



## **CONTRACT WATERJET CUTTING SERVICES**

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# TESTIMONIALS

## CUSTOMER SUCCESS STORIES

ICS has had the privilege of providing waterjet cutting services for some of the most renowned aerospace and aviation companies worldwide. Additionally, ICS has collaborated with prestigious universities at the forefront of innovative and technological advancements. Waterjet cutting proves to be an exceptional choice for research and development projects.

"We cannot say enough about the quality and great turn around times from ICS. they are going to be an asset to our company. It has been very easy communicating with Rick to get exactly what we need. We are looking forward to a long relationship between ICS and our company."



"Rick and his team are fast to respond to requests and questions. The lead time they provide is perfect for our projects. Rick has also been very accommodating if an issue with an order needs to be addressed. My team of engineers and designers in our Special Gage Division at Starrett all know about ICS."



"Everyone I have dealt with at ICS has been really great. All are very friendly, professional and just a pleasure to work with. RFQ's are responded to promptly and your pricing can't be beat."



"This was the first utilization of ICS for our company. Rick Comeau was extremely responsive and even with our extremely critical, time-sensitive request the team at ICS was able to make things work and ensure that we had parts. We are extremely grateful for the work that ICS has done and will most definitely be looking to utilize ICS more."



"Amazing company which far exceeds customer's demands with its exceptional customer service and lead time. Definitely a place I would recommend to all companies in need for water-jet."



"Prompt attention to customer questions and equally fast quote replies. We were also very pleased with the work quality."



"Excellent communication with customer on specifications, when product available and overall customer friendly"



"Rick and Nick take incredible responsibility for every part they make for us. The quotes are reasonable, the turnaround times are fantastic, and the communication is top-tier."





# ABOUT ICS

## INTELLIGENT CUTTING SOLUTIONS

ICS has had the Founded in 2019, ICS emerged from its owners' recognition of the need to enhance the waterjet cutting service experience through advanced technology and effective management strategies. Drawing on decades of experience in the aerospace industry, they identified a gap in reliable, customer-centric waterjet vendors in New England.

### CORE COMPETENCIES

Intelligent Cutting Solutions (ICS) provides contract waterjet cutting services, specializing in the aerospace and defense industries. Utilizing state-of-the-art Flow waterjet machines, ICS achieves the fastest cutting speeds and highest accuracy. The facility houses six waterjet machines equipped with taper compensation, 5-axis cutting heads, and HyperJet 94i-S intensifier pumps operating at 94,000 PSI. This advanced technology enables ICS to cut a wide range of materials with thicknesses from 1/16" to 10".

### OUR TECHNOLOGY

Intelligent Cutting Solutions (ICS) uses state-of-the-art Flow waterjet machines that have the fastest cutting speeds and highest accuracy in the industry. All of the machines used at ICS have the following cutting edge technology:

- Taper Compensation
- Dynamix XD 5-axis cutting head
- FlowCut Software
- HyperJet 94i-S Intensifier Pump
- Moto Jet 60,000 PSI intensifier pump



AS9100D,  
ISO9001,  
AND ITAR  
CERTIFIED

ISO9001, AS9100D and,  
ITAR Certified.



QUICK  
QUOTES

The staff at ICS is trained to  
provide quotes within 24  
business hours.



COMPETITIVE  
PRICING

ICS offers pricing that is at  
least 10% more competitive  
than industry standards.



NEW  
TECHNOLOGY

State-of-the-art  
machines to provide  
customers with the  
highest quality work.



FAST  
LEAD TIMES

ICS boasts some of the best  
lead times in the industry  
and has distribution plans  
in place to prevent delays.



EXPERIENCE

Extensive waterjet cutting  
background and, over a  
decade of experience in  
the aerospace industry.

# ICS ADVANTAGE

## A CUT ABOVE THE REST

Unlike many other waterjet cutting shops, ICS is not a parts manufacturer with spare capacity. Instead, ICS is wholly dedicated to its customers' projects. This customer-centric approach drives their competitive edge in lead times, pricing, and quotes. At ICS, customers can expect to receive parts in days, not weeks.

PROCESSED

**6,891**

JOBS

SHIPPED

**245,728**

PARTS

SERVED

**194**

CUSTOMERS

**95 %**

**Customers reported that they would highly recommend ICS services.**

## ADVANCED CAPABILITIES

### 5-AXIS & BEVELED CUTTING

Dynamic XD™ cutting head technology that can cut bevels up to 60°. This allows ICS to cut complex 3D shapes. The cutting head wrist articulation has a motion capability of up to 89°.

