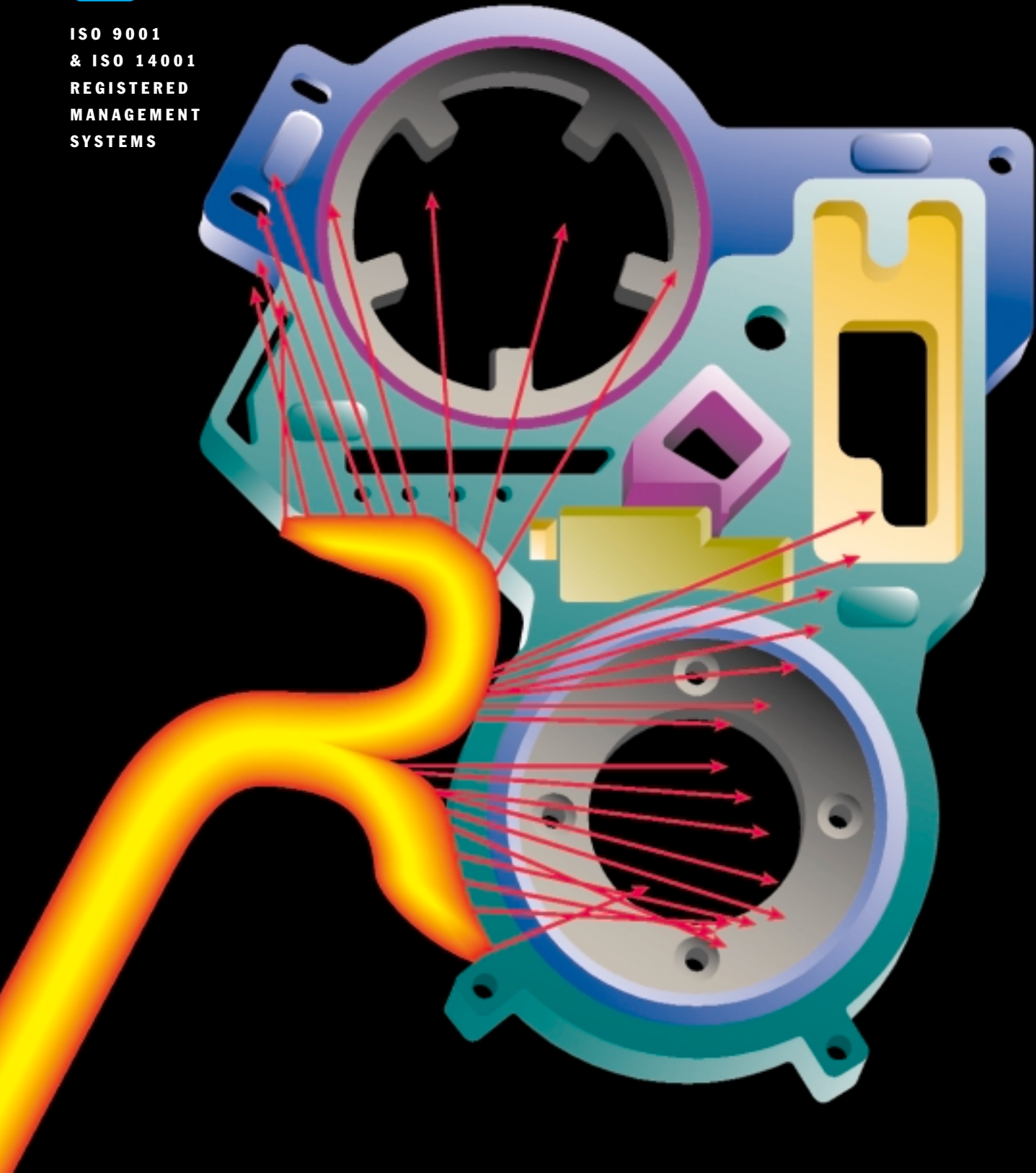


**Chicago White Metal Casting, Inc.**

**Advanced Technologies & Systems  
for Cost-Effective Die Cast Products and  
Complete Manufacturing Solutions**



**ISO 9001  
& ISO 14001  
REGISTERED  
MANAGEMENT  
SYSTEMS**

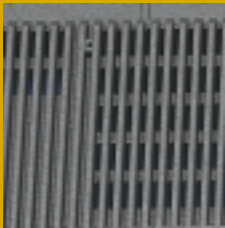


**TOTAL, FLEXIBLE  
MANUFACTURING  
SOLUTIONS  
FROM CWM**



Our flexibility in providing a wide range of cost-effective manufacturing solutions can make CWM one of your most valuable production resources.

