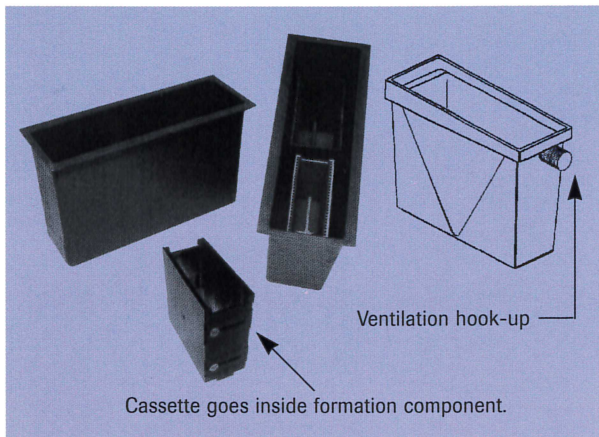


# CHECK OUT SMARTDRY'S BENEFITS

## IMPROVED PRODUCT QUALITY

SmartDry consistently produces a drier plate, removing moisture down to 0.1 percent, while cutting PbO content to less than 3 percent. The increase in free lead available ensures superior negative plate performance while low temperatures keep the passivation of the positive plate to a bare minimum.

Tiegel makes this winning combination possible with its unique AutoDry and AutoCool features. These advanced features shorten the drying times for less deterioration of the plates. AutoDry accurately determines when the plates are dry by continuously monitoring the plates.



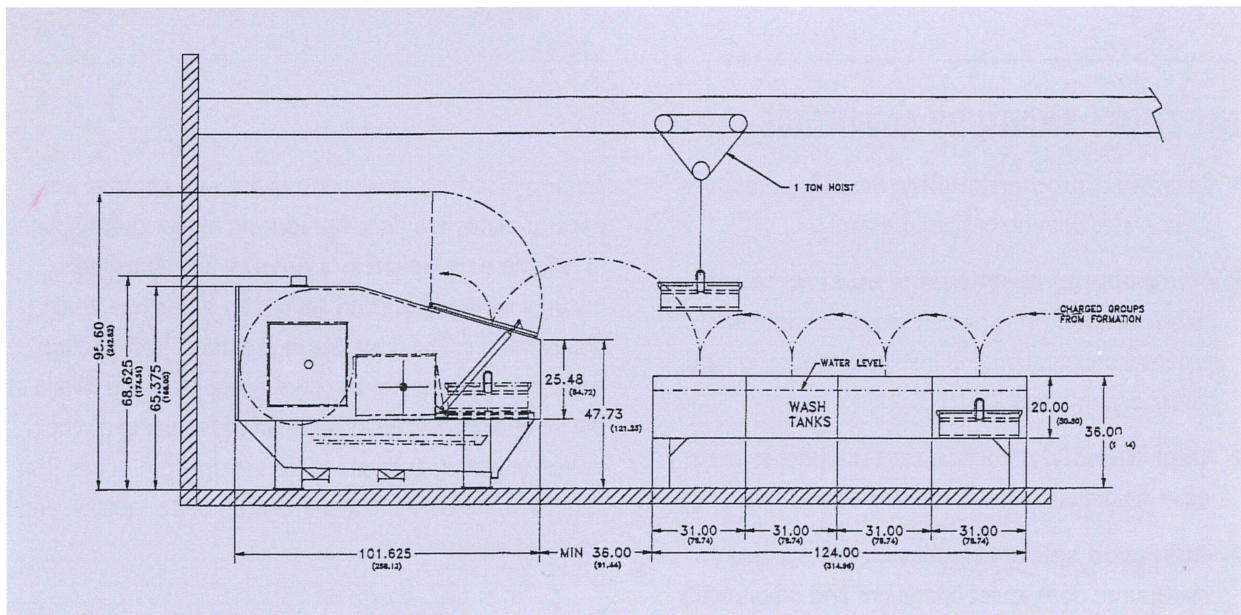
AutoCool ensures that the water leaving the machine is always the same by auto-controlling the amount of water entering the machine. Low-pressure, 85° F (30° C) water for cooling is acceptable, minimizing the problems for cooling towers.

## DRAMATIC ENERGY SAVINGS AND ENHANCED PRODUCTIVITY

Greatly increased dryer performance and improved basket design allow SmartDry to process 2,050 automotive (4-3/4" x 5-5/8" x .065" thick) plates on racks per cycle in under 55 minutes. (It will also dry 2,000 automotive plates in formation cassettes in under 30 minutes.) This combination translates into lower costs and increased production.