### STACKED & LAMINATE CUTTING

ICS's waterjet cutting services also include the cutting of stacked and laminated material. The abrasive waterjet process allows ICS to optimize output by cutting several inches of varying material at once in a single pass.

### PRECISION CUTTING

ICS is capable of holding extremely tight tolerances for most materials. The ICS team specializes in serving the aerospace and defense industries, two of the most demanding in terms of tolerance requirements.

### LARGE TABLE SIZES

ICS's machines are equipped with a wide range of table sizes, allowing them to accommodate larger-scale projects.

### EXPERIENCE

ICS's operators possess over 30 years of combined experience in waterjet cutting, while the company's owners contribute decades of experience from the aerospace industry.

### SERVING EVERY INDUSTRY

Waterjet cutting is employed across nearly every industry, from medical device manufacturing to architecture. The versatility of these machines enables their use in the production of a wide range of products.



# INDUSTRIES

## ICS INDUSTRIES SERVED

Waterjet cutting is utilized across a wide range of industries, from medical device manufacturing to architecture, due to its remarkable versatility. The technology employed by ISC enables this process to be integral to the production of numerous products. A significant portion of ISC's work is concentrated within the aerospace sector, where this cutting method is preferred for its high precision and the absence of heat-affected zones (HAZ).



### AEROSPACE & AVIATION

Precision in aerospace manufacturing is imperative, and there are zero margins for error. Waterjet cutting services can be used to make components for jet engines and turbine blades. The lack of heat-affected zones during the waterjet process means that there is no thermal distortion, making waterjet cutting the superior cutting method for the aerospace industry.



### DEFENSE

The manufacturing of military machinery depends heavily on abrasive waterjet cutting. The waterjet machine's versatility allows for it to be used for a variety of materials and projects that are typically difficult to machine, including: composites, rotary blades, jet engines, and various metals up to 11" in thickness.



### ARCHITECTURE

Waterjet cutting in architecture is the preferred cutting process, because of the machine's capability to cut thicker materials in irregular shapes while maintaining accuracy and cutting at fast speeds. Materials often cut for architectural applications include acrylic, wood, metals & alloys, and stone.



### AUTOMOTIVE

The versatility of a waterjet machine makes it perfect for the automotive industry. Waterjet cutting is capable of cutting both interior and exterior components. Professionals in the automotive industry often use this process because of its precision, smooth edges, and lack of mechanical stress.



### MEDICAL

Advancements in waterjet cutting technology have made it possible to hold the tight tolerances needed in medical manufacturing. ICS's 5-axis cutting heads allow for cutting angles and bevels up to 60 degrees making it the ideal choice for many medical manufacturers. This process is often used for both prototyping and larger runs of components.

# WHY WATERJET?

## CUTTING COMPARISONS

ICS's state-of-the-art waterjet machines produce a satin-smooth finish without the need for additional finishing processes. Explore how waterjet cutting compares to other traditional cutting methods.

