



Shaping a better future

AEROSPACE METAL
FORMING
TECHNOLOGIES

www.cyrilbath.com



For over 95 years, Cyril Bath has established itself as the world leader in forming technologies for the commercial and military Aerospace industry. We utilize our substantial experience and process knowledge to design and build custom stretch forming machines to provide our customers around the globe with world-class solutions to their production challenges.

Cyril Bath continues to develop innovative forming technologies through active research and development programs. These investments allow us to offer state-of-the-art aluminum, titanium and nickel based alloys forming solutions for our worldwide customers.



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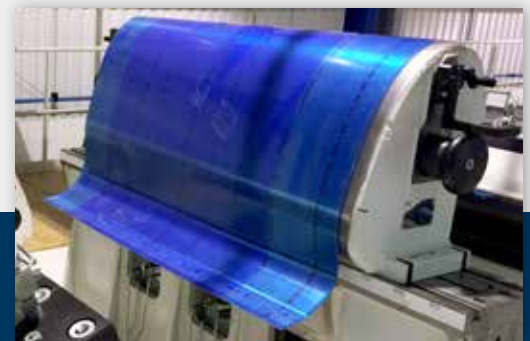
SHEET STRETCH FORMING

Sheet Stretch Forming is a fast, economical, and accurate way to form a large panel from a metal sheet. The process involves stretching the sheet to a calculated yield point and forming it over a tool.



Transverse Sheet Stretch Forming Press (FET/T)

- Up to 12 independently controlled axes allow for the forming of leading edge and fuselage parts
- Tangency tracking device decreases setup time for new part programs
- CNC control for high accuracy and repeatability and CAM package
- Optional bulldozer for reverse contour forming
- Easy integration of automated die handling system
- Proven design, providing quick and safe operation
- Process simulation available
- Supplied with fixed or hydraulically adjustable die table

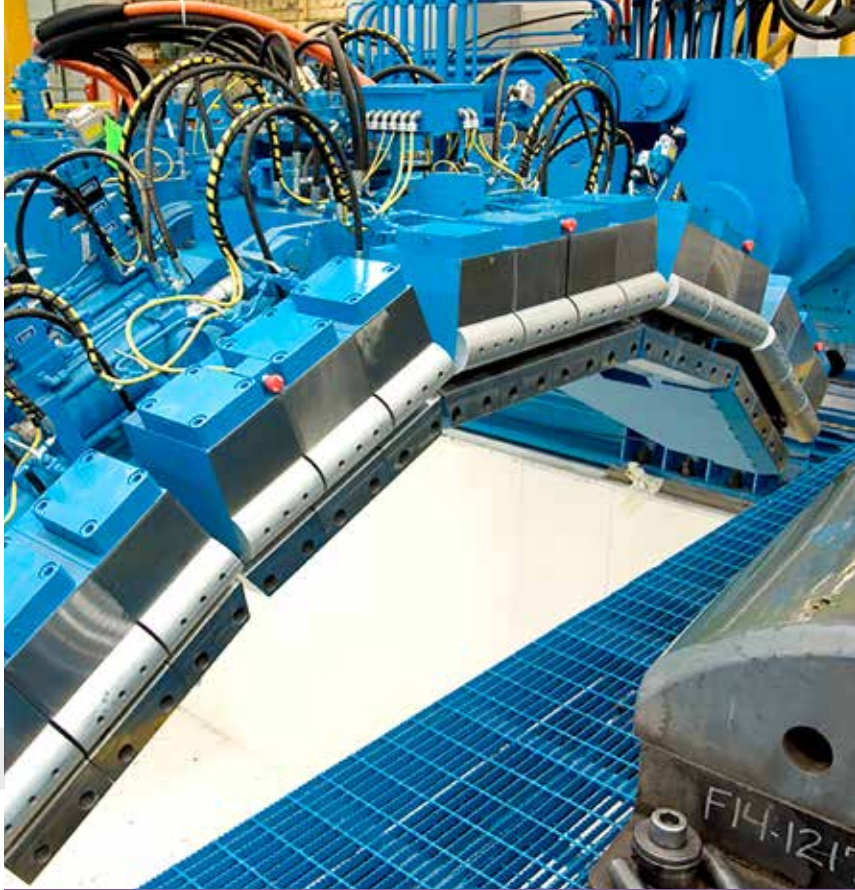


Leading edge

MACHINE RANGE:
FROM 300T TO 1500T

PARTS:

