

# Gas Turbine History in Japan

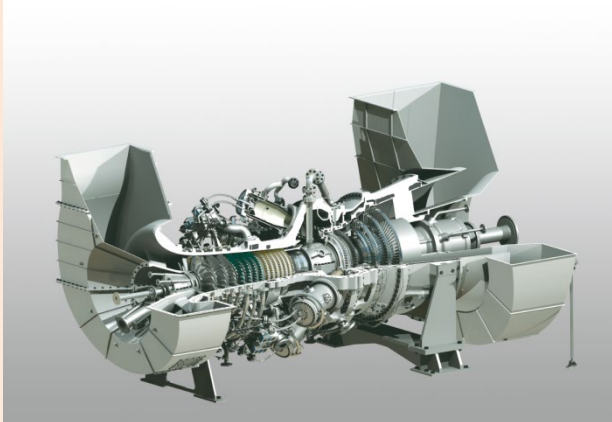
## Industrial Gas Turbines



### Latest Gas & Steam Turbines



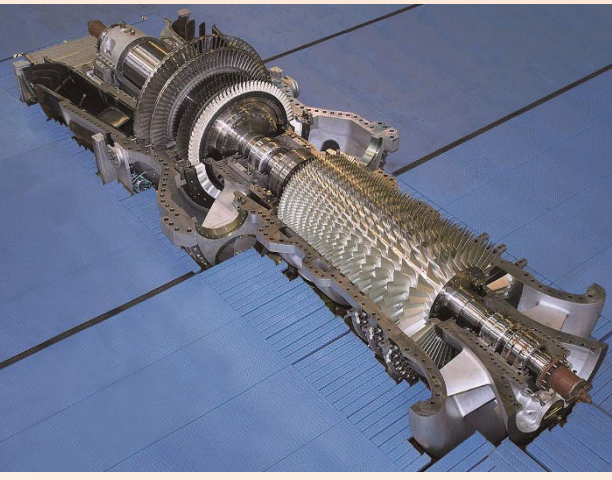
M501JAC Gas Turbine by Mitsubishi Power



L30A Gas Turbine by KHI



48" LP-rotor for Combined Cycle Steam Turbine by TOSHIBA ESS



H-100 Gas Turbine by Mitsubishi Power

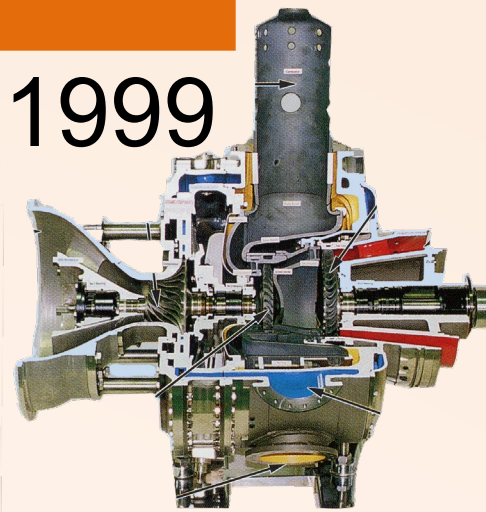
### Major National Projects

Ceramic Gas Turbine (CGT) in New Sunshine Program

1988

1999

CGT302 (322kW)