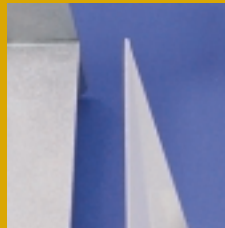
■ Advanced die casting design, prototyping and production technologies—in all the most widely used alloys, from large components to micro-miniature parts, from high-volume to short-run production.



■ State-of-the-art CNC machining and screw machining capabilities.



■ Total contract manufacturing services, delivering all stock and custom parts required, in all processes, completely assembled and packaged.



The front cover illustrates a computer-generated display of the latest metal flow die casting die design technology used by CWM. It helps assure that die construction will consistently meet the precise production specifications of the most complex part. CWM's management systems are ISO 9001:2000 and ISO 14001 registered.



CWM and the CWM symbol are U. S. registered trademarks of Chicago White Metal Casting, Inc.



**DIE CASTING PRODUCTION SOLUTIONS IN AL, MG, ZN AND MINIATURE ZN & ZA**

**Now CWM die casting can do even more for your product programs**

The die casting process has proven its ability to produce complex, high-strength housings and components. To net or near-net shapes at low unit cost. Durable parts that can be serviced and renewed—and finally recycled, with an established infrastructure, at the end of their useful life.

Chicago White Metal Casting, with over 65 years of commitment to process innovation, can offer the product engineer a greater range of freedom from design and process constraints to help achieve lower total product costs.

Early consultation with CWM can often allow you to design more intricate contours and closer tolerances, reducing costs and multiple parts. Porosity can be minimized with special die design and advanced vacuum technology. Thinner wall designs can add package space and cut weight.

And these benefits can be delivered on shorter volume runs, with significantly reduced tooling and production lead times.

**Tap CWM's Special Objectivity**

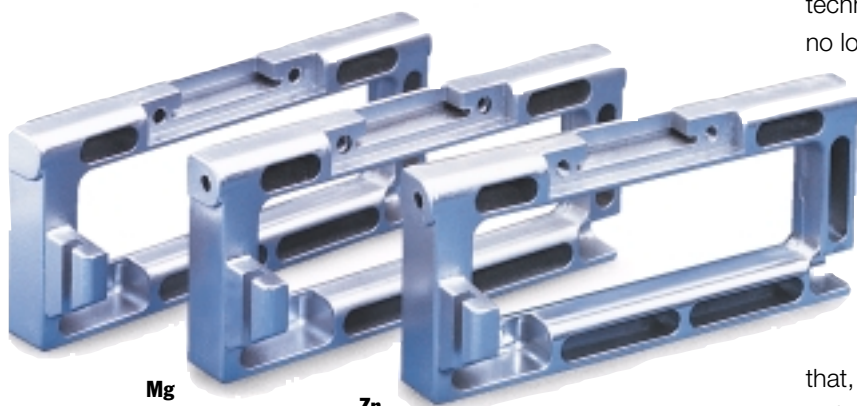
Because we cast in *all* of the most widely specified alloys, you're always assured of objective material recommendations for your application.

CWM was a pioneer in thinwall zinc die casting technology, allowing for reduced part weight with no loss in strength, space-saving designs and lower material costs. We now offer the benefits of miniature Zn & ZA-8 parts.

One of the first North American custom die casters to utilize the hot-chamber magnesium process, we continue to innovate in mag for larger light-weight, lower-cost, corrosion-resistant parts.

When vacuum technology indicated that, combined with refined die designs, it could reduce porosity in aluminum parts, we installed centralized die casting vacuum systems in our aluminum and magnesium departments.

CWM can harness the most advanced information and production technologies to die casting solutions. What follows is how we do it.