Leading edge parts, fuselage parts up to 20 feet long, fuselage parts requiring counter-forming capability



Longitudinal Sheet Stretch Forming Press (FEL/L)

- Up to 38 independently controlled axes allow for the forming of complex shapes
- Up to 5 different motions inside the yoke greatly decrease material waste
- Up to 3 die tables allow long dies to be utilized
- Yoke swing up to 60 degrees
- Tangency tracking device decreases setup time for new part programs
- CNC control for high accuracy and repeatability and CAM package
- Optional bulldozer for reverse contour forming
- Easy integration of automated die handling system
- Proven design, providing quick and safe operation
- Process simulation available
- Supplied with fixed or hydraulically adjustable die table

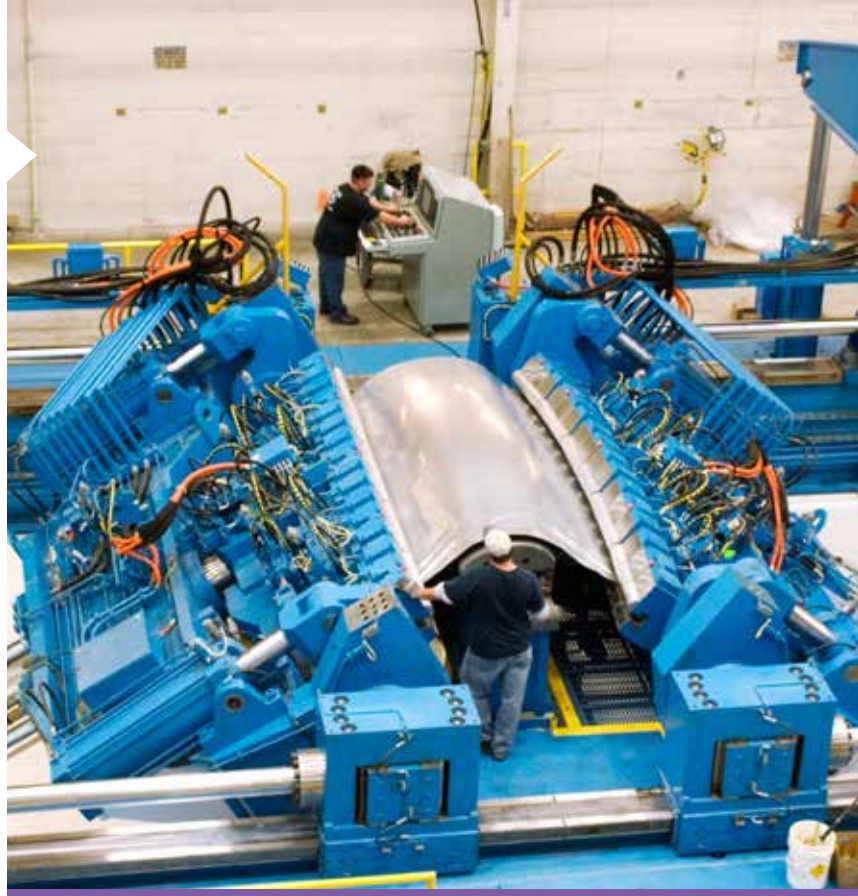
Aluminium stainless steel parts



MACHINE RANGE:
FROM 300T TO 1600T

PARTS:
Fuselage parts up to 50 feet long, fuselage parts requiring counter-forming capability