Utilizing a new blower configuration, SmartDry reduces the drying time by 33 percent. Additionally, Tiegel has reduced its main blower motor to under 5 HP, which reduces total power consumption to under 5 kW.

By insulating the firebox, SmartDry increases the drying temperature by 20° F (11° C), which substantially reduces drying time without creating decomposition or auto-ignition problems.



(top) Tiegel's formation components can be modified to fit any dimension plate. The new formation tank design simplifies ventilation with its own ventilation hook-up and cover (not shown).

(bottom) A typical layout of wash tanks and SmartDry dry charge (total space required 22' x 7'6").

## USER-FRIENDLY OPERATION

### ■ Auto Pilot

Once started, SmartDry automatically purges the whole oven of any combustible gases in less than 30 seconds by opening the large loading door. After the purge cycle is complete, Auto Pilot automatically turns off the main blower and switches the butterfly valve to low fire. From there, the pilot is ignited automatically. A moisture proof flame rod assembly prevents false signaling of lack of flame due to moisture. If ignition is successful, a green ready light illuminates on the control panel, indicating that the dryer is ready to process plates. What's more, all functions are set into motion with the turn of just one switch!

### ■ Auto Process

To process plates, the operator simply loads the basket into the dryer and pushes the Process Start Button. Then, the burner comes up to high fire and the main blower comes on-line followed by the loading door automatically closing. After drying, a white light illuminates, signaling the operator that the plates are dry and the loading door will open in 5 minutes or less (if adjusted by the operator). With SmartDry, there is no process clock to set, because the dryer always knows when the plates are just dry enough. Additionally, Tiegel has eliminated the need to handle the main drop-out gas valve or loading door.

### ■ AutoDry/AutoCool

AutoDry and AutoCool work together to dry the plates as fast as possible to the same level of dryness every time. They also keep cooling water and gas consumption to a minimum. AutoDry determines the exact level of moisture in all plates. This feature also compensates for tight basket packing by increasing the drying time, and automatically adjusts for changes in product type. The operator can select the level of dryness required by simply changing the AutoDry set point. Tiegel's unique AutoCool feature introduces just enough cooling water to remove moisture as it leaves the plates. Cooling is automatically reduced as the amount of moisture leaving the plates declines.

### ■ SmartDrive Option

This feature provides automatic adjustment of blower speed to compensate for back pressure differentials when changing from group drying to cassettes or rack drying. This further maximizes the drying speed of the oven by 50 percent. SmartDry also eliminates the blind current problem, since if only 2 HP are required, that is all the power that is supplied, even though it has a 5 HP motor.

### ■ Easy Troubleshooting

Veriflame flame control gives a clear indication of basic combustion interlocks such as high/low gas, combustion air, flame signal and high/low fire. This makes troubleshooting a snap.

The control box displays the temperatures of the process air, exhaust stack, AutoDry and water outlet, which allows the operator to detect and correct malfunctions, such as lack of cooling, without the machine shutting down while processing plates, thus reducing product loss. Cooling tower status is also indicated.

## ADVANCED SAFETY FEATURES

- The large loading door is fail safe. If all systems fail, the loading door still opens with only 3" of water column pressure from the main blower. The door opens immediately upon loss of flame, electric power loss or thermal runaway signal.
- The machine is quiet due to the lower horsepower and gas demand. There is only 3 dB over factory background in front of the machine.
- The impeller turns at less than 1200 rpm instead of 3400 rpm.
- Three independent control packages that shut off the main gas or restrict the flow of gas prevent thermal runaway.
- The purge is rapid and complete, because the loading door is open, the 10,000 cfm blower is on during the purge cycle, and a combustion blower purges the combustion chamber.
- There is no exhaust damper to stick.

