



***SOLID*** A total system for stereolithography  
***CREATION***  
***SYSTEM***

**Improve your production efficiency.**

# Introducing the SCS, a total system

Shortening product development spans, producing smaller lots, reducing production costs...

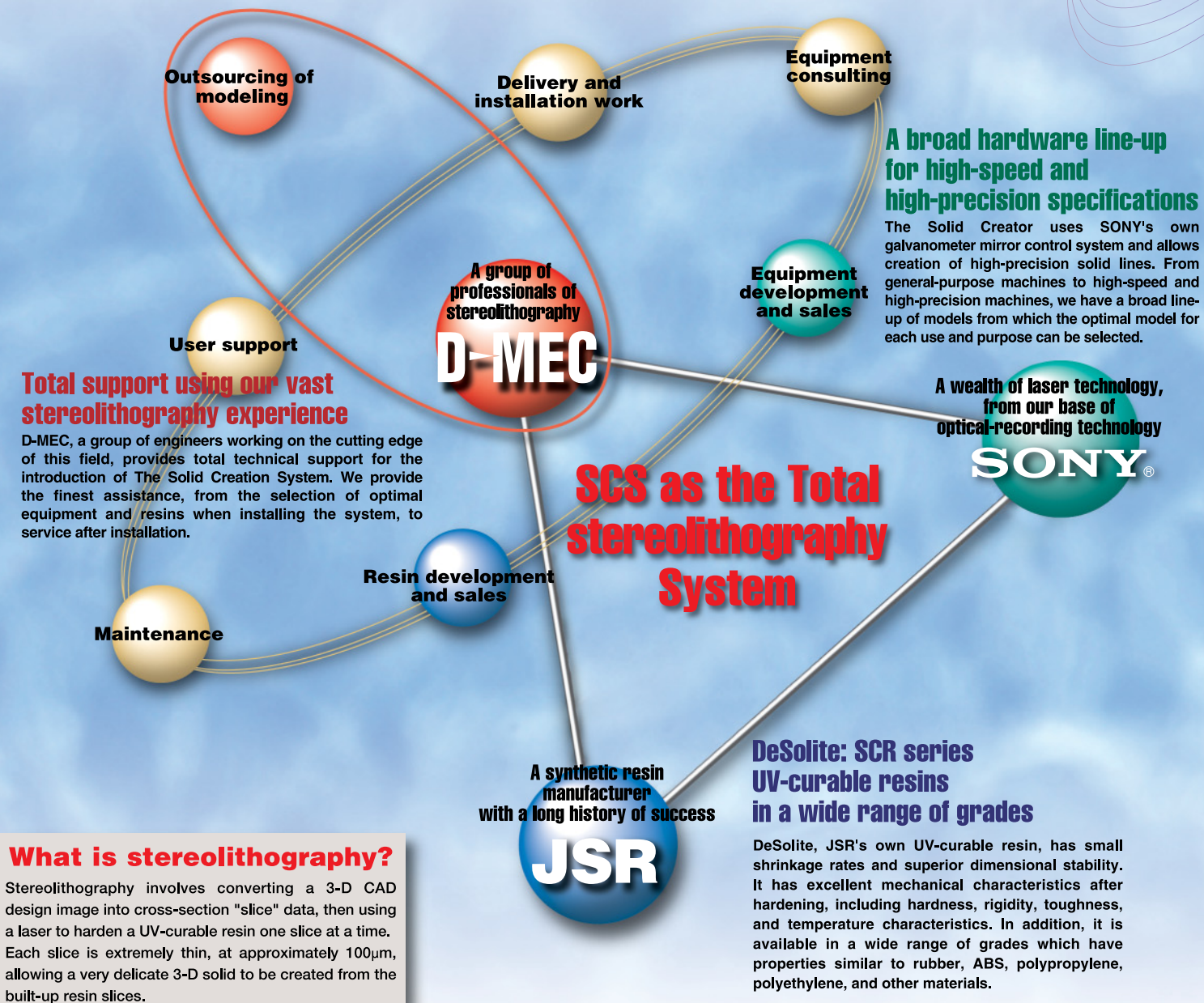
Improving production efficiency has become an important theme for all kinds of modern businesses.

Stereolithography, capable of 3-dimensional modeling with higher speed and greater precision, is essential technology for improving business competitiveness.

The Solid Creation System (SCS) is a total modeling system,

with hardware from Global SONY, UV-curable resin from the synthetic resin authority JSR, and technical support provided by D-MEC.

## Integrating versatile, high-level know-how



# for stereolithography.

► *Meeting ever-more-demanding user needs*

**Solution 1**



**World's First Modeler Capable of Quantity Output Cutting-Edge Modeler Offering Ease of Use with Added Modeling Function**

The world's first high-speed modeling machine for quantity production with advanced features including: improved modeling speed, enlarged modeling area, real-time data processing, improved radiation effect, self-propelled tank for easy resin changes, added dual-beam function, and automatic palette changer (optional).

