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### CONTENTS

### Parts When You Need Them...from Prototype to Production



About Incodema Group				
Rapid Sheet Metal				
MicroCut	5			
Water Jet	6			
Wire EDM	7			
Bending	8			
Four/Multi Slide	9			
Machining & Turning	10			
Welding	11			
Process Comparison	13			

Photo Chemical Machining	15		
Additive Manufacturing			
Polyjet	17		
FDM	18		
SLA	19		
DMLS	20		
Additive Comparison			
Software, Quality Control & CAD			

Email us at sales@incodema.com to get quote within 24-48 hours or give us a call at 607-277-7070

# INVENT CONCEPT DESIGN MANUFACTURE

### INCODEMA can prototype what others can't and do it **FAST**!

### **Core Competency**

- ► State of the Art Technology
- ► Engineering Principles, Creative Approach
- Experienced in CAD/CAM
- ► Time to Market Emphasis

### **Empowered Team**

After

- ► 49 highly skilled technicians well versed in metal formings as well as experienced in CAD.
- Each technician overees their project for total quality managment throughout the manufacturing cycle



Water Jet Wire EDM Ram EDM MicroCut Four/Multi Slide **CNC** Milling **CNC** Turning Metal Forming, Bending & Punching Welding Photo Chemical Machining Direct Metal Laser Sintering (DMLS) Stereolithography (SLA) Polyjet Fused Deposition Modeling (FDM) Urethane Cast Full Turnkey Assemblies Guaranteed!



located at 407 Cliff Street, Ithaca, NY 14850



### Rapid Sheet Metal Prototyping

With over **190 CNC Machines**, Incodema Group provides a wide range of manufacturing capabilities



MicroCut



**CNC** Milling



Wire EDM



**CNC** Lathe



Water Jet



Four/Multi Slide



Laser



Press Brake

#### **Additional Services**

Prototype Tube Wire Forms PEM Insertion Tapping Riveting Plating/ Painting Welding Heat Treat Engineering Design Assistance

### Is it the Equipment or WHO uses it?

While we utilize the latest CNC technology...it is out proprietary tooling methods, in house secondar equipment and more importantly, our creative team that makes the INCODEMA difference

Many can blank, few can form....

### MicroCut



### ADVANTAGES

Fast transition from design to cutting Faster setup and cutting speed with higher accuracy minimizes secondary cleaning operations Ideal for quick prototypes, flexible production and proven high volume production Optimum material utilization Materials range from flexible plastic to hardened alloys



### SPECIFICATIONS

Positioning Accuracy: 0.0001" Contouring Accuracy: +/- 0.0004 in. Kerf width: 0.009" Kerf width with Abrasive: 0.0118" Maximum Workpiece: 24" x 39"



### PROCESS COMPARISON

The MicroCut process was specifically designed to machine two dimensional, high precision and micro parts with a substaintially smaller kerf width (0.012") compared to traditional cutting (0.045") that are primarily used to cut or rough out large shapes and/or thicker materials.

More competitive with EDM and Laser cutting, MicroCut cuts without Heat Affected Zones (HAZ)

### Water Jet Cutting



The Incodema Waterjet rapidly and accurately cuts a wide variety of materials, including materials up to 8"thick.

Water Jets are ideally suited for heavy gage applications and with materials such as aluminum, steel, titanium, inconel, brass, tool steel, glass, stone or composites.

► Our Water Jet's are paired with a dynamic head, eliminating taper and hold tolerances of +/- 0.005" to +/- 0.001"

- ► Material Thickness: 0.625" to 8"
- ▶ 60,000 psi



Incodema features three Mitsubishi RA-90 Electrical Discharge Machines (EDM). EDM is a cutting technology which uses high electrical currents to erode metal on a work piece.

Wire EDM is highly precise and ideal for very hard materials, intricate geometries and tooling. With an experienced team and Wire EDM machines with 5 axis cutting capability enabling taper cuts, use of thicker work pieces (up to 6") and increased accuracy, Incodema Group can provide cutting solutions for all your parts



### **Bending Metal**

![](_page_8_Picture_1.jpeg)

Incodema Group can stamp and form your most intricate parts!!