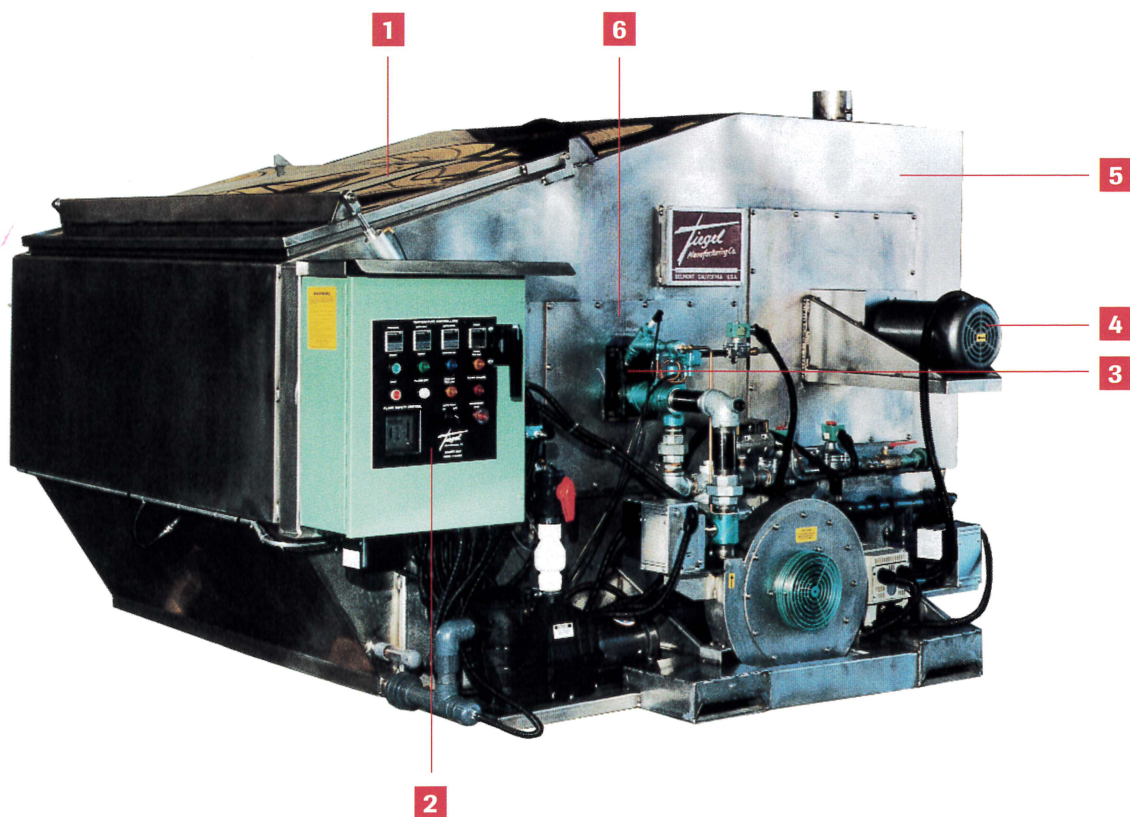


## MAINTENANCE MADE EASY

- No paint. All body parts are constructed of Type 316L stainless steel.
- No re-bricking due to Tiegel's unique insert firebox modules.
- No moisture problems with the new flame rod holder.
- No zero governor feedback tube to clog with moisture and firebox material.
- No basket seals to maintain.
- Increased bearing life because blower bearings are in ambient air.
- No mist eliminator.
- No exhaust port damper to stick.
- No pressure sensor interlocks needed for main blower.
- New low-profile machine that allows multiple baskets to be dried. Only 50" from ground level to the bottom of the basket is required to clear the loading entrance.

## SMARTDRY AT A GLANCE

- 1** Deep, two-basket drying chest—increased productivity of higher quality plates.
- 2** Automatic cycle control with AutoDry and AutoCool.
- 3** New flame rod assembly prevents moisture build-up.
- 4** 5 HP motor—lower energy costs and less noise.
- 5** Stainless steel—rugged, corrosion resistant, low maintenance.
- 6** Quick change firebox modules—less down time.



## INCREASED ANNUAL SAVINGS

	Other Ovens	Total Annual Cost	Tiegel SmartDry	Total Annual Cost	Total Annual Savings
<b>Electrical</b>	28kW per oven (3 ovens required)	USD \$13,440 (For 3 ovens)	3 kW	USD \$480	USD \$12,960
<b>Gas (BTU/Hour)</b>	450,000 per oven (3 ovens required)	USD \$10,800 (For 3 ovens)	150,000	USD \$1,200	USD \$9,600
<b>Cooling Water</b>	17.5 GPM (66LPM) per oven (3 ovens required)	USD \$5,040 (For 3 ovens)	6.5 GPM (25LPM)	USD \$624	USD \$4,416
<b>TOTAL ANNUAL SAVINGS</b>					<b>USD \$26,976</b>

**One SmartDry has the productivity of three older models, so up-front purchase costs and floor space requirements are fractional.**

The above amounts are based on actual production costs for 2,400 lbs. (1,089 kg.) per 45-minute cycle of industrial plates previously requiring three ovens for the equivalent production. The other oven used in this comparison is a Tiegel SYD-180-400 Dry Charge oven. Annual amounts based on electricity at USD \$0.10 per kW hour, gas at .50 per 100,000 BTU, and water at 1.00 per 1,000 gallons. Your costs may vary depending on local utility charges.