**Quantity-output high-speed modeling type**

***SCS-8100***

**Solution 2**

**Succeeding in high-precision, ultrafine modeling at the top level of the industry**

The SCS-1000HD uses a combination of a He-Cd laser, with a tighter beam focus, and a special UV-curable resin for high-precision, ultrafine modeling that meets the industries highest standards.

**High-precision, ultrafine modeling type**

***SCS-1000HD***



# The numerous advantages of the SCS make for an even broader range of

## Merit

**With SCS, anyone can easily create 3-dimensional models for checking shape and function. As a result, SCS provides the following advantages.**

### Advantages for design and development

- Texture and shape can be verified by actually viewing the model.
- Grip feeling and other human-engineering aspects can be experienced with the actual object.
- Design verification can be done easily at the concept stage or when specifications are changed.
- Functional evaluations and tests can be shortened and streamlined.

### Advantages for production technology

- Assembly workability, and in particular any interference in the work track, can be checked in advance.
- Jigs used in assembly can be reviewed in advance.
- Workability after deformation under load can be checked.
- The prototype process for molds becomes unnecessary, allowing the production phase to be reached quickly.

### Advantages for sales

- Customers can be provided with models as prototype samples.
- Communication with customers can be made smoother and negotiations more advantageous.
- Consideration of product price can be made easier.

### Advantages for management

- Molds for production can be made without going through the prototype process, reducing the time and costs required for development.
- Proposals for multiple shapes can be compared and reviewed in a short time, speeding the decision-making process.
- Smooth interaction between departments is facilitated.
- Prototypes which used to be assigned to professionals can now be easily created by anyone, contributing to business streamlining.

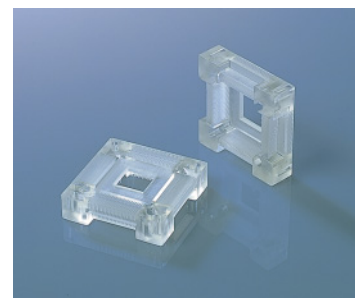
## Various

### Design models



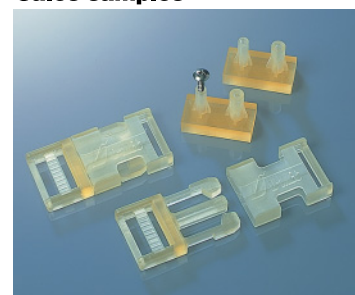
Original model, SANYO Electric Co., Ltd.

### High-precision models



### A wide variety of

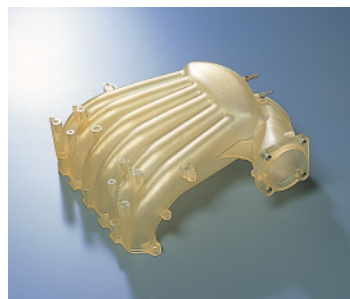
#### Sales samples



# CS applications.

## Users

### Working models



Created by artist Yukihiro Yoshihara

Provided by Nakakin Co., Ltd.

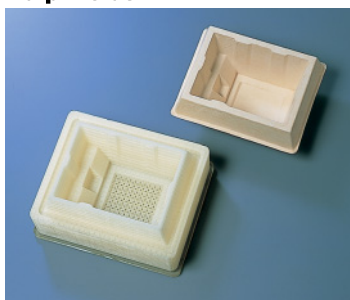
High-precision models

### models

### All kinds of master models



#### Pulp molds



#### Casting



#### Vacuum forming

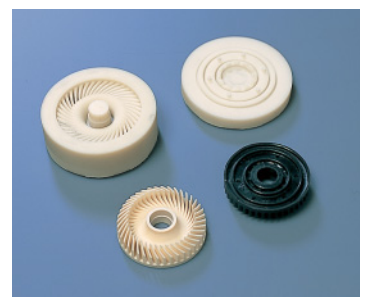
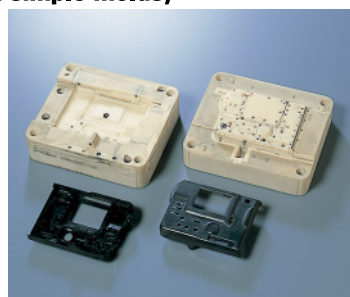
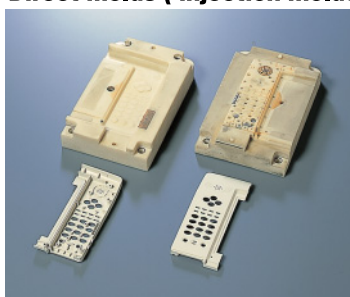


### of other uses

#### Medical models



#### Direct molds ( injection-molded simple molds)



"With my current stereolithography equipment, I have trouble meeting delivery deadlines when the operating rate is high."

"I would like to be able to rapidly create models, but I do not have the volume of work to justify purchasing stereolithography equipment."

"Purchase of stereolithography equipment is still a long ways off, but I would like to try it and see how it works."