### WATERJET CUTTING



**Process:** Erosion process using a mixture of high pressure water and garnet (sand)

**Heat Input:** None

**Thermal Damage:** No part distortion or thermal damage

**Material Types:** All materials

**Material Thickness:** <11"

**Part Accuracy:** .001"

**Edge Cleanup:** None, part can be used as-is after cutting



### PLASMA CUTTING



**Process:** Melting process using a high temperature gas

**Heat Input:** High heat input

**Thermal Damage:** Significant distortion and thermal damage

**Material Types:** Primarily steel, stainless steel, and aluminum

**Material Thickness:** <2-3"

**Part Accuracy:** .010"

**Edge Cleanup:** Heavy deburring and slag removal required



### LASER CUTTING



**Process:** Melting process using a concentrated light beam

**Heat Input:** High heat input

**Thermal Damage:** Significant distortion and thermal damage

**Material Types:** Primarily steel, stainless steel, aluminum

**Material Thickness:** <1"

**Part Accuracy:** .001"

**Edge Cleanup:** Heavy deburring and slag removal required



### EDM CUTTING



**Process:** Erosion process using electrical discharge to erode material

**Heat Input:** High heat input

**Thermal Damage:** Significant microscopic thermal damage

**Material Types:** Only conductive material

**Material Thickness:** <12"

**Part Accuracy:** .001"

**Edge Cleanup:** Recast layer removal required by most aerospace customers

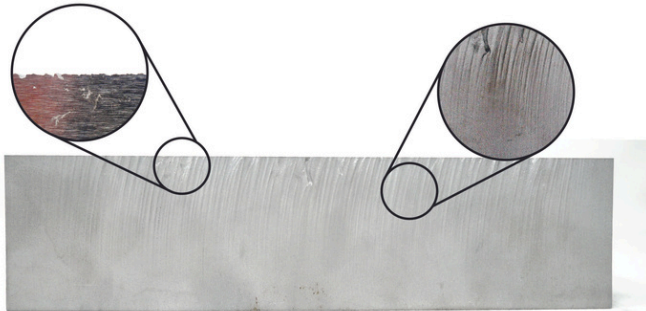




# EDGE FINISH

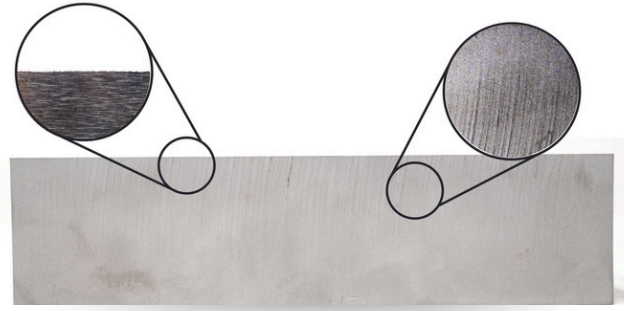
## DESIGNING FOR WATERJET

Intelligent Cutting Solutions (ICS) provides four levels of surface finish to meet diverse customer needs. Each finish correlates with a specific cutting speed, where achieving a smoother surface requires longer cutting time.



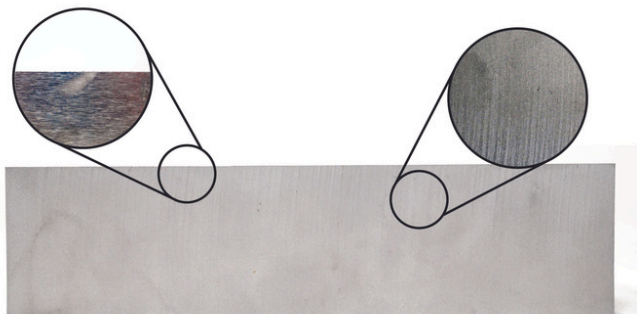
### 80% FINISH

An 80% edge quality represents the fastest cutting speed and produces very visible lines. This finish is best suited for applications where edge quality is not critical or when additional machining is required.



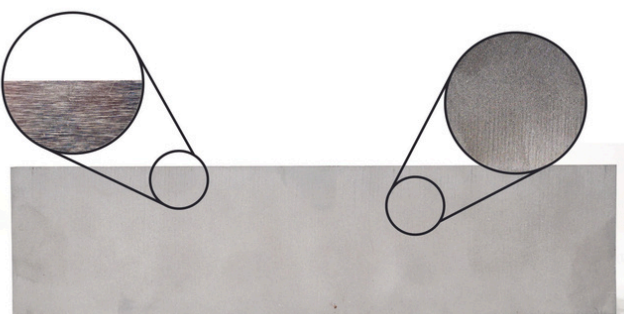
### 60% FINISH

A 60% edge quality results in a medium-rough waterjet cut. While the striations are less noticeable compared to an 80% finish, the pieces require more time to be completed on the waterjet machine.



### 40% FINISH

A 40% edge quality is achieved by reducing the travel speed of the waterjet stream. This is ICS's standard cut and is the most frequently chosen option by our customers.



### 20% FINISH

A 20% finish is of exceptionally high quality and the most accurate, with a tolerance range of  $\pm .003$ ". This finish is achieved by operating the waterjet machine at the slowest cutting speed.

### DESIGN TIPS

When designing for waterjet cutting, it is advisable to plan for a tolerance of  $.005$ ". ICS's machines can achieve a minimum inside corner radius of approximately  $.020$ " and a minimum hole diameter of  $.100$ ". ICS's waterjets can cut a wide range of materials with varying thicknesses. The maximum sheet size that ICS's largest tables can accommodate is  $10' \times 13'$ ".

# MATERIAL VERSATILITY

## MATERIAL CUTTING CAPABILITIES

Waterjet cutting technology is rapidly becoming one of the world's fastest-growing major machine tool processes due to its versatility. The Flow waterjet machines at Intelligent Cutting Solutions (ICS) are capable of cutting a wide range of materials in varying thicknesses. Abrasive waterjets can cut materials from 1/16 inch to over 10 inches thick.