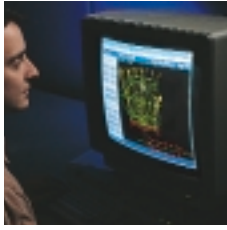


Al

Mg

Zn

**Above part was die cast in aluminum, magnesium and zinc alloy for exhaustive cost-performance comparisons.**



**Using powerful CAD workstations, CWM can accept your CAD data and submit 3D models prior to die design.**

**Leveraging Information & Production Technology**  
The latest digital information and production technology is being fully harnessed at CWM.

Secure FTP Internet transfer and electronic annotation of customer design files is routine. State-of-the-art CAD workstations, using the latest 3D modeling software, are being used for dimension-driven execution of die cast product and tooling designs, with secure tooling construction photo updates via the Internet. Networked PCs operate on every manager's and supervisor's desk.

CWM has set the standard in North America for the more cost-efficient hot-chamber magnesium die casting process. Fifteen Frech die casting machines allow the CWM Mg department to

## Harness CWM's Advanced Capabilities

### TECHNOLOGY, QUALITY INTEGRATION AND CONTINUOUS TRAINING OF PEOPLE



**A training program that never stops is a critical ingredient in leveraging new technology.**

**The latest electronic testing equipment in a fully equipped QA lab backs up a rigid program of calibration control.**



**End results: This high-tech die casting has seven external thread sets cast in place, for an 85% unit cost reduction.**



produce a complete size range of net-shape and near-net-shape hot-chamber Mg parts. This department is now one of the largest custom hot-chamber magnesium die casting facilities in the world, and includes three 650-ton machines—among the world's largest (see right).

#### **CWM Concurrent Engineering**

For testing prior to die design, the latest CNC machining centers are in operation, in-house, for CAD/CAM design and execution of machined prototypes in Al, Mg or Zn.

CWM generates a Fused Deposition Model (FDM) prototype for each new project. This serves to expedite the simultaneous production of die cast tooling, trim dies, and any required secondary finishing fixtures. Shorter lead times can be assured.

#### **Company-wide Quality Integration: ISO 9001**

Quality assurance has moved from production inspection to total management commitment and responsibility in all aspects of defect prevention.

An ongoing, plant-wide integration of QA programs aims always to detect and exert corrective action continuously and at the earliest point. This includes pre-production capability studies; pre-die construction cost-reduction involvement,



Certificate No. 003620  
Bensenville, Illinois



**Three of among the world's largest hot-chamber Mg die casting machines, 650-ton Frechs (left), cast 24 in. x 24 in. (60.9 x 60.9 cm) Mg parts using the more cost-efficient hot-chamber process.**

preferably during the part design stages; incoming material QA monitoring; in-process monitoring and SPC to control the manufacturing process; and planned, continuous quality improvement.

The company's quality management system is ISO 9001:2000 registered.

### **Continuous Plant-Wide Training**

Qualified, well-trained and motivated people are at the heart of any custom production system. CWM management has been committed to an ongoing, comprehensive and company-wide approach to assuring that its employees are equipped to excel.

Continuing classes are held in-plant, on company time, in every subject from improving English, math and communications skills to SPC charting, ISO 9001 procedures, and an understanding of all aspects of defect prevention to assure quality production.

This program uses third-party instructors and customer-conducted classes in-house, as well as off-site classes where required. It embraces managerial as well as plant employees in all areas.

It includes an ongoing vendor education program aimed at assuring the consistent, certified quality of purchased material and services affecting the final delivered components of CWM.



**Supervisor-operator interaction aimed at defect prevention builds on commitment: 20% of CWMers are 15-year-plus veterans.**