For customers such as these

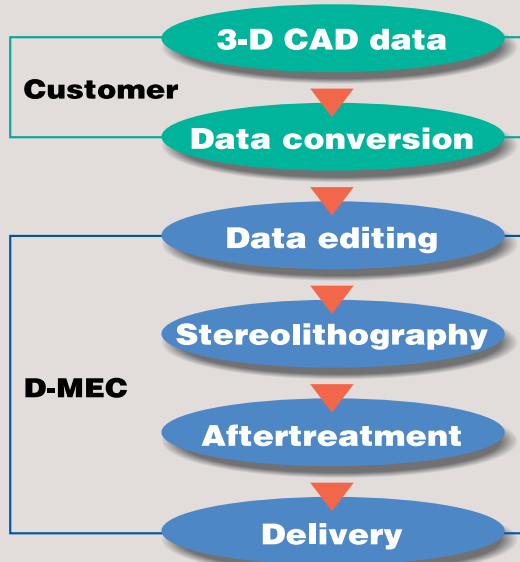
## We introduce *D-MEC Modeling, commissioned model production using SCS.*

**D-MEC Modeling will deliver the commissioned 3-dimensional model, created with SCS and based on the 3-D CAD data or drawings provided by the customer.**

### Service contents

- Use of stereolithography to create 3-dimensional models.
- Production of vacuum-injection molds from a master stereolithography-model.
- Production of direct molds ( injection molded simple molds) and injection-molded products.
- Creation of 3-D CAD data from design drawings.

### Service flow



#### Point 1

We can provide an immediate estimate once a customer provides us with STL data or 2-dimensional drawings. We take responsibility for controlling all data we receive, and no data leaves our company.

#### Point 2

We have a wide variety of resins with special characteristics, including high-precision general-use epoxy resins, heat-resistant resins, ABS-like resins, polypropylene-like resins, polyethylene-like resins, and elastomer-like resins. A model is created using the ideal resin for the customer's needs.

#### Point 3

Our Modeling Center is equipped with a large quantity of stereolithography equipment, and uses a system for responding quickly to customer orders. We are also linked to over 20 chain member businesses across Japan for providing the finest service.

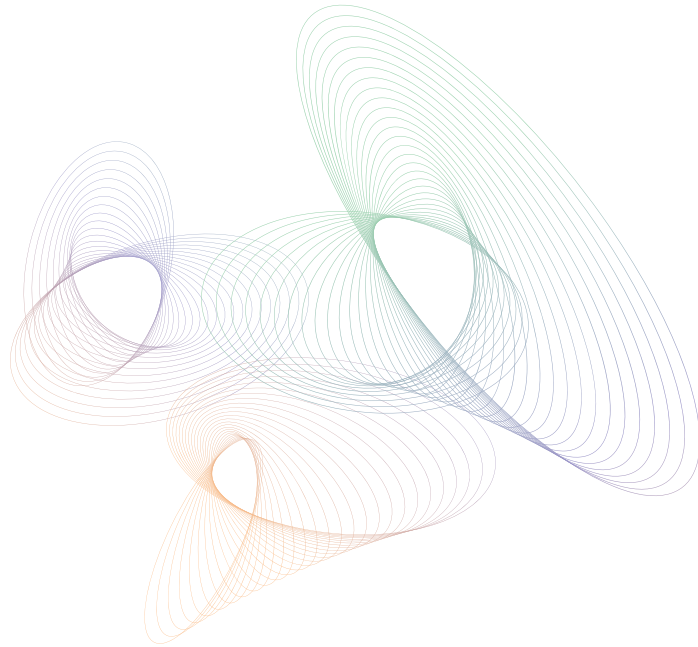
**For inquiries regarding D-MEC Modeling, please contact us at the offices below.**

■ Model creation orders, requests for estimates, other inquiries

**D-MEC Head Office Sales Dept.**  
TEL.81-3-5565-6661 FAX.81-3-5565-6642  
URL : <http://www.d-mec.co.jp>  
e-mail : [tokyo@d-mec.co.jp](mailto:tokyo@d-mec.co.jp)