## SAVE WATER WITH WASH MAXIMIZER I

Close the plate-washing loop in the dry charge operation by installing Tiegel's Wash Maximizer I. This will reduce waste water to 40 gallons per three shifts.

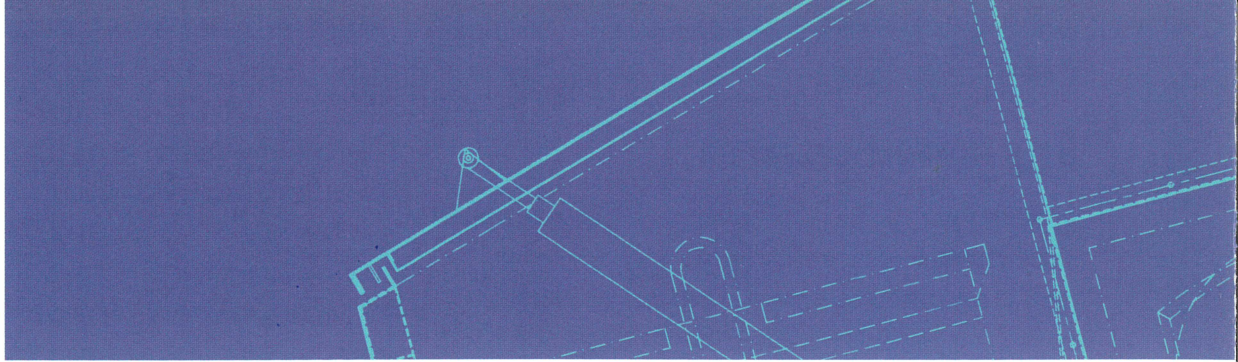
### Water is saved in three ways:

- Water from the SmartDry is cooled and returned via a cooling tower or heat exchanger.
- Slow flow is at a minimum while maintaining washing efficiency with three slow flow tanks. Ninety-nine percent of acid is removed.  $H_2SO_4$  of up to 4 percent concentration is recovered for re-use in wet battery production.
- High-flow, salt-free wash water is recirculated through Tiegel's unique acid-sponge beds. The remaining 1 percent of acid is neutralized and does not come in contact with the product. The recovered acid and salt-free water is filtered for any remaining particulates. This produces crystal clear water for washing plates and elements.



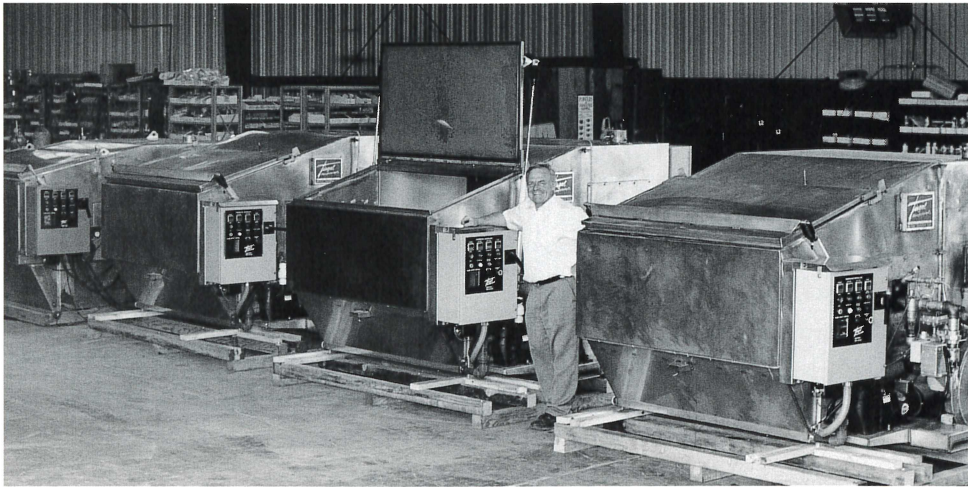
**Tiegel's Wash Maximizer I recirculates the wash water through its unique acid-sponge beds, filtering out impurities and recycling 99 percent of the acid.**





## BACKED BY OVER 50 YEARS' EXPERIENCE

As the pioneers of dry charge technology with over 50 years of experience in the battery industry, Tiegel Manufacturing has earned a reputation for outstanding customer service and consistently reliable equipment, built to last in a demanding environment. Tiegel's engineers strive for improvements and innovative products that will help our customers stay competitive.



Four more SmartDry dry charge machines ready to ship.



*Helping to make the best batteries...yours.*  
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