### METALS

ICS can seamlessly cut all metals including Inconel, titanium, aluminum, stainless steel, and 4130.



### STONE & TILE

ICS' versatile waterjet systems allow for a wide variety of applications when it comes to stone, tile and ceramic.



### GLASS

ICS has UltraPierce technology which allows us to properly dwell at the pierce point when introducing the stream hole without cracking.



### RUBBER, PLASTICS & FOAM

Flow Waterjet machines can produce a very narrow water stream, which is needed to achieve the cleanest of cuts on your materials.



### COMPOSITES

Composites typically cut by ICS include fiberglass, graphite, carbon fiber, reinforced plastics, and composite foam.



### THICK MATERIALS

The greatest advantages of this equipment is it's ability to cut many materials up to 11" in thickness.



### PRECISION CUTTING

ICS' machines are able to achieve beveled cuts due to our cutting edge technology. Our cutting head can articulate up to a 60 degree bevel.



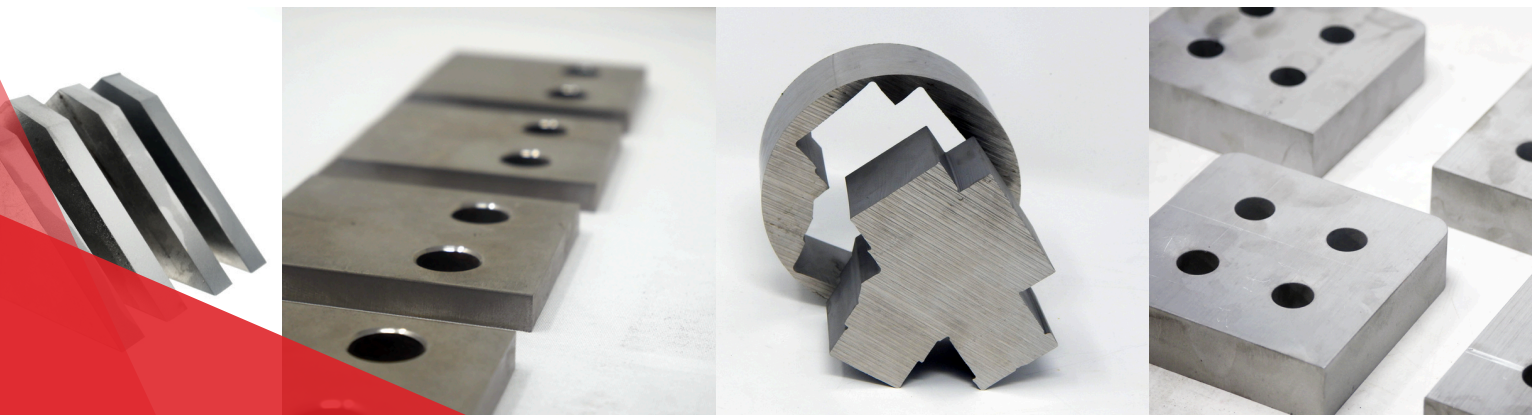
### STACKED & LAMINATED

ICS can optimize output by cutting several inches of material in one pass. Laminated material can also be cut multiple layers at a time.



### 5-AXIS CUTTING

ICS' machines are able to achieve beveled cuts due to our cutting edge technology. Our cutting head can articulate up to a 60 degree bevel.





# PRECISION CUTTING

## MATERIAL CUTTING CAPABILITIES

Intelligent Cutting Solutions (ICS) provides precision waterjet cutting services with tight tolerance capabilities for a wide range of materials. These stringent tolerance requirements are particularly prevalent in the aerospace and defense industries.

### WATERJET KERF

ICS exclusively uses Flow waterjet machines, which are known for their accuracy and minimal kerfs. This minimal kerf (.30" -.40"), is a result of the narrow stream. With such a precise range, ICS is able to maximize your material usage, reduce scrap, and save you money.