SHEET STRETCH FORMING



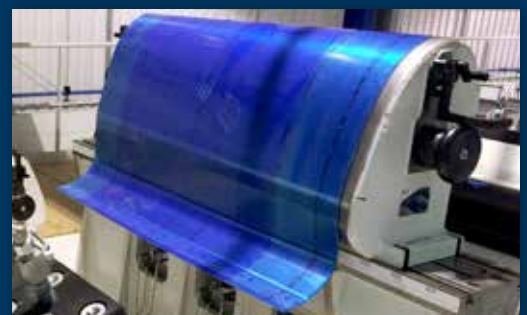
Transverse/ Longitudinal Sheet Stretch Forming Press (VTL Press)

- Flexibility to make longitudinal and transversal parts
- Up to 38 independently controlled axes allow for the forming of complex shapes
- Up to 5 different motions inside the yoke greatly decrease material waste
- Up to 3 die tables allow long dies to be utilized
- Yoke swing up to 90 degrees
- Tangency tracking device decreases setup time for new part programs
- CNC control for high accuracy and repeatability and CAM package
- Optional bulldozer for reverse contour forming
- Easy integration of automated die handling system
- Proven design, providing quick and safe operation
- Process simulation available

Aluminium
stainless
steel parts



Leading edge



MACHINE RANGE:
FROM 300T TO 1600T

PARTS:

Complex contours around cockpit, long fuselage parts up to 50ft, fuselage parts requiring reverse contour forming capability, leading edge parts



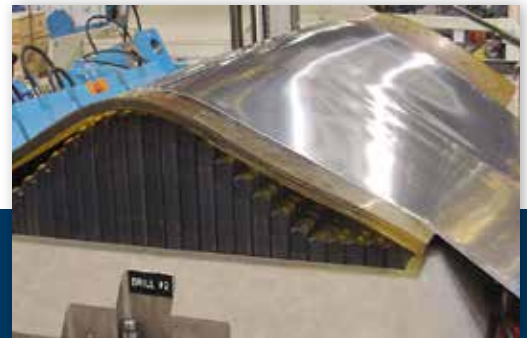
Reconfigurable Die

The Reconfigurable Die is an assembly of movable pins with a spherical top surface.

All the pins are vertically adjustable and can be locked at a desired position.

The reconfigurable die is an adaptive tool for sheet stretch forming that can replace numerous solid dies. It is versatile and can quickly change shapes, allowing for faster tool changing when compared to using different individual dies.

Structural part



PARTS:
Fuselage parts

EXTRUSION STRETCH STRAIGHTENING

Extrusion stretch straightening and forming is a fast, economical, and accurate way to straighten and form a large extrusion. The process involves stretching the extrusion to yield, straightening and forming it over a tool.



Extrusion Stretch Straightening and Forming Press

- Up to 8 Independently controlled axes
- Up to 5 die tables allow long dies to be utilized
- Swing up to 45 degrees
- Direct acting or taper locked jaws available
- CNC control force and position modes for high accuracy and repeatability
- Proven design, providing quick and safe operation

MACHINE RANGE:
FROM 30T TO 2000T

PARTS:
Large fuselage frame parts, wing spars from 5feet to 110feet long

PROFILE STRETCH FORMING

Profile Stretch Forming is a very accurate and repeatable process for profile forming in up to 3 planes for complex shapes. The process involves stretching the profile to yield and forming it around a tool.



Swing Arm Profile Stretch Forming Press (V Press)

- Up to 10 Independently controlled axes
- High forming torque
- Direct acting or taper locked jaws available
- CNC control force and position modes for high accuracy and repeatability and CAM package
- Simulation package for part programs and compensate for spring back when designing tools
- Easy integration of automated quick change die and jaw systems



Structural parts

MACHINE RANGE:
FROM 3T TO 200T

PARTS:

Aerospace fuselage frames & stringers, rialway coach frames, automotive bumpers & frames

ELASTO-FORMING

Elastoforming is an economical and high productivity forming technique to stamp shallow parts. The process uses high pressure to press a blank into a die using a flexible, high strength elastomer pads.