**In-house classes, on company time, sharpen the job skills demanded by increasingly sophisticated technologies.**

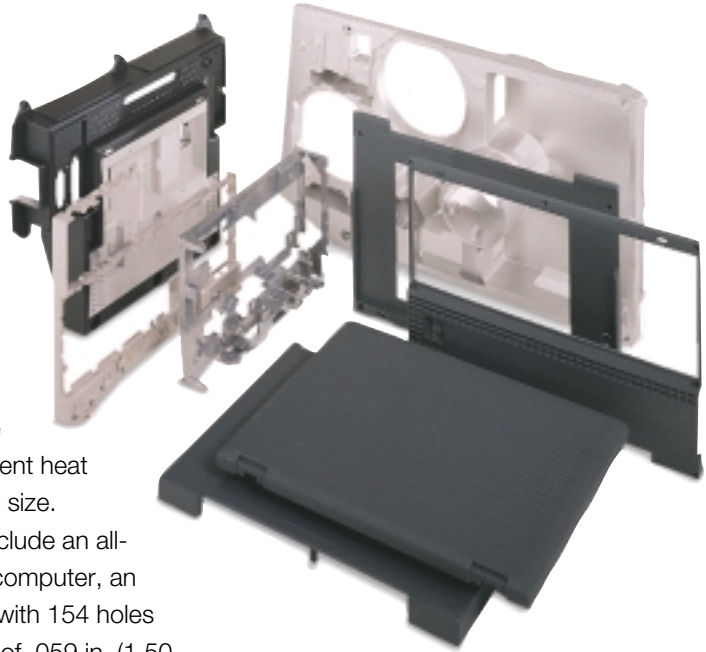
**This electronic flatness tester is used to verify a critical flatness tolerance to  $\pm .0005$  in. ( $\pm .0127$  mm).**



### FOR COMPUTERS

Near-net-shape die castings in aluminum and hot-chamber magnesium are delivering rigidity, strength and light weight for computer housings and peripheral components—with the advantage of built-in EMI shielding and excellent heat dissipation in a minimum package size.

These CWM-produced parts include an all-magnesium case for a notebook computer, an aluminum mobile computer base with 154 holes cast to size, and wall thicknesses of .059 in. (1.50 mm) for the complex stiffener frame in a docking notebook computer. Direct feed in magnesium and zinc provides a superior surface finish and the ability to cast fine details.



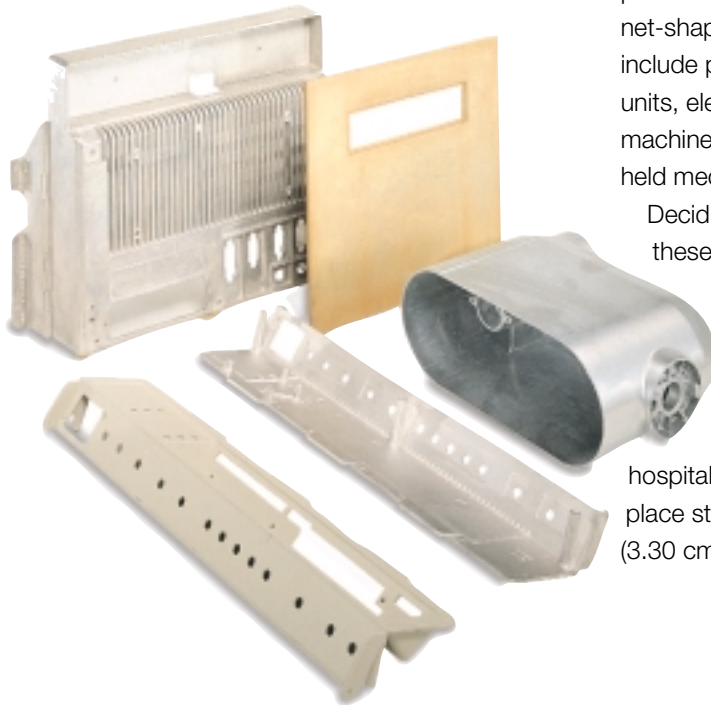
## Experience in Producing the Components You Design—in Al, Mg and Zn

### FOR MEDICAL DEVICES

Intricately configured component parts for medical products are being produced as optimized near net-shape CWM die castings. Applications include portable medical monitors, dental X-ray units, electronically operated hospital beds, EKG machines, ultrasound equipment, and other hand-held medical devices.

Deciding factors for die cast production for these medical components include part strength, rigidity, light weight, and built-in EMI/RFI shielding—along with unit cost savings over alternative manufacturing processes.