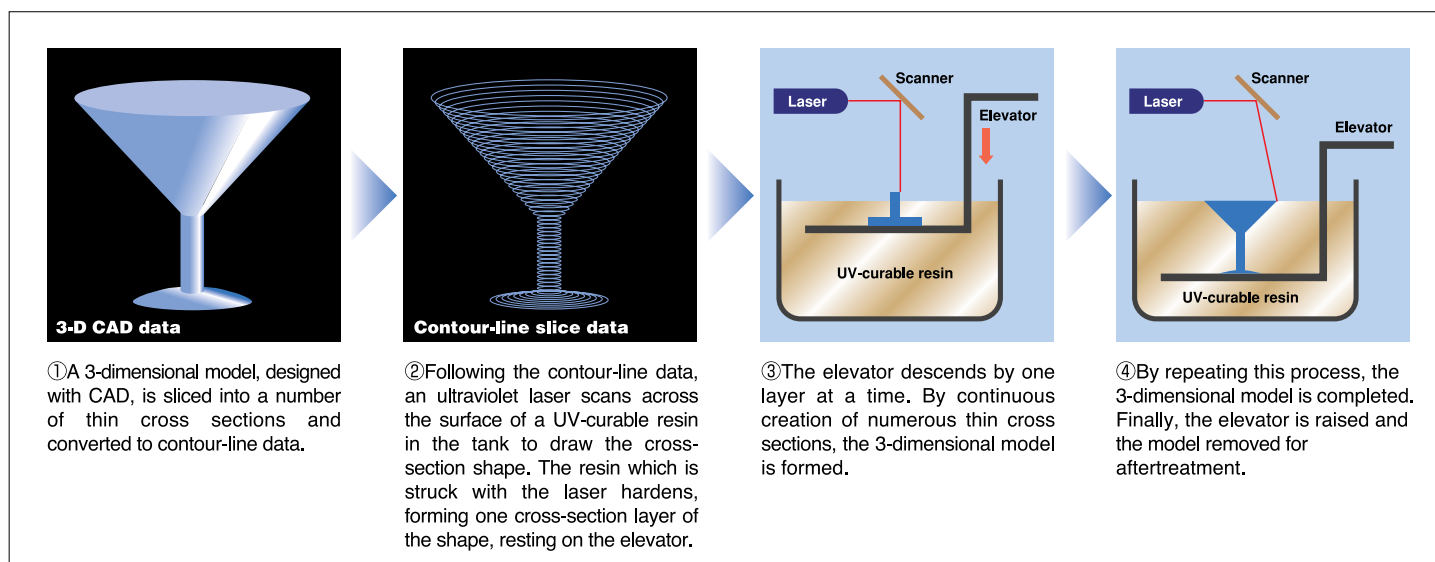
■ Technical questions, inquiries regarding consultations

**D-MEC Modeling Center  
Model Commission Dept.**  
TEL.81-29-854-9281 FAX.81-29-854-9285  
e-mail : [tsukuba@d-mec.co.jp](mailto:tsukuba@d-mec.co.jp)



# The principle of stereolithography

Stereolithography involves converting a 3-D CAD design image into cross-section "slice" data, and then using the data to guide a laser which strikes a UV-curable resin and hardens it. The model is build up one slice at a time.



Head office : HAMARIKYU Parkside Place, 5-6-10 Tsukiji, Chuo-ku, Tokyo, 104-0045 Japan

Modeling Center : JSR Tsukuba Laboratory, 25 Miyukigaoka, Tsukuba, Ibaraki, 305-0841 Japan

Nagoya office : 6F, Nagoya Mitsui Bldg, Annex, 1-24-21 Meieki Minami, Nakamura-ku, Nagoya, 450-0003 Japan

<http://www.d-mec.co.jp>

TEL 81-3-5565-6661 FAX 81-3-5565-6642

TEL 81-29-854-9281 FAX 81-29-854-9285

TEL 81-52-571-1331 FAX 81-52-561-8475





## Company Profile

Our company has combined 3-dimensional CAD, lasers, and UV-curable resin to create a cutting-edge stereolithography system, the Solid Creation System (SCS). We perform the business operations below related to this system.

This system was developed jointly by SONY, JSR, and D-MEC.

- (1) Sales and maintenance of the Solid Creation System (stereolithography equipment)
- (2) Commissioned production of 3-dimensional models (D-MEC modeling), design and manufacture of direct molds and pulp molds
- (3) Sales of UV-curable resin (DeSolite)

Fields of application: Automotive field, OA, home appliances, precision machinery, master models, resin molds, medical field, containers, others

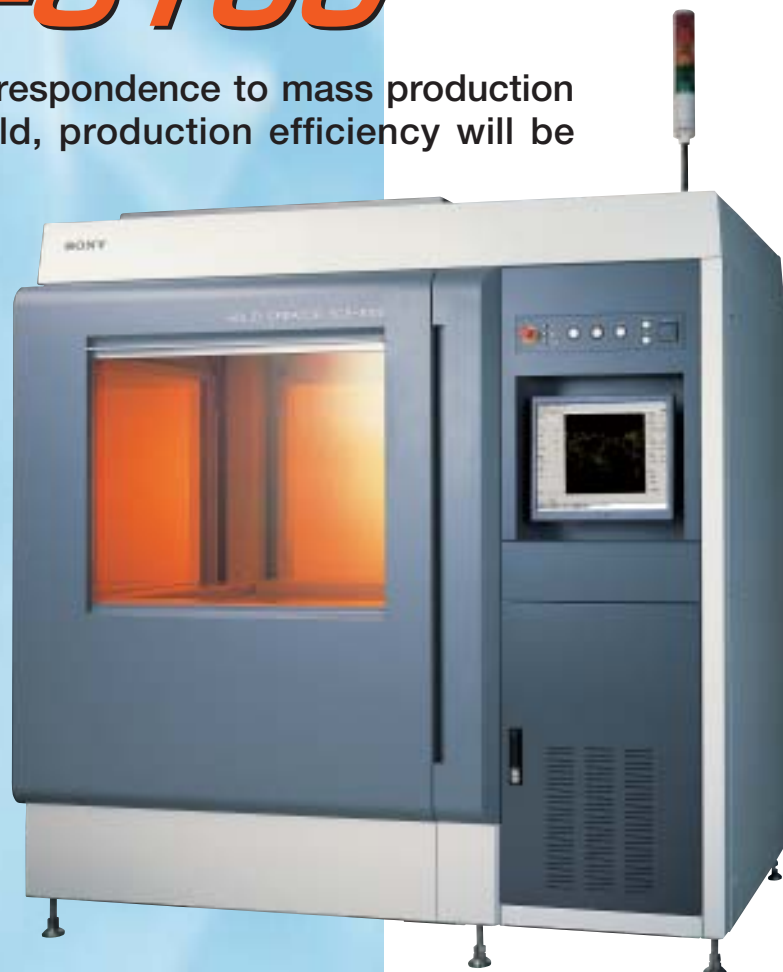
Company name: D-MEC Ltd.  
Established: February 28, 1990  
Head office: HAMARIKYU Parkside Place  
5-6-10 Tsukiji, Chuo-ku, Tokyo , 104-0045 Japan  
TEL 81-3-5565-6661 FAX 81-3-5565-6642  
Modeling Center: JSR Tsukuba laboratory, 25 Miyukigaoka,  
Tsukuba-shi, Ibaraki, 305-0841 Japan  
TEL 81-29-854-9281 FAX 81-29-854-9285  
Representative: Katsutoshi Igarashi, president  
Capital: 65,000,000 yen (100% owned by the JSR Corporation)