8 press beakes in the press room to ensure Incodema is able to handle large volumes as fast as possible

Coupled with out extensive cutting solution technologies, out press brake team can develop and produce complex parts quickly with the capability to incorporate design changes in real time, if needed.

Utilizing the latest in CAD/CAM software and CNC equipment, we can produce precise, innovative tool designs to enhance bending and forming capabilities

- Highly Experienced Team
- ▶ Press Capacity ranging from 20 to 50 tons
- ► Ability to form material from 0.001" up to 0.25" thick and 8' long

![](_page_8_Picture_9.jpeg)

### Four/Multi Slide

![](_page_9_Picture_1.jpeg)

# Building tooling in house

6 Four/Multi Slide machines to produce intricate stampings as well as wire forms. Freat for volume terminals, connectors and more... 1,000 to 100,000+

![](_page_9_Picture_4.jpeg)

Using state of the art equipment and software, Incodema Group has a highly skilled and fully equipped machine shop. With 3D machining capability, we specialize in complex and technically difficult machines parts that most other shops shy away from. Our CNC engineers work from your 3D CAD model and will assist you throughout the process of building your part to ensure it meets or exceeds requirements.

### Capabilities Include:

- ► Turning
- ► Milling
- Grinding
- ▶ Wire & RAM EDM
- Part Assembly
- CMM Inspection

![](_page_10_Picture_9.jpeg)

### Welding

![](_page_11_Picture_1.jpeg)

### Incodema's Welding Processes:

- ► Arc welding
- ► Shielded metal arc welding (SMAW)
- Manual metal arc welding (MMA)
- Gas metal arc welding (GMAW)/ Metal inert gas (MIG)
- ► Flux-cored arc welding (FCAW)
- ► Gas tungsten arc welding (GTAW)
- ► Tungsten inert gas (TIG)
- ► Submerged arc welding (SAW)
- Oxyfuel Welding and Cutting
- Resistance Welding
- Spot welding
- Seam welding

- Butt welding
- Flash welding
- Projection welding
- Upset welding
- Energy beam Welding
- Laser beam welding
- Laser-hybrid welding
- Solid-state Welding
- Ultrasonic welding
- ▶2Explosion weldingom

- Friction welding
- Electromagnetic pulse welding
- Co-extrusion welding
- Cold welding
- Diffusion welding
- Exothermic welding
- High frequency welding
- Hot pressure welding
- Induction welding
- Roll welding

![](_page_11_Picture_35.jpeg)

![](_page_12_Picture_0.jpeg)

Housing

![](_page_12_Picture_2.jpeg)

![](_page_12_Picture_3.jpeg)

Clips

Embossed

![](_page_12_Picture_6.jpeg)

Contacts

![](_page_12_Picture_8.jpeg)

Four/ Multi Slide

![](_page_12_Picture_10.jpeg)

Formed Plate

![](_page_12_Picture_12.jpeg)

Drawn

![](_page_12_Picture_14.jpeg)

![](_page_12_Picture_15.jpeg)

![](_page_12_Picture_16.jpeg)

odema.com | 13

### **Process Comparison**

Process	Material	Tolerance (+/-)	Kerf	Part Volume	Set Up Cost	Lead Time***	Notes
	THICKHESS						
Water Jet	up to 5"	0.005" 0.015	0.04	1 - 1,000	low, +30% to laser	6 - 8 days	
Laser	AL: 0.375" SS: 0.50" CRS: 0.75" CU: 0.060"	0.002" - 0.005"	0.012"	1 - 5,000	Low	6 - 8 days	Metals
MicroCut	.0005" - 0.5"	0.0005 - 0.005"	0.009" - 0.0196"	1 - 5,000	Low	6 - 8 days	Metal, glass, plastic, stone, rubber, kevlar, carbon fiber, ceramics, etc.
Wire EDM	0.001to 6"	0.0005"	0.0065"	1 - 200 is best	Low	6 - 8 days	Conductive metals, carbon
Chem Etch	0.005" to 0.125"	0.0005" - 0.003"	*	1 - infinity	Low	6 - 8 days	No burring, edges are beveled
Bending	0.250"	0.003 - 0.010	-	5-10K is most efficient	Moderate**	6 - 8 days	Forming, gussets, deep draw, dimples
CNC Machining	up to 20" thick	0.0002" - 0.0005"	-	1 - 100	Dependent on geometry	10 - 12 days	Metal, plastics, ceramics
Turning	up to 12" diameter	0.1 - 0.0005	-	1 - 1,000	Low	10 - 12 days	
Fourslide	0.003" to 0.125"	0.002" - 0.010"	-	3-15K pays for tooling	High tooling, low part price	4 - 8 weeks	Metals