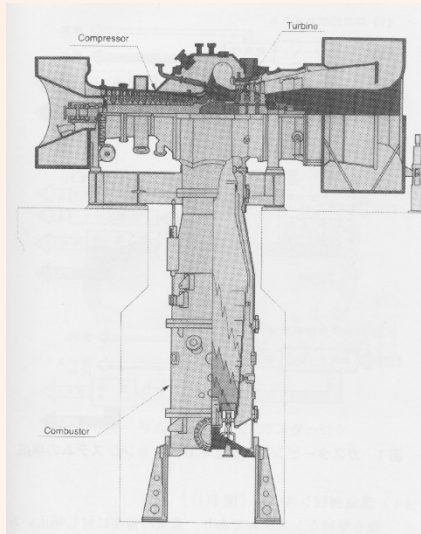
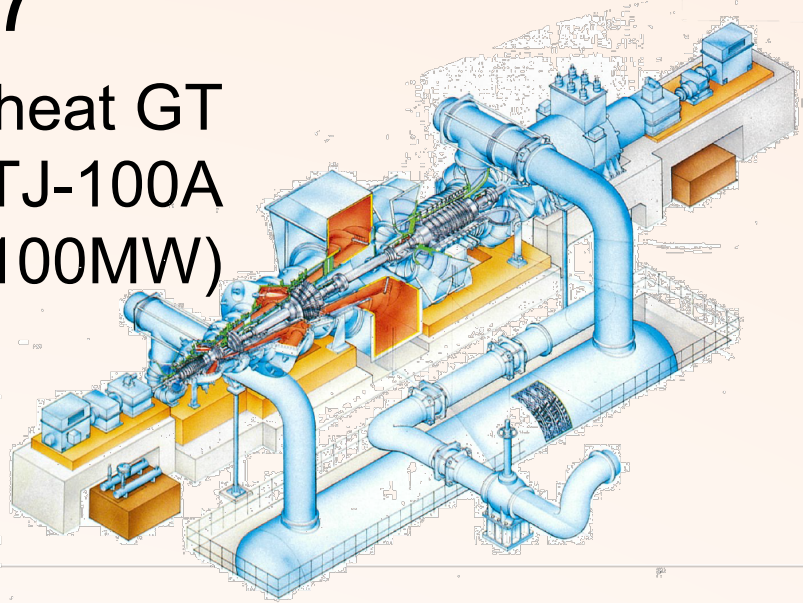


Advanced Gas Turbine Research in Moonlight Project

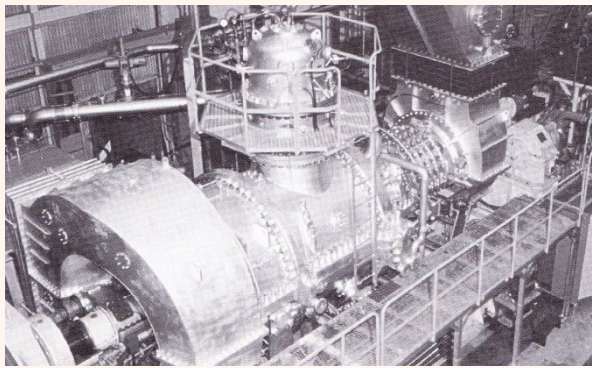
1978

1987

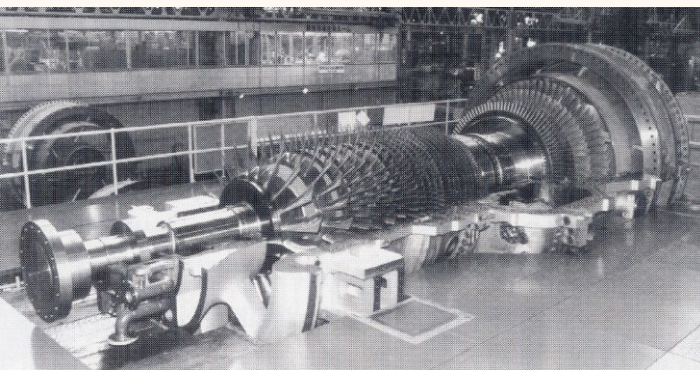
Pilot Plant of Reheat GT AGTJ-100A (100MW)



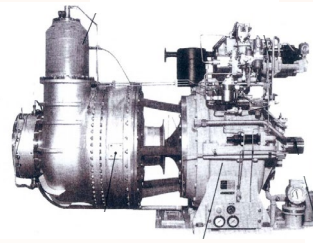
1982 World's First over 1000°C Class GT for Low Calorie Gas M151 (16MW) by MHI