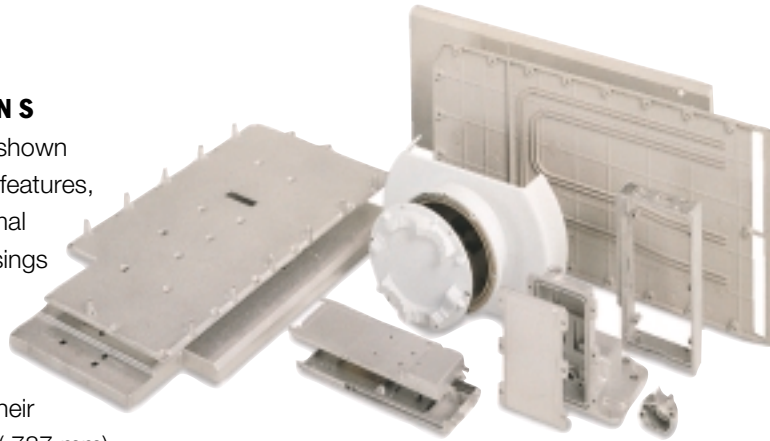
The aluminum die cast panel for a hospital bed's footboard controls has cast-in-place standing bosses that measure 1.30 in. (3.30 cm) high.



## FOR TELECOMMUNICATIONS

All of the CWM Mg and Al components shown here are die cast to near-net shape—all features, bosses and holes cast to size with minimal secondary machining. Included are housings and component parts for satellite antennas, wave guides, two-way radio communications, and hand-held and master station cellular phones. Among their features are wall thicknesses of .031 in. (.787 mm).

Many dimensions for telecom products are being routinely die cast to NADCA precision tolerances.



## FOR ELECTRICAL/ELECTRONIC PRODUCTS

These high-tech Mg and Zn die castings are examples of net-shape and near-net-shape housings and components for electrical and electronic control panels, servo drives, flow meters, commercial scales, radar detectors, PC board assemblies, and connectors. Part specifications

in zinc meet superior as-cast surface finish requirements. In aluminum, wall thickness are being cast down to .015 in. (.381 mm) with zero draft in selected areas. Fail-safe EMI/RFI shielding and heat sink properties are built-in features for these components in Al, Mg or Zn, together with excellent strength and rigidity.



## FOR INDUSTRIAL, COMMERCIAL AND DEFENSE APPLICATIONS

For this wide range of applications, CWM Al, Mg and Zn die castings are maximizing product performance at lowest unit cost. Vacuum-assisted die casting produces sound, porosity-controlled valve bodies for marine power steering, industrial pumps, and commercial air compressors; a manifold valve has seven external thread sets cast in place, replacing six former parts. Superior strength and as-cast surface finish makes die casting the optimum choice for Zn commercial door handles and executive desk staplers. Light weight and high impact strength are combined in housings for hand-held Mg pneumatic staplers and nailers and in Al aircraft food tray arms.



# A Robust Design, Production and Assembly System Fine-Tuned to Your Needs



## 1 EARLY PROJECT INVOLVEMENT

### Early design

#### consultation to establish castability

Before designs are locked in, minor modifications can make a non-castable part suitable for die casting, at significant savings. If die casting is not cost-effective for your part, we'll tell you.



## 2 CAD PRODUCT REFINEMENT

### Product design assistance for optimized die casting

Using the customer's electronic design files in virtually any format, or the part prints, CWM will work with you in developing your final design or

suggesting possible refinements that can result in substantial production savings. 3D computer modeling of parts, using the latest SolidWorks® software on powerful CAD workstations permits more accurate evalu-

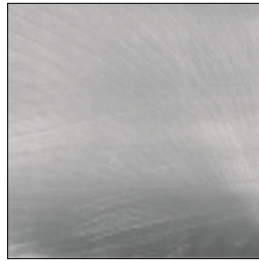
ation of complex designs prior to die construction. Access the CWM website (see back cover) for current file transfer specifics.

## 3 PROTOTYPE ENGINEERING

### Prototyping alternatives for fail-safe results

To assure form, fit and function, CWM can rapidly process the correct alloy alternative in prototype. We'll produce complex parts by CNC machining, in-house from your CAD data, or FDM prototypes (left) for form, fit and functional evaluation.