\* inner radius should be 100% of material thickness, outer radius should be 75% of material thickness

\*\* dependent on geometry

\*\*\* dependent on geometry, volume and material; expedite options are available

![](_page_14_Picture_0.jpeg)

### Photo Chemical Machining (PCM)

![](_page_15_Picture_1.jpeg)

PCM is a process of selectively removing material by using a chemical action. The process begins with cleaning the material of all debris, grease and it is then coated with a photosensitive film and etchant resistant. Dry film or a liquid resist is applied to both side of the work piece to allow etching of both sides simultaneously. The photosensitive coating is then exposed to a UV light, which transfers the photo tool image onto the coated material. Then, the material is developed, during this process any material not protected by the resist is eroded. Once the material is processed, you are left with a metal sheet with the image of the design protected by the photo resist. The material is then stripped of the protective coating to produce your part.

![](_page_15_Picture_3.jpeg)

![](_page_15_Picture_4.jpeg)

### High Precision | Fast Turnaround | Prototype to Production Parts

#### SPECIFICATIONS

Material Thickness: 0.0005" (0.013 mm) to 0.1" (2.5 mm) Part Quantity: 1 to infinity

Minimum Piece Size: 0.040" (1.02 mm) square

Maximm Piece Size: 40" x 60" panels

#### Standard Tolerance: +/- 0.003" to +/- 0.0005" (added cost)

#### DIMENSIONS

- Etched Dimensions are generally +/-10% of material thickness
- All edges are beveled
- Hole sizes cannot be smaller than the thickness of the material
- Line widths must be at least equal to material thickness
- Line widths must be 125% if the material thickness is over 0.0005" (0.127 mm)
- ► Inside corner radius is generally 100% of thickness
- Outside corner radius is generally 75% of thickness

#### **ADVANTAGES**

- ► Los Cost Tooling
- Inegrity of Metal Parts
- Multiplicity of Design
- ► Tooling Modifications
- ► No Burring
- ► Half Etch Available
- ► No Cost to Add ID Marks
- Ideal for small intricate parts with tigh tolerances

### Additive Manufacturing

![](_page_16_Picture_1.jpeg)

#### POLYJET

With the ability to print multiple materials in one build, Polyjet enables you to simulate diverse mechanical and physical peroperties, from rubber to rigid; opaque to transparent; and standard to ABS grade with a range of 100 materials

![](_page_16_Picture_4.jpeg)

#### FDM

fused deposition modeling

Incodema Group's Fortus 400mc has the ability to build parts in nine production grade engineering thermoplastics.

ABS ESD6, ABSi, ABS M30, ABS M30i, PC, PC ABS, PC ISO, and PPSF

#### SLA stereolithography

With the ability to produce fine detailed three dimensional prototypes, they are ideal for concept models, form and fit studies and as master patterns for injection molding, cavity inserts, thermoforming and blow molding.

Somos 11122XC and NeXt

![](_page_16_Picture_12.jpeg)

#### DMLS

direct metal laser sintering

Utilizing powdered metal, Incodema Group can process a wide rand of materials; from light metals to stainless and tool steel to super alloys.

SS 15-5PH, SS 17-4PH, Aluminum, Maraging Steel, Titanium Alloy, Cobalt Chrome,

# Polyjet

### Multi Materials Can be Built Simultaneously in the Same Part!

### PROCESS

Layers are built up one at a time to create your prototype. Polyjet 3D printers jet layers of liquid photopolymer onto a build tray and cure them with a UV light. Fully cured models can be handled and used immediately, without additional post curring. In addition to the selected materials, the Polyjet printer also jets a gel like support material specially designed to uphold overhangs and complicated geometries.