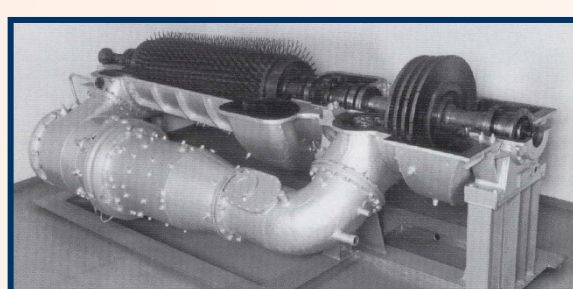
1980 Domestically-Produced GT SB60C-M (13MW) by Mitsui Engineering & Shipbuilding



1984 World's First GT with Dry Low NOx Premixed Combustor M701D (130MW) by MHI



1984 Small GT for Co-Generation M1A (1MW) by KHI



1949 1st GT (1MW) Originally developed by Ishikawajima Shibaura Turbine

for Emergency  
for Peak Load  
for Base Load

Annual Production of GT in Japan (by Electricity Output)

GW  
10  
9  
8  
7  
6  
5  
4  
3  
2  
1  
0



## Aircraft Gas Turbines



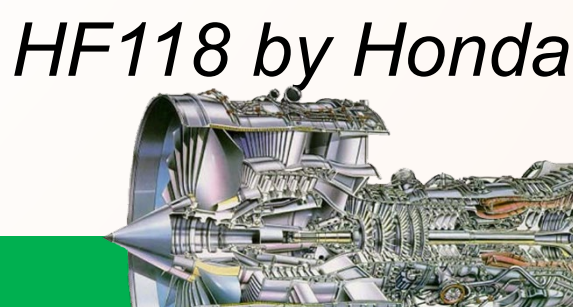
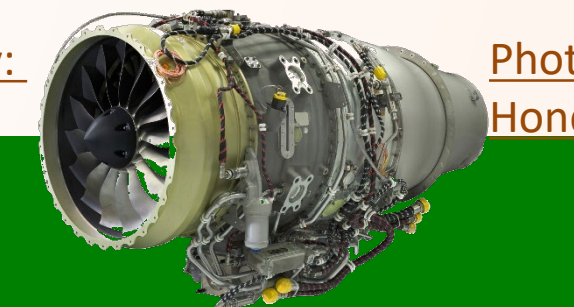
|      |  |
|------|--|
| NAL  | National Aerospace Laboratory of Japan (Reorganized into JAXA in 2003) |
| MITI | Ministry of International Trade and Industry (Till 2000)               |
| METI | Ministry of Economy, Trade and Industry (Since 2001)                   |
| MOD  | Ministry of Defense  |
| ATLA | Acquisition, Technology & Logistics Agency                             |
| NEDO | New Energy and Industrial Technology Development Organization          |

Risk Sharing Partners for Commercial Jet Engines



CF34-10, GENx, Trent1000, PW1100G-JM, etc.

Engine Development for Business Jets



V2500 Development and Production as Joint Venture Partner

1983

1989 Entry into Service

V2500

V2500 on MD90

RJ500 Development by Japan and Rolls-Royce

1979

1983

1989

Small Eco Engine Project (NEDO/METI)

2003

2012

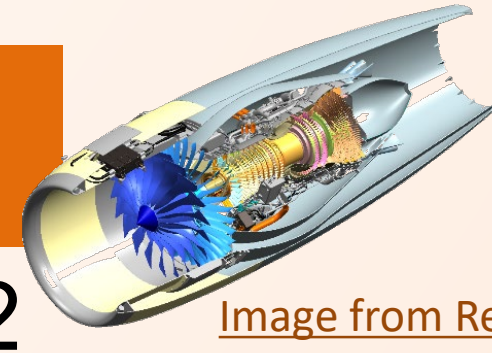


Image from Report of NEDO Small Eco Engine Project



FJR Engine Project (Fan Jet Research) by NAL/MITI

1971

1981

1988

R&D for High-Bypass Ratio Fan Engine



Installed on STOL Experimental Plane "ASKA"