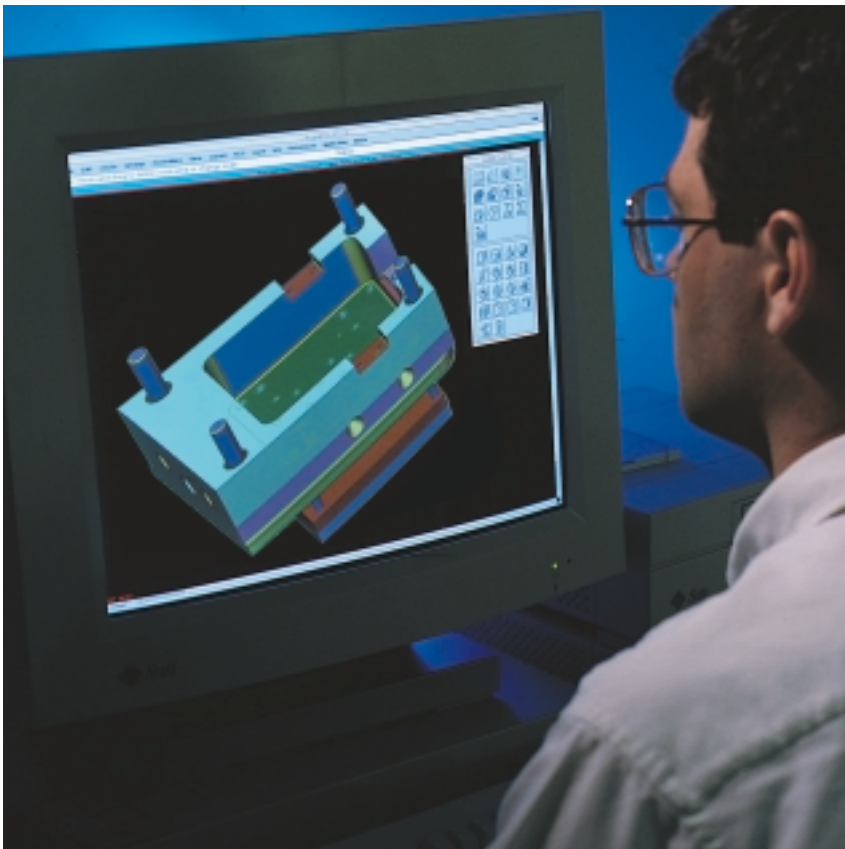
**Raw material certification to precise specifications**

Superior-grade tool steel is 100% certified.

Die microstructure must have uniform carbide distribution, free of internal defects, to insure against premature failure. Your selected casting alloy's composition is approved by supplier certification, and again with alloy melt at the furnace.

#### 4 CAD/CAM DIE DESIGN & CONSTRUCTION

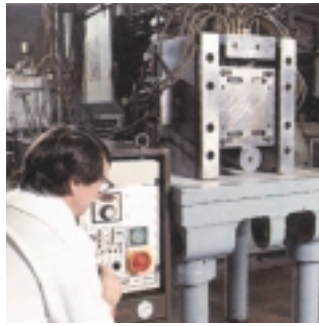
#### 5 CERTIFIED & DOCUMENTED RAW MATERIALS



and accurate die casting die construction. You're assured that your die will consistently produce to the dimensional accuracy and surface finish that can eliminate costly secondary operations.

**Reduced tooling lead time, greater accuracy with CAD/CAM**

CWM CAD die designs make use of advanced runner, gating and metal flow analysis. Final designs interface with CNC programming for more rapid



**Quick die change systems for JIT, short-run production** can be reduced by 20% on small parts and 30% on large parts, making shorter production runs economic. With "quick die-change" equipment, die set-up time can

## 6 HOT-METAL DELIVERY

### Molten-metal delivery of filtered alloy

Aluminum alloy delivered in molten form minimizes metal turbulence and temperature fluctuations. Alloy filtration, plus this superior metal handling, assures part integrity.

## 7 FIRST-PIECE VALIDATION

### Die cast part validation to 3-axis accuracy of 40 millionths

The programmable Brown & Sharp "Validator" coordinate measuring system is used for all first-article inspection and control of especially complex parts. CWM can qualify as a self-certified supplier to your company.