**New development**

## High-power high-speed light molding device

# SCS-8100

Because of correspondence to mass production first in the world, production efficiency will be improved more.



### ●Main features

- Molding speed is increased up to 2 times (our company comparison)
- Increased molding area (610 x 610 x 500 mm)
- Non-stop operation realized because of real-time data processing
- Easy update of version to DualBeam
- Irradiation efficiency is increased by 20% because of a new optical system
- Renewed user interface for Solid-Engine, improved operability, and reduced editing time
- Easy replacement of resins because of adoption of new-developed self-running tank
- Continuous unmanned operation because of auto-pallet changer (option)

### ●Main specifications of "SCS-8100"

Laser	Semiconductor-energized solid laser (1,000mW@60kHz)
Modulator	Laser built-in
Deflection device	Galvano-mirror type(With defocus distortion calibration by sweeping)
Molding possible range	610×610×500mm
Spot size**	0.15 to 0.40mm (auto change)
Maximum scanning speed**	10m/sec
Lamination thickness**	0.10~0.20mm
Tank capacity	280 liter (replaceable: self-running)
Power supply for body	100VAC40A
Laser cooling device	Built-in
Dimension of body	1,940×1,150×1,990mm(excluding projection and patio-light)
Weight of body	1,700Kg

\*\*Spot size, maximum scanning speed, and lamination thickness depend on the range to be used.

Maker: Sony Manufacturing Systems Ltd.



### ●Contact for products

D-MEC Sales Dept. Hamariky Park Side Place Tsukiji 5-6-10, Chuo-ku, Tokyo  
TEL (03)5565-6661 FAX(03)5565-6642

New

# Solid Creation System *SCS-6000*



## ● Main characteristics

- Advanced solid-state laser lowers running costs
- Leading-edge laser optics technologies improve maintenance and energy efficiency
- Selectable parameters allow choices from high-speed and high-precision modes
- Real-time data processing eliminates waiting by transitioning immediately from data-processing to modeling
- Solid-Engine modeling software realise easy operation

## ● Specifications

Laser	Solid-state semiconductor laser (200 mW, 25 kHz)
Modulator	Include in laser
Deflection equipment	Galvanometer mirror system (includes sweep-defocus correction function)
Model creation range	300 x 300 x 250 mm (11.8 x 11.8 x 9.8 in.)
Spot size*	0.075 ~ 0.4 mm (0.003 ~ 0.0157 in.) (automatic adjustment)
Max. scan speed*	7.5 m/sec (295.2 in./sec)
Layer thickness*	0.05 - 0.2 mm (0.002 ~ 0.008 in.)
Tank volume	55 L (replaceable)
Power source	100 VAC 30 A
Laser coolant	Not needed
Main unit dimensions (excluding signal tower and projections)	1,425(W) x 1,115(D) x 1,610(H) mm (56.1(W) x 43.9(D) x 63.4(H) in.)
Main unit weight (excluding resin)	650 kg (1,435 lbs)

\*The spot size, maximum scan speed, and layer thickness vary according on the resin used.