Elastoforming Press (EMC)

- Multi plane forming
- Equipped with multi-layer elastomer pads
- Custom sized die table
- Up to 12 tooling tables for increased productivity
- Capability to store and use pre-equipped tables with tool kit
- Proven design, providing quick and safe operation
- Low maintenance and operational costs

Structural and joining parts



MACHINE RANGE:
FROM 2900 psi TO 11,600 psi
FROM 200BAR TO 800BAR)

PARTS:
Supports, gussets, clips, frames, leading edge reinforcing pieces

HOT FORMING (HF)

Hot Forming is a forming technique with a short cycle time using medium-high temperature to increase the formability of the material being formed. The process has low thickness dispersion and involves punching a hot sheet then holding at forming pressure for a set time.



Hot Forming Press (HF)

- 4 independently controlled axes control platen parallelism
- Metallic or ceramic platens can be sized up to 122 inches x 83 inches
- Hot box with temperature homogeneity at 1500°F
- High accuracy and repeatability of ram position
- Easy integration of automated die and part handling system
- CAM package

Titanium part



MACHINE RANGE:
FROM 60T TO 600T

PARTS:
Titanium and aluminum parts, pylon parts, nacelle parts, engine parts, blades

SUPER-PLASTIC FORMING (SPF)

Superplastic Forming is a forming technique using material heated to the super plastic state to increase its formability allowing high elongation ratio for forming complex parts and deep shapes. The process uses high temperature and gas pressure to form material at the desired deformation rates.



Superplastic Forming Press

- Metallic or ceramic platens up to 138 inches x 80 inches
- Hot box with temperature homogeneity at 1800°F
- High accuracy and repeatability of ram position
- High accuracy of gas management system, with multiple lines
- Option of dual capacity of SPF/HF for optimized quality and cycle time
- Easy integration of automated die and part handling system



Titanium parts

MACHINE RANGE:
FROM 60T TO 3000T

PARTS:

Titanium, aluminum and nickel based alloy parts, pylon panels, nacelle panels, firewalls, engine parts, fan and OGV blades

PROCESS AUTOMATION

Based upon the customer's expectations, Cyril Bath can supply fully automated work cells to significantly increase production rates and efficiency as well as reducing costs.

- Reduced cycle times
- Cycle repeatability
- Higher availability of production machines

Cyril Bath expertise

- Loading and unloading of raw and finished parts
- Loading and unloading of tools
- Preparation of tools
- Full work cell integration with tools and material
- Preparation or finishing tasks on parts

TURNKEY WORKSHOP

Cyril Bath can help you develop your modernization or expansion projects, and/or the creation of production workshops.

Our scope goes from focusing on one specific area of improvement, to the creation of a complete plant from a green field.

The projects are organized around 3 stages:

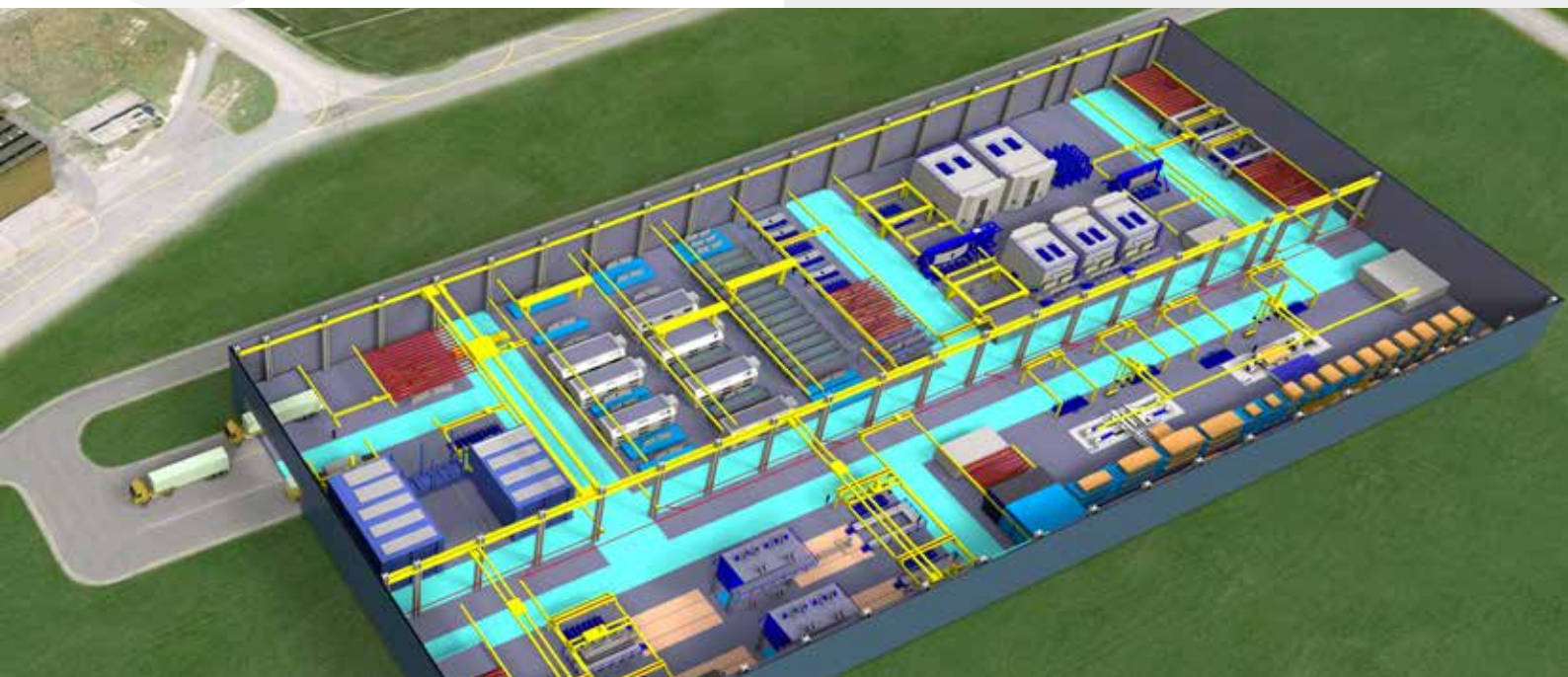
- Strategic overview and planning
- Implementation
- Staff training

Cyril Bath specializes in projects of:

- Elementary part forming workshops
- Pre-assembly and assembly workshops

With a particular focus on the following:

- Improving industrial efficiency
- Reorganizing production processes
- Optimizing handling, transfer, and storage of material, parts and tooling
- Lean manufacturing for improving production times and costs
- Developing and controlling the supply chain



CUSTOMER SUPPORT

Cyril Bath offers its customers a wide range of services in order to assist them in effectively using their equipment. It includes not only assistance in maintenance of the equipment, and training but manufacturing process support as well. Equipment retrofit is proposed as well.

Manufacturing engineering

- CAM (Computer Aided Manufacturing) for cold and hot forming
- Process simulation definition and optimization of all process parameters such as blank size, run number, heat treatment, etc.
- Tool design and manufacturing
- Part program definition, optimization, and industrialization up to production

Training

Cyril Bath offers basic and continuous training programs. The aim is to provide the user with the necessary tools and knowledge for optimized machine use and process efficiency.

Maintenance

Spare Part Management

Cyril Bath can assist its customers in providing with original, quality controlled spare parts adjusted to keep Cyril Bath equipment up and running.

Preventive Maintenance

Cyril Bath proposes a range of preventive maintenance contracts to meet the needs of each machine user. Maintenance is performed by Cyril Bath specialists in collaboration with on-site Cyril Bath technicians.