## 8 QUICK-DIE-CHANGE SYSTEMS

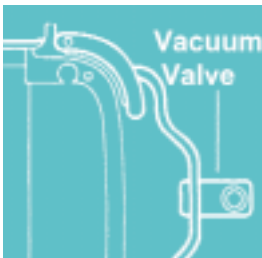




**Shot monitoring** allowing  
**to match the** corrective  
**optimum** action to pre-  
**die casting** vent out-of-  
**process profile** spec parts  
 Computerized before volume  
 shot-cycle casting  
 monitoring production  
 provides instant begins.  
 information on  
 critical shot  
 parameters,

## 9 VACUUM POROSITY CONTROL

**Porosity-**  
**controlled die**  
**casting**



During the  
 CWM process-  
 ing cycle, a  
 vacuum valve  
 system  
 replaces die  
 venting to the  
 atmosphere.

Die cast parts  
 can be  
 produced with  
 objectionable  
 porosity  
 greatly  
 reduced.

## 10 DIE CAST SHOT-CYCLE MONITORING

## 11 PLANT-WIDE SPC PRODUCTION MONITORING

**Plant-wide**  
**statistical**  
**process control**

Using the  
 During the  
 first and each  
 successive  
 casting run,  
 control charts  
 are processed  
 on critical mea-  
 surements.

statistical docu-  
 mentation of  
 SPC, process  
 adjustments  
 can be  
 made before  
 dimensions  
 exceed their  
 predetermined  
 limits.



corrective  
action immedi-  
ately taken.

**Real-time**

Simultaneous  
video images  
are available for  
customer  
review.

**in-plant X-ray**

With enhanced  
automated  
digital radiogra-  
phy, internal  
porosity can be  
accurately  
determined and

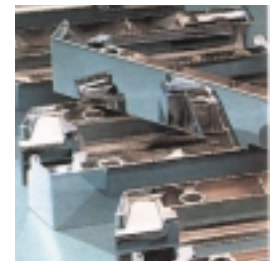


**Secondary part  
finishing  
to precise  
specifications**

In addition to  
machining,  
CWM executes  
any secondary  
operation  
required: from  
vibratory  
deburring and

wheelabrating  
through  
impregnation,  
for 100% pres-  
sure-tightness

to withstand  
the highest  
operating tem-  
peratures and  
pressures.  
Finished com-  
ponents can



be delivered  
anodized, pol-  
ished, buffed,  
chromated,  
painted or  
chrome plated,  
certified to your  
requirements.

**12 REAL-TIME X-RAY EVALUATION**

**13 IN-HOUSE CNC MACHINING**

**14 CERTIFIED DIE CASTING FINISHING**

**In-house CNC  
machining to  
micro-precision**

**tolerances**  
Where net-  
shape die cast-  
ing is not  
feasible, ultra-  
precision  
machining to  
final tolerances  
is performed,  
in-house, at

state-of-the-art  
CNC machining  
centers. Skilled  
fixture design-  
ers, program-  
mers and CNC  
operators  
understand the  
unique require-  
ments of  
machining die  
cast parts.





**Complete**

**turnkey**

**contract**

**manufacturing**

**and assembly in**

**all production**

**processes**

For mechanical

and electro-

mechanical

enclosures and

components ,

CWM will

provide turnkey

responsibility for

all production

processes. This

includes tooling

construction,

volume produc-

tion, post-

production

machining, and

part surface fin-

ishing for both

die cast and all

non-die cast

parts—as well

as stock parts

procurement

and complete

final assembly.

Visit the CWM

Contract

Manufacturing

website (see

back cover).

**15 CONTRACT MANUFACTURING & ASSEMBLY**

**16 CUSTOMIZED CONTRACT PRODUCT PACKAGING**

**Customized**

**contract**

**product**

**packaging to**

**your exact**

**needs**

In accordance

with any

component

packaging

requirements,

your parts—or

subassembled

products—can

be specially

packed and

shrink-wrapped

for shipment.





**CWM's Environmental Management System is ISO 14001 registered**

CWM was the first North American custom die caster to achieve this ISO registration. The company has established systematic monitoring, control and continuous improvement enabling it to reduce future impacts on the environment.

With ISO 14001 registration of its environmental management, CWM is assuring reduction of its consumption of natural resources, reduction of the disposal of waste materials and reduction of pollutants of land, air and water. Our customers benefit from more cost-efficient die casting production.

**Company-wide environmental and recycling practices**

Throughout its offices and plant, CWM practices concern for the environment: its co-generation plant conserves power for peak loads; process water is recycled to minimize entry in the waste stream; products are purchased with an eye for their recycled source; waste materials are segregated for weekly pickup and recycling.