![](_page_17_Picture_4.jpeg)

### APPLICATIONS

- Over molded parts
- Electronic Components and Packaging
- Presentation Models
- Patterns for Advanced Urethane Castings
- Medical parts
- Translucent Parts
- Fitting and Valves
- Parts with Complex Interior Features

### SPECIFICATIONS

- 16 micron layers
- Accuracy as high as 0.1mm for smooth surfaces, thin walls and complex geometries
- ▶ Build Volume: 19.3" x 15.4" 7.9"

### ADVANTAGES

- Superior quality and speed, high precision with a very wide variety of materials available
- ► Fine feature details and accuracy for smaller parts
- ► The only additive manufacturing system that can combine different 3D printing materials within the same 3D printed model, in the same print job
- Offers more material versatility than any other technology

### Fused Deposition Modeling (FDM)

### PROCESS

- ► 3D printers that run on FDM Technology build parts layer-by-layer by heating thermoplastic material to a semi-liquid state and extruding it according to computer-controlled paths.
- ► FDM uses two materials to execute a print job
  - Modeling material which constitutes the finished piece,
  - Support material which acts as scaffolding.

Material filaments are fed from the 3D printer's material cartridges to the print head, which moves in X and Y coordinates, depositing material to complete each layer before the base moves down the Z axis and the next layer begins.

► Once the FDM machine is done building support material is broken away or dissolves it in detergent

### SPECIFICATIONS

- Maximum dimensions for parts in a single build
  - ► ABS- 23" x 19" x 23"
  - ► Polycarbonate (PC)- 14" x 16" x 16"
- Dimensional tolerances:
  - ► +/-0.005" for the first inch; +0.002"/in
- Layer thickness
  - Standard resolution: 0.01"
  - Minimum wall thickness: 0.02"

#### APPLICATIONS

- In standard, engineering grade and high performance thermoplastics.
- Concept Models
- Functional Prototypes
- End-use parts
- Rapid Tooling Patterns
- Presentation models
- ► High Heat Applications

#### ADVANTAGES

- Fast Turnaround
- ► Ready to use parts
- Complex geometries and cavities are achievable that would be difficult to build with traditional manufacturing methods
- ► Parts are unrivaled in mechanical, thermal and chemical strength.
- Multiple materials

![](_page_18_Picture_32.jpeg)

## Stereolithography (SLA)

#### ADVANTAGES

- ► Time savings–We can fabricate your SLA prototype in 1-3 days
- ► High accuracy and smooth surface finish
- ► Fine detail capability
- ► Wide range of materials are available
- Multiple finishing options; optical clarity can be achieved
- Tight tolerances
- SLA is well suited to low volume manufacturing of prototype or end use parts
- SLA investment casting patterns allow rapid production of metal prototypes
- Rapid prototyping allows you to get your products to market faster

#### MACHINES

Incodema Group offers a broad variety of resins along with our high-resolution Viper machine, which offers SLA parts at .002" layer thickness

Large-format Viper Pro has the ability to build the largest single part builds available to suit all your SLA prototyping needs

### APPLICATIONS

- Limited number of prototypes needed (1 10)
- Master Patterns
- Injection molding core
- Cavity inserts
- Form & Fit Testing
- Functional Testing
- Blow molding
- Metal castings

![](_page_19_Picture_23.jpeg)

### FINISHING DEPARTMENT

Incodema Group has a highly skilled finishing team that knows the importance of a good finish, which is why we have an established finishing department.

Many manufacturers have little to no finishing capabilities causing delays, added cost and poor finishes.

Our experienced and meticulous team of finisher's will take your parts and exceed your expectations with their finishing abilities.

# Direct Metal Laser Sintering (DMLS)

#### PROCESS

DMLS is an additive manufacturing technology that builds components directly from any 3D CAD model.

- Built layer by layer
- ► 20 micron layers
- Powdered metal

Complex geometries can be built while reducing time and cost of conventional manufacturing

### ANY SHAPE, ANY DESIGN

Components are built layer by layer, enabling the design of internal and external features that could not be otherwise machined, such as:

- ► Free form surfaces
- Deep grooves
- ► Three dimensional cooling channels

Complex geometries and assemblies with multiple components can be simplified into fewer processes and offers nearly unlimited design potential

#### MATERIALS

Stainless Steel (15-5 equivalent) Stainless Steel (17-4 equivalent) Aluminum Maraging Steel Titanium Alloy Ti-64 Cobalt Chrome Inconel

![](_page_20_Picture_15.jpeg)

#### ADVANTAGES

To compliment our DMLS machine, we have a highly skilled and fully equipped in house machine shop. Our experienced engineers post process the components, providing surface finish and any additional feature each component requires.