### MACHINE ACCURACY

- Linear straightness accuracy:  $\pm .0381$  mm/m [ $\pm .0015$  in/3ft]
- Repeatability:  $\pm .025$ mm [ $\pm .001$  in]
- Ballbar circularity:  $\pm .0635$ mm [ $\pm .0025$  in]

### EDGE QUALITY

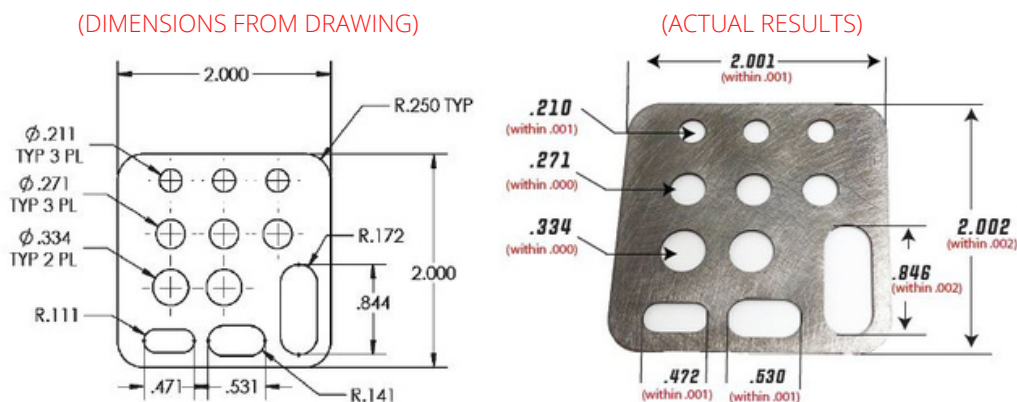
ICS offers waterjet cutting services that deliver superior edge quality by eliminating the introduction of heat or mechanical stress during the process. In many instances, the edge finish is suitable for use as is, without the need for additional removal or finishing.

### CUTTING AXIS

ICS's machines are capable of cutting 2-axis, 3-axis, and 5-axis.

### MAXIMUM TABLE SIZES

10' X 13'



Base Material: .40" Thick Grade 5 Titanium  
Q5 Quality (Holds the best tolerances at the slowest cutting speed for accuracy)  
Typical example of the accuracy when using our state-of-art Waterjet Machines.



# THICK MATERIAL

## MATERIAL CUTTING CAPABILITIES

A key advantage of working with Intelligent Cutting Solutions (ICS) is their state-of-the-art equipment, which can cut materials up to 11 inches thick. For materials under 4 inches thick, very tight tolerances are maintained. While materials over 4 inches still achieve precise cuts, the tolerances are adjusted to near net shape.

### MATERIAL THICKNESS

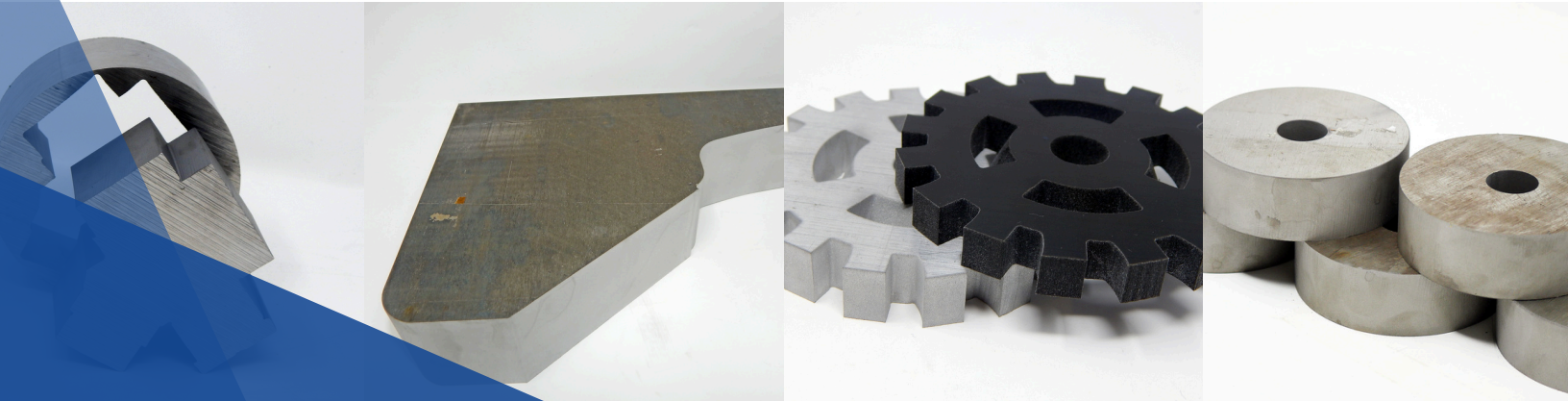
The chart below lists some of the materials the machines are capable of cutting, as well as their corresponding max thickness measurements.

Material type	Thickness
Mild Steel	10"
Aluminum	11"
Titanium	9"
Hastalloy	9"
Tool steel	9"
Rubber	10"
Glass	6"

### PART TOLERANCE

The chart below lists the tolerances that can be held with varying material thickness.

Material thickness range	Tolerance range
.062-.250"	.003-.005
.250-.500"	.005-.007
.500-1.00"	.007-.010
1.00-3.00"	.010-.025
3.00-10.00"	Plan on near net shape





# METALS & ALLOYS

## MATERIAL CUTTING CAPABILITIES

The abrasive waterjet cutting process at Intelligent Cutting Solutions (ICS) can handle virtually any metal. Whether cutting mild steel for structural applications or an 8-inch thick titanium blank for aerospace components, ICS's services are equipped to meet your needs. Abrasive waterjet cutting of aerospace alloys is the most common process at ICS.



### STEEL

As with many other metals, steel comes in a large variety of qualities. Mild steel, the typical go-to choice for many fabricators, welders, and machinists. The waterjets can accommodate up to 10" in thickness.



### STAINLESS STEEL

Stainless steel is a family of iron-based alloys with a composition that makes it both heat and rust resistant. The waterjets can accommodate up to 10" in thickness.



### TITANIUM

Titanium is a material which is high-strength, low-corrosion, and light-weight. Titanium is often used in prosthetic devices and in the aerospace/aviation industry. The waterjets can accommodate titanium up to 9" in thickness.



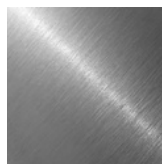
### COPPER

Copper is used in lots of different applications across various industries but is often seen in architectural work and signage. The waterjets can accommodate copper up to 9" in thickness.



### ALUMINUM

Components comprised of Aluminum have become increasingly popular in the aerospace industry. These alloys can also be seen quite often in the automotive industry. The waterjets can accommodate aluminum up to 11" in thickness.



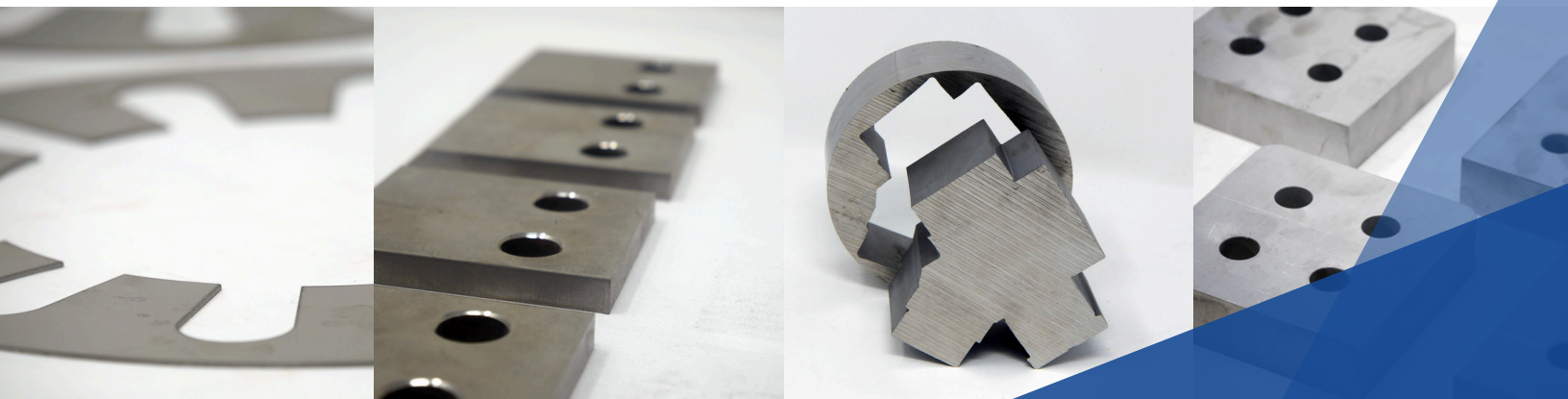
### INCONEL

Inconel is a nickel-chromium based alloy. It is corrosion resistant and ideal for use in extreme environments, such as those of high heat and pressure. The waterjets can accommodate Inconel up to 10" in thickness.



### BRASS

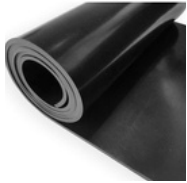
Brass is a metal alloy that is made with a combination of copper and zinc. This alloy is often seen in decorative and mechanical applications. The waterjets can accommodate brass up to 9" in thickness.



# RUBBER, PLASTICS & FOAM

## MATERIAL CUTTING CAPABILITIES

The Flow waterjet machines used by Intelligent Cutting Solutions (ICS) can cut materials such as paper, plastic, rubber, and foam. The most commonly processed materials in this category at ICS include rubber, glass, reinforced plastic, and composite foams. Utilizing the latest waterjet technology, ICS produces a very narrow water stream, resulting in extremely clean cuts.



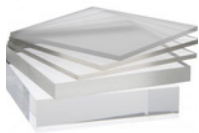
### RUBBER

A versatile, all-purpose material that is used in many different industries. A material that is known for being flexible in terms of its mechanical properties and in regards to its chemical properties. All varieties of rubber are compatible with waterjet cutting.



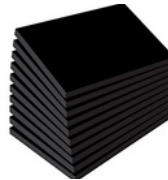
### FOAM

Foam is generally highlighted for its high strength to weight ratio and is often used for its thermal insulation properties. The more gas present in the foam and the lower the density the less strong the foam will be.



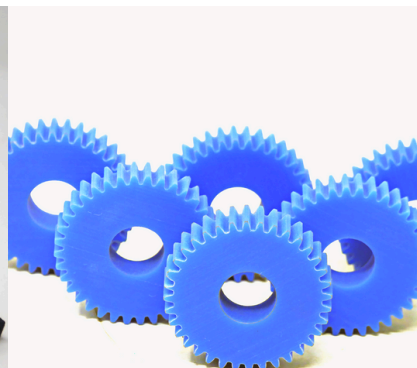
### ACRYLIC

A plastic material that is known for its incredible strength, and stiffness. This material is often used for aesthetic purposes due to its durability and superior attractiveness. Much lighter in weight and more resilient than its clear counterpart, glass.



### PVC

Polyvinyl Chloride (also known as PVC) has become the third most widely produced polymer of plastic. PVC has high hardness and mechanical properties and has good electrical insulation.



# OTHER MATERIALS

## MATERIAL CUTTING CAPABILITIES

Among the less commonly processed materials at Intelligent Cutting Solutions (ICS) are glass, laminated and stacked materials, stone and ceramics, and composites.

### GLASS

Intelligent Cutting Solutions (ICS) Flow waterjet machines feature the industry-leading UltraPierce™ option, enabling precise dwelling at the pierce point to create the stream hole without cracking the glass. ICS has extensive experience cutting various types of glass. However, tempered glass cannot be cut with a waterjet, as it shatters upon being pierced by the waterjet stream.

### LAMINATED & STACKED

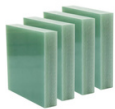
Intelligent Cutting Solutions (ICS) can cut laminated materials and optimize output by cutting several inches of material in a single pass.

### STONE & CERAMIC

Intelligent Cutting Solutions (ICS) handles a diverse range of stone and ceramic materials. Whether cutting stone for architectural projects or ceramic for scientific applications, ICS ensures prompt and efficient results. Our state-of-the-art technology delivers a superior edge finish without introducing heat or surface stress to the materials.

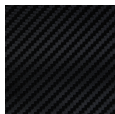
### COMPOSITES

Intelligent Cutting Solutions (ICS) possesses the capability to process composite materials, including graphite, carbon fiber, fiberglass, reinforced plastic, and composite foams. ICS's advanced technology generates a very narrow water stream that minimizes impact on composites, effectively eliminating issues such as delamination, whiskering, and cracking.



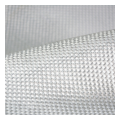
#### G10

Components comprised of Aluminum have become increasingly popular in the aerospace industry. These alloys are seen quite often in the automotive industry. The waterjets can accommodate aluminum up to 11" in thickness.



#### CARBON FIBER REINFORCED POLYMER (CFRP)

This fibrous composite material is extremely strong and light-weight. CFRP is often used in industries such as aerospace, because of its high strength-to-weight ratio.



#### GLASS FIBER REINFORCED POLYMER (GFRP)

This low-cost composite is made from glass fibers and is often seen in the architecture industry. This composite has a medium weight and a medium density.



# TECHNOLOGY

## FACILITY & STATE-OF-THE-ART EQUIPMENT

Intelligent Cutting Solutions (ICS) utilizes state-of-the-art Flow waterjet machines, renowned for their industry-leading cutting speeds and precision. The machines at ICS incorporate the following advanced waterjet technologies.

### MACHINES

#### MACH 500

The Mach 500 is ICS most advanced waterjet solution, distinguished by its unparalleled technology and design.