Troubleshooting

Our specialists can:

- Provide telephone assistance
- Provide remote diagnostics by Internet and VPN, if you have chosen to implement this option
- Come to your site to evaluate and fix issues

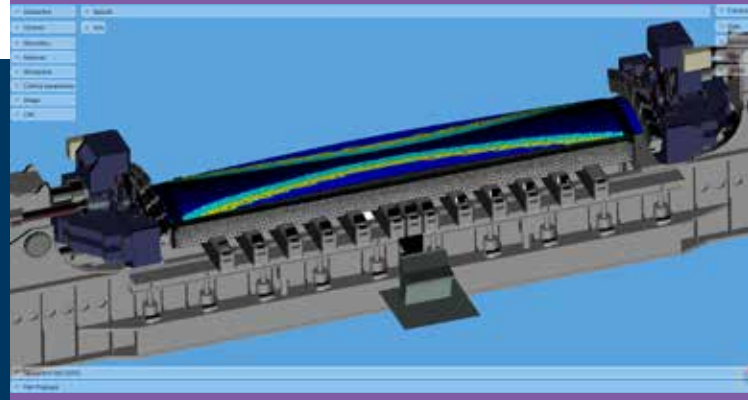
Service contract

Cyril Bath proposes its customers with yearly maintenance contract, that includes training, preventive maintenance and up to 24/7 technical assistance.

Retrofit

What we can do:

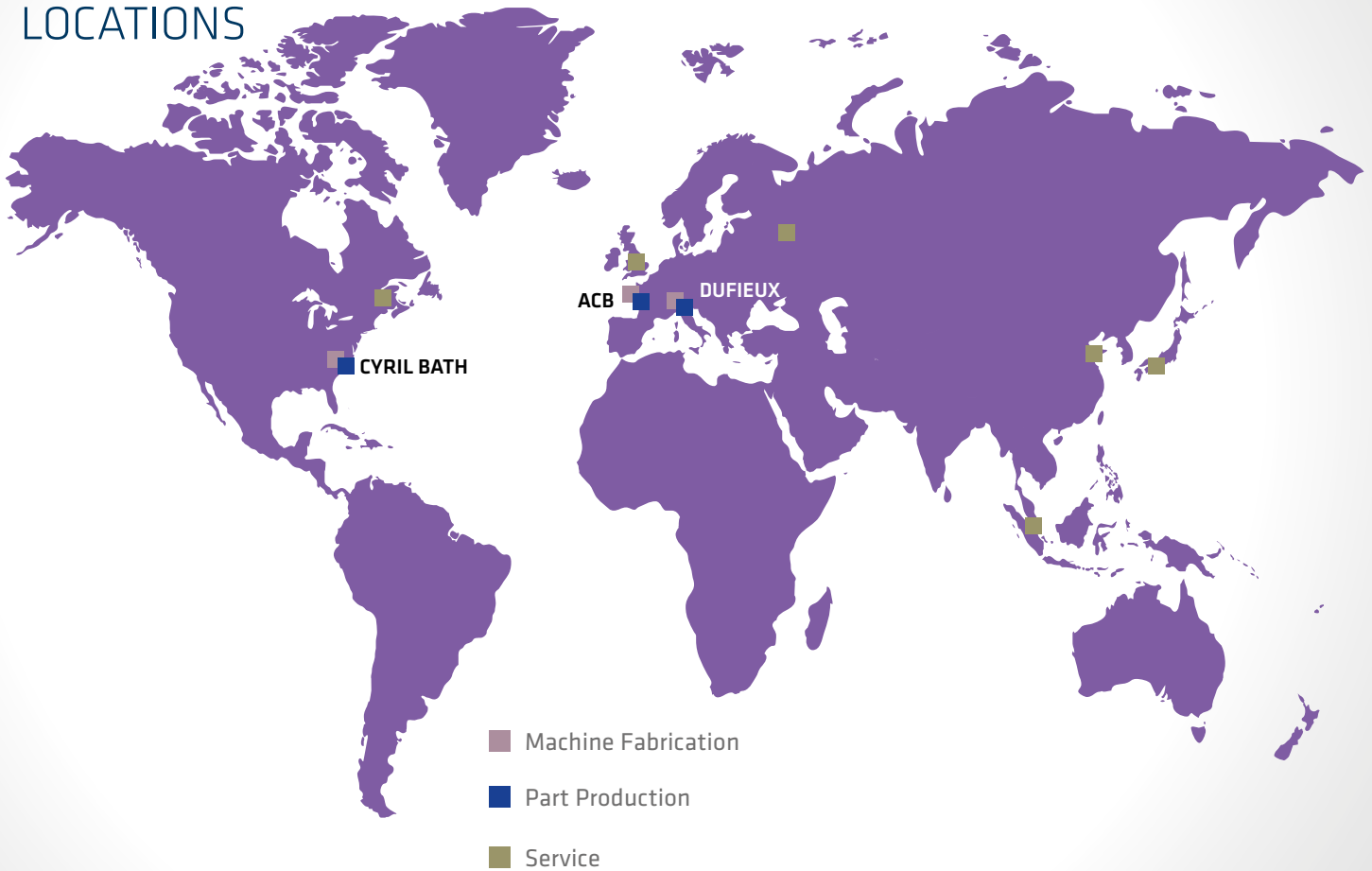
- Retrofit with the latest technology
- Modernize equipment to meet your customer's needs by cost effectively extending the lifespan of your current investment
- Benefit from the latest developments: maintenance tracking, standardized components
- Restore your machine to its original operational state
- Adaptation of machines to upgraded processes