Made by Sony Manufacturing Systems Corporation

# Solid Creator specifications

	<b>SCS-1000HD</b> High-precision, ultrafine modeling machine	<b>SCS-6000</b> Small-size modeling machine	<b>SCS-8100</b> Large-size modeling machine	<b>SCS-8100D</b> Large-size modeling machine	<b>SCS-9000</b> Large-size modeling machine
<b>Laser</b>	He-Cd laser	Solid-state semiconductor laser 200mW, 25kHz	Solid-state semiconductor laser 1000mW, 60kHz	Solid-state semiconductor laser 1000mW, 60kHz × 2	Solid-state semiconductor laser 800mW, 60kHz (first in Japan)
<b>Modulator</b>	AOM (acousto-optic element)	Built-in			
<b>Deflection equipment</b>	Galvanometer mirror system (Includes sweep-defocus correction function)				
<b>Model creation range</b>	300 × 300 × 270mm	300 × 300 × 250mm	610 × 610 × 500mm	610 × 610 × 500mm	1,000 × 800 × 500mm
<b>Spot size</b>	0.05 - 0.3 mm (automatic adjustment)	0.075 - 0.4 mm (automatic adjustment)	0.15 - 0.4 mm (automatic adjustment)	0.15 - 0.4 mm (automatic adjustment)	0.2 - 0.4 mm (automatic adjustment)
<b>Scan speed</b>	Max. 2 m/s	Max. 7.5 m/s	Max. 10 m/s	Max. 10 m/s	Max. 20 m/s
<b>Layer thickness</b>	0.02 ~ 0.15mm	0.05 ~ 0.2mm	0.1 ~ 0.2mm	0.1 ~ 0.2mm	0.1 ~ 0.4mm
<b>Tank volume</b>	45 L (exchangeable)	55 L (exchangeable)	280 L (replaceable; wheeled)	280 L (replaceable; wheeled)	840L
<b>Power source</b>	100V20A	100V30A	100VAC40A	100VAC45A	100V35A
<b>Coolant</b>	Not needed	Not needed	Not needed	Not needed	Not needed
<b>Main unit dimensions (W × D × H) (mm)</b>	1,425 × 1,100 × 1,590	1,425 × 1,115 × 1,610	1,940 × 1,150 × 1,990 (excluding signal tower and projections)	1,940 × 1,150 × 1,990 (excluding signal tower and projections)	2,340 × 1,640 × 2,760
<b>Main unit weight (including resin)</b>	710kg	710kg	1,700kg	1,750kg	2,920kg

Made by Sony Manufacturing Systems Corporatio



SCS-1000HD



SCS-6000



SCS-8100



SCS-8100D



SCS-9000

## Table of resin properties

1.General							
1) Grade		SCR701	SCR710	SCR735	SCR740	SCR11120	
2) Material type		Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	
3) Equipment model		SCS-2000, others	SCS-2000, others	SCS-8000, others	SCS-8000, others	SCS-8000, others	
4) Laser		Ar/solid-state	Ar/solid-state	Solid-state	Solid-state	Solid-state	
5) Characteristics		General use, moisture resistant	High toughness	High heat resistance, high toughness	Ultra-high heat resistance	Crystal clear	
6) Post-cure		Not needed	Not needed	Not needed /or heating	Heating	Not needed	
2.Liquid resin properties							
1) Threshold exposure: Ec	mJ/cm <sup>2</sup>	33	13	23	16	12	
2) Penetration depth: Dp	μm	191	135	160	120	160	
3) Viscosity (25°C)	Pa·s	0.34	0.5	0.47	0.43	0.26(30°C)	
4) Density(25°C)	g/cm <sup>3</sup>	1.13	1.19	1.13	1.13	1.12	
3.Physical properties of hardened substance (after post-cure for types that require it.)							
1) Tensile strength	MPa	75	66	45	67	62	47
2) Young's modulus	MPa	3300	2700	2510	2720	3000	2650
3) Elongation at break	%	6	10	6.8	6.0	3	20
4) Flexural strength	MPa	104	85	83	97	110	63
5) Flexural modulus	MPa	3100	2500	2530	2570	2800	2040
6) Izod impact strength	J/m	25~27	32~38	29~33	34~39	29	30
7) Hardness (durometer D)		87	81				81
8) Self-tapping property		×	◎	◎	○		◎
9) HDT (heavy load) *Glass transition temp. (Measurement method)		HDT=53°C Tg=82°C (DMA)	HDT=49°C Tg=78°C (DMA)	HDT=48°C Tg=90°C	HDT=85°C Tg=110°C	HDT=100°C Tg=135°C	HDT=46°C Tg=43°C
4.Other							
1) Safety	Hazard	Non-hazardous substance Deleterious substance	Non-hazardous substance Deleterious substance	Non-hazardous substance Deleterious substance	Non-hazardous substance Deleterious substance	(Class 3, No. 4 mineral) Deleterious substance	
2) Remarks							

This information contained herein is given in good faith but without any guarantee or warranty and may involve proprietary rights of third parties. Our advice given in this information does not release you from the obligation to check its validity and to test our products as to their suitability for the intended process and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely on your own responsibility. Our products are sold in accordance with Product Specification separately issued by us.