- Strong and durable components (produce metal components that are 99.8% dense)
- Rapid Prototypes
- No tooling, reducing cost
- High quality
- ► High accuracy in fine details
- Complex geometries
- Weight reduction with build in internal chambers
- Excellent for functionality testing allow for more rigorous testing of prototypes

![](_page_20_Picture_26.jpeg)

	Additive Process					
Machine	SLA	SLA Viper	FDM	Polyjet	DMLS	
Materials Available	UV cured photopolymer (similar to ABS or PP) Somos 11122XC and Somos NeXt		Plastics: ABS, PC, ABS/PC, PPSF, ULTEM	UV cured photopolymer (similar to ABS or TPE)	Laser sintered powdered metal. Stainless 15-5 & 17-4, Alumi- num, Maraging Steel, Titanium Alloy, Cobalt Chrome and Inconel	
Building Envelope	20" x 20" x 23"	Standard: 10" x 10" x 10" HR: 5"x 5" x 5"	16" x 14" x 16"	19" x 15" x 7"	9.85" x 9.85" x 12.8"	
Tensile Strength	Fair		Fair	Poor	Good	
Layer Thickness	0.004" or 0.006"	Standard: 0.004" HR: 25 μm	.005" - 0.013"*	0.0018"	0.0008" - 0.003"	
Thin Walls	Good	Very Good	Fair	Good	Good*	
Tolerances	+/-0.005" for the first in. + 0.001"/in	+/- 0.0003"	+/- 0.005" for the first in. + 0.002/in.	+/- 0.002" for the first in. + 0.0005"/in.	+/- 0.002"	
Secondary Finish	Multiple Finishing Options		Multiple Finishing Options Available	Multiple Finishing Options Available	Multiple Finishing Options	
Durability	limited		excellent	limited	excellent	
Functional Samples			•	•	•	
Proof of design	•		•	•	•	
Process can be applied to metals				•	•	
Multi material components				•		
Post Processing Available	•		•	•	•	
Master Pattern	•			•		
Injection Molds					•	
Lead time*	1-3 days		1-3 days	1-3 days	1-5 days	
Strip & Ship **	•		•	N/A	•	
Cost per part	\$\$		\$\$\$	\$\$\$	\$\$\$\$	

\* dependent on geometry and material used \*\* no fipishing. For plastic parts, support stuctures are removed and the part is cured. For DMLS parts, support structres remain intact and shipped directly to you! a . c o m

![](_page_22_Picture_0.jpeg)

### Get Your Quotes Fast ! 24-48 hours

### **INSTANT SLA Online Quoting at www.iwin-rp.com**

### Software

Prototype Life Cycle Management Software. Custom in house software for:

- Customer Quote Creation
- Order Processing
- Scheduling
- Order Tracking & much more

### CAD

Computer Aided Design is the language of the shop. Every team member has the ability to access and launch CAD/CAM with 3D models at every station

- ► Pro-E
- ► IGES
- SolidWorks
- ► DXF
- MasterCam
- SAT
- ► AutoCAD
- ► DWG

### **Quality Control & Inspection**

- ► Coordinate Measuring Machine (CMM)
- Starret Optical Comparator (s)
- Profilometer
- ► Force Gage
- Leak Check
- ► Microscope

 Digital Calipers and full sets of hole and thread gages

- ITAR Certified
- ▶ ISO 9001: 2000 Compliant

![](_page_23_Picture_28.jpeg)

- ▶ Prototype manufacturing is a cost effective option for mechanical components.
- Lead-times are typically shorter than other processes such as Injection Molding.
- Modern Machine tools and software have transformed the processing of prototyping.
- Ease of design and design tools (CAD) allow for fast turn around.

### **Thank You for Choosing**

![](_page_24_Picture_1.jpeg)

Get Your E-Quote TODAY at sales@incodema.com or www.incodema.com