REFERENCES

AEROFABRICATION	BOEING	EUROCOPTER	KHI	NORTHROP GRUMMAN	SHENYANG AIRCRAFT
AGUSTA	BOMBARDIER	FAMAT-GENERAL ELECTRIC	KHRUNICHEV AEROSPACE	OAK MOSCOW	SIMAIR
AIRCELLE	CAPITAL SPACE	FOKKER AEROSTRUCTURES	KVZ KAZAN	ODK	SLICOM
AIDC	CHARRITON	GSE	LATECOERE	PAC KAMRA	SMEA
AIRBUS	CESSNA	HAL AIRCRAFT	LAUAK	POTEZ	SNECMA
AIRBUS HELICOPTERS	CHENGDU AIRCRAFT	HAL LPSC	LEONARDO	PREMIUM AEROTEC	SOGERMA
AIRBUS DEFENSE AND SPACE	CSIST	HARBIN AIRCRAFT	LEARJET	ROLLS ROYCE UK	SONACA
ALCAN	DAHER SOCATA	HELLENIC AEROSPACE	LETOV	ROLLS ROYCE SINGAPORE	SPIRIT AEROSYSTEMS
ALCOA	DASSAULT AVIATION	IAI	LIMING AEROENGINE	ROMAERO	STELIA AEROSPACE
ANTONOV	DEMA	IAZ IRKUTSK	LIYANG AEROENGINE	ROSTVERTOL	TAI
AOI EGYPT	DENEL	INDRAERO SIREN	LOCKHEED	RUAG AG	TURBOMECA
AUVERGNE AERONAUTIQUE	DMRL	IRT JULES VERNE	MAZ'AIR	SAAB AEROSTRUCTURES	UMPO UFA
AVIASTAR-SP	DUCOMMUN	ISRO	MBDA	SAFRAN	UUAZ ULAN UDE
BAMTRI	EADS	ITP	MECAHERS	SAMARA AEROSPACE	VASO
BAE SYSTEMS	EMBRAER	KAZ KAZAN	NANCHANG-HONGDU	SHAANXI	VOUGHT
BEML	ENAE	KNAAZ KOMSOMLSK	NAZ NOVOSIBIRSK	SHANGHAI AIRCRAFT	XIAN AIRCRAFT

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