## Table of resin properties

1.General						
1) Grade		SCR751	SCR950	SCR9100	SCR9120	SCR802
2) Material type		Epoxy	Oxycetane	Epoxy	Epoxy	Epoxy
3) Equipment model		SCS-1000HD	SCS-1000HD	SCS-8000, others	SCS-8000, others	SCS-2000, others
4) Laser		He-Cd	He-Cd	Solid-state	Solid-state	Ar/solid-state
5) Characteristics		General use, moisture resistant	High sensitivity, high toughness	Ultra-high toughness	Ultra-high toughness	For direct mold
6) Post-cure		Not needed	Not needed	Not needed	Not needed	Heating
2.Liquid resin properties						
1) Threshold exposure: Ec	mJ/cm <sup>2</sup>	20	5	6.8	10.9	9
2) Penetration depth: Dp	μm	139	79	130	140	152
3) Viscosity (25°C)	Pa·s	0.36	0.59	0.56 (30°C)	0.45 (30°C)	4.8
4) Density (25°C)	g/cm <sup>3</sup>	1.13	1.10	1.11	1.13	1.59
3.Physical properties of hardened substance (after post-cure for types that require it.)						
1) Tensile strength	MPa	80	51	28~32	30~32	85
2) Young's modulus	MPa	3400	2000	1100~1400	1200~1500	9200
3) Elongation at break	%	5	8	14~17	15~25	2
4) Flexural strength	MPa	115	75	42~62	41~46	120
5) Flexural modulus	MPa	3300	2600	1200~1500	1300~1500	8900
6) Izod impact strength	J/m			32~43	48~53	
7) Hardness (durometer D)		88	85			92
8) Self-tapping property			◎	◎	◎	
9) HDT (heavy load) *Glass transition temp. (Measurement method)		HDT=56°C Tg=108°C (DMA)	HDT=64°C Tg=121°C (DMA)	HDT=60~65°C —	HDT=52~61°C —	HDT=~250°C Tg=133°C (DMA)
4.Other						
1) Safety	Hazard	Non-hazardous substance Deleterious substance	(Class 3, No. 4 mineral) Deleterious substance	(Class 3, No. 4 mineral) Deleterious substance	(Class 3, No. 4 mineral) Deleterious substance	Non-hazardous substance Deleterious substance
2) Remarks						

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Newly appeared

Micro stereo-lithography system

# ACCULAS

*Completely new micro processing system has just completed.*

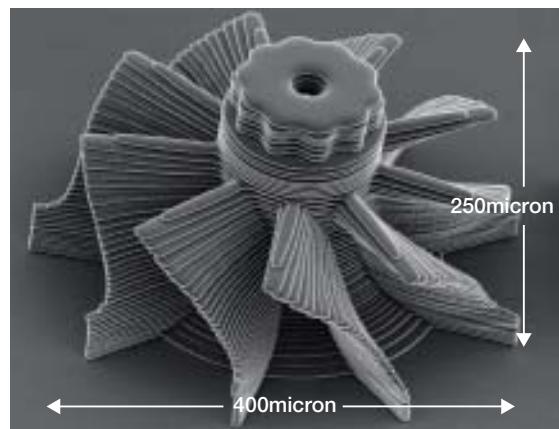
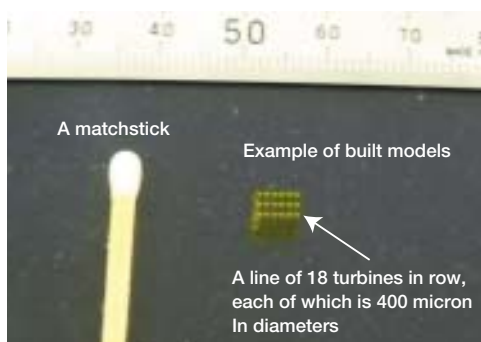
ACCULAS is simple to operate and can made structure automatically in short time.

3D micro structures can be built with the resolution level of 1 micron.

It is useful for trial production, development and manufacture of micro devices.



## ●Example of molding



Here is an SEM image of one turbine.

The total time required to build 18 turbines is one hour.

Manufacturer:



Laser Solutions Co.,Ltd.

Keihan Bus Jujo Bldg., 5 Minami-Ishida-cho, Higashi-Kujo,  
Minami-ku, Kyoto 601-8033

TEL (075) 693-4666 FAX (075) 693-4677

URL <http://www.laser-solutions.co.jp>

Sales sole agency:



Hamariyuu Park Side Place, Tsukiji 5-6-10, Chuou-ku, Tokyo 104-0045

TEL (03) 5565-6661 FAX (03) 5565-6642

URL <http://www.d-mec.co.jp> E-mail [acculas@d-mec.co.jp](mailto:acculas@d-mec.co.jp)

## ACCULAS superiority compared with other micro processing technologies

- With three-dimensional CAD data, any three-dimensional microstructure can be produced in a singular attempt ( there is no need for multi-stage processing )
- It does not require the massive monetary investment in equipment that LIGA and semiconductor processes
- Simple to operate and automated production
- Processing completed in short time (several minutes to a few hours)
- Production of high-aspect-ratio and thick-film microstructures possible
- Large reduction in development time
- Reduction of MEMS production costs made possible

## Examples of using ACCULAS

- For MEMS research, to test applications during test stage
- For applying sacrificial layer for semiconductor process
- For making master production device for electroform coating, etc.
- As a device for injection molding, emboss processing
- As a device for producing the final product