Dynamic XD™ cutting head: 5-axis cutting head technology that can cut bevels up to 60°. This allows ICS to cut complex 3D shapes. The cutting head wrist articulation has a motion capability of up to 89°.

#### MACH 300

A system that was designed to deliver reliable performance that ICS can depend on. This waterjet solution is efficient and practical.

Dynamic cutting head: Dynamic waterjet cutting head with active tolerance control to produce more accurate parts at significantly higher cutting speeds

#### HYPERJET® 94I-S INTENSIFIER PUMP

Delivers 94,000 PSI which almost doubles the cutting speed from most conventional waterjet pump systems.

#### MOTO JET 60,000 PSI INTENSIFIER PUMP

Delivers 640,000 PSI and was built for dependability in tough industrial cutting applications.

### FACILITY FEATURES

#### SPARE PARTS INVENTORY

ICS always keeps spare parts and backup pumps in stock to eliminate down time in the event that a machine requires maintenance.

#### HUMIDITY CONTROLLED STORAGE

ICS's garnet storage system is humidity controlled to keep garnet dry at all times. ICS always has a 6 month supply of garnet in stock to prevent supply chain disruption.

# QUALITY & INSPECTION PROCESS

## ICS APPROACH TO QUALITY

Integrating full visual and dimensional inspections for each job to ensure accuracy.

## QUALITY DRIVEN INSPECTION PROCESS

### FULL VISUAL & DIMENSIONAL INSPECTIONS

At ICS, every job undergoes a first-piece inspection to ensure dimensional accuracy before proceeding with full production.

When performing first article inspections, the ICS team adheres to the AS9100 format, meticulously documenting and retaining the records as required. Following the full production run, ICS conducts a comprehensive 100% visual inspection along with a sample dimensional inspection for all jobs. Dimensional inspection reports are available to customers upon request.

## INSPECTION TOOLS: VIRTEK LASERQC

### IDENTIFY QUALITY ISSUES QUICKLY

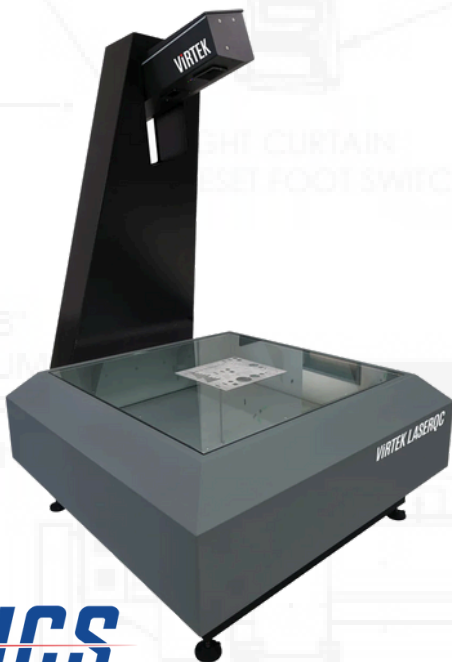
ICS's Virtek LaserQC was designed for the manufacturing environment.

The Virtek LaserQC technology ensures system calibration is verified before each scan, guaranteeing repeatable accuracy. ICS's Virtek LaserQC immediately identifies errors, significantly reducing scrap and rework efforts.

### TAKING QUALITY TO THE NEXT LEVEL

ICS's Virtek LaserQC system's frequent quality control reports help instill confidence in our customers.

ICS's Virtek LaserQC captures over 500 data points per second and swiftly performs 100% inspections with an accuracy of  $\pm 0.002"$  (0.05mm) for 2D measurements and  $\pm 0.010"$  (0.25mm) for formed measurements.



### LASERQC® 1200 SYSTEM SPECIFICATIONS

#### Scanning Accuracy

- $\pm 0.05\text{mm}$  (0.002") (2D only)  $\pm 0.25\text{mm}$  (0.010") for height measurement

#### Maximum Part Thickness

- 200mm (8.0") for 2D, 305mm (12.0") for AFM

#### Calibration

- Automated

#### Maximum Scan Zone (single scan)

- 1220mm x 1220mm (48" x 48")

#### Oversized Parts

- Capable with merged scan feature

#### Overall Dimensions (LxWxH)

- 2007mm x 1651mm x 2440mm (79" x 65" x 96")

#### Laser Class:

- Class II, meeting the 21CFR 1040 standard for CDRH certification in North America
- Class 2, meeting the 60825-1:2014 (3rd Ed.), standard for CE certification in Europe



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