**Ongoing employee educational assistance: In-plant and at local schools and colleges**

In-company training programs are only one part of Chicago White Metal's ongoing commitment to employee education and continuing skill enhancement.

Special off-site training courses and seminars in quality assurance, special equipment operation, new die design technologies and management techniques are regularly scheduled. Employees, as well as their families, can qualify for tuition payments at local colleges.

**Professional counseling programs available to all employees**

An employee assistance program, administered by highly qualified third-party professionals, is available to help company employees work through their special challenges. This confidential counsel can range from aiding those wishing to stop smoking to coming to grips with emotional problems or substance abuse.

**Our product: recyclable die castings**

The company's primary function is the production of environmentally friendly products. Metal alloys used by CWM are produced from recycled raw materials, created with far less energy than is required for virgin alloy. For example, all aluminum die castings produced by Chicago White Metal are made of post-consumer recycled aluminum. At the end of their life cycle, a long-established metal reclamation infrastructure exists to reclaim, re-alloy and recycle these parts back into high-performance manufactured components.

**We Take Our Corporate Citizenship Seriously**



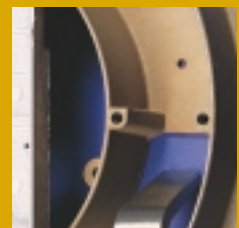
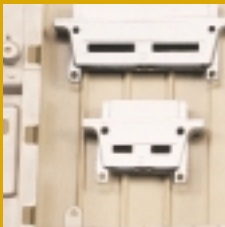
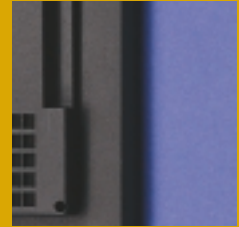
**CWM is the only custom die caster to receive recognition in the EPA's National Environmental Performance Track Program**

**Die castings offer superior recyclability**



**The mission of CWM:**

**CWM produces value-added die cast solutions for a global market. This provides the opportunity for customers to remain competitive while introducing new technologies to the world. By expanding our reputation as a leader in the industry, we provide opportunities to a dedicated team by sharing our knowledge and resources.**



**CWM makes available to OEM engineers and specifiers a library of design-for-die casting documents, instantly downloadable from its website. These data guides and bulletins provide assistance to designers in optimizing die cast components for lower cost production and improved performance. Visit the Literature Section (Sec. 8) at: [www.cwm diecast.com](http://www.cwm diecast.com)**

**CWM publishes an introductory "Design and Specification Guide" for engineers designing components for die casting. It is available in both printed and CD-ROM format. Contact your CWM Sales-Engineering Representative, who can be located at [www.cwm diecast.com](http://www.cwm diecast.com), or CWM's Sales Dept.**

**Tap the CWM design and production resource.**

If you have yet to visit the 136,000 sq. ft. facility of Chicago White Metal, consider doing so before your next design project. CWM engineering representatives are available to you across the United States and in Canada and Mexico. They can discuss feasibility of CWM high-tech die casting or turnkey contract manufacturing & assembly for a current product program, or arrange a plant visit.



**Chicago  
White Metal  
Casting, Inc.**



Certified Aluminum, Magnesium & Zinc Die Casting  
and Miniature Zinc & ZA-8 Die Cast Parts

**EXCELLENCE IS EXPECTED**

Route 83 and Fairway Drive  
Bensenville, Illinois 60106-1382 U.S.A.  
Phone: 1 (630) 595-4424 Fax: 1 (630) 595-4474  
CWM E-mail: [sales@cwmtl.com](mailto:sales@cwmtl.com)  
CWM Website: [www.cwmdiecast.com](http://www.cwmdiecast.com)  
CWM-CM E-mail: [sales@cwm-contractmfrg.com](mailto:sales@cwm-contractmfrg.com)  
CWM-CM Website: [www.cwm-contractmfrg.com](http://www.cwm-contractmfrg.com)

Sales & Engineering Representation throughout North  
America and in Central America. See Websites.

**MEMBER:**



North American Die Casting Association



Diecasting Development Council



International Magnesium Association

© 2003 Chicago White Metal Casting, Inc.  
3311 Printed in the U.S.A. on Recycled Paper