### ● System specifications

Light source	LD (405 nm)
Image modulation	Digital mirror device
Exposure resolution	1 $\mu\text{m}$ <sup>(※1)</sup>
Molding range	150 × 150 × 50 mm
Maximum model size	50 mm square <sup>(※2)</sup>
Lamination layer pitch	5 $\mu\text{m}$ ~ 10 $\mu\text{m}$ (Machine accuracy: 2 $\mu\text{m}$ )
Resin	Special high-resolution resin
Data interface	Dedicated I/F software "Viola" (plugged in Magics) <sup>(※3)</sup>
Power supply	100VAC, 2KVA
Outside dimensions (body)	1,000(W)×1,000(D)×1,700(H)mm (excluding Control PC)
Weight (body)	Approx. 600kg

※1 It is the optical resolution, which may not correspond to the resolution of the molded object depending on shapes of models.

※2 Sizes of models depend on capacity of physical memory of the PC.

※3 New direct interface has been developed.

Magics is Matielialise's editing software.



## DeSolite SCR-950

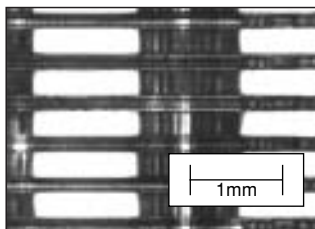
Tough, high-precision resin for stereolithography

The JSR Corporation has developed SCR950, a new UV-curable resin for use with the SCS-1000HD (He-Cd laser) high-precision stereolithography equipment. SCR950 uses oxycetane, a new chemical species, for improved performance over the conventional epoxy resin SCR751.

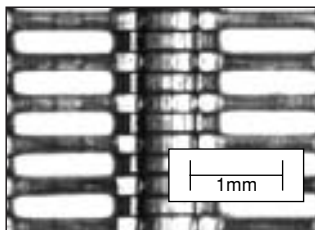
### ■ Characteristics of SCR950 (compared with SCR751)

- (1) Very tough: 600% improvement in snap-fitting properties, 500% improvement in folding endurance.
- (2) Very sensitive: Laser scan speed can be increased 200%
- (3) High resolution: Shapes with sharper edges can be obtained.

Enlarged photo of connector model



SCR950



SCR751

### ■ Properties of SCR950

	SCR950	SCR751
	Oxycetane	Epoxy
Fluid properties		
Viscosity (cps at 25°C)	590	360
Hardening properties		
Ec (mJ/cm <sup>2</sup> )	5	20
Dp (μm)	79	139
Hardened film properties		
Young's modulus (kg/mm <sup>2</sup> )	168	210
Elongation at break (%)	18	14
Folding endurance (times)	42	8
Snap-fitting properties (times)	18	3

## Example of injection molding with direct molds

### What is a direct mold?

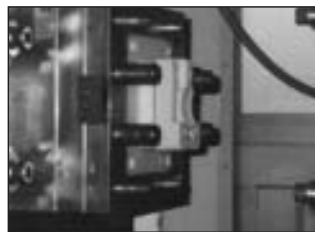
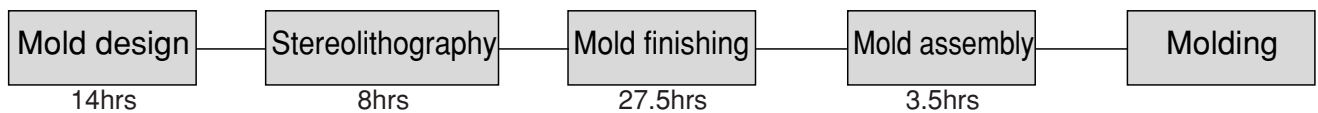
- An injection-molding mold modeled directly from 3-D CAD data using the SCS (Solid Creation System)
- The greatest advantage is the ability to produce in a short time a shape in the same material as the product.

### Fields of application

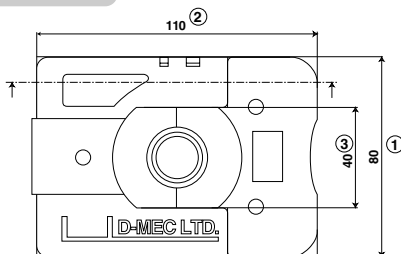
- Improving prototype efficiency
- Checking the design of production molds
- Small-lot production
- Beginning production start-up

### Sample shape (camera body)

#### Processes and required time



### Molding results



Molding material: ABS

		①	②	③	④	⑤
Design value (mm)		80.00	110.00	40.00	29.80	19.80
Actual mold measurement value (mm) f = 4/1000		80.38	110.49	40.19	29.92	19.82
Actual product measurement value	10th shot	79.97	109.88	40.01	29.74	19.78
	20th shot	79.99	109.91	40.03	29.76	19.80
	50th shot	79.99	109.92	40.03	29.76	19.80
	100th shot	79.99	109.93	40.03	29.76	19.80
	150th shot	80.03	109.96	40.05	29.77	19.80
Average value		79.99	109.92	40.03	29.75	19.80

This direct mold was used for 600 shots of ABS

Materials which can be used for molding: PP, ABS, PC, G-PET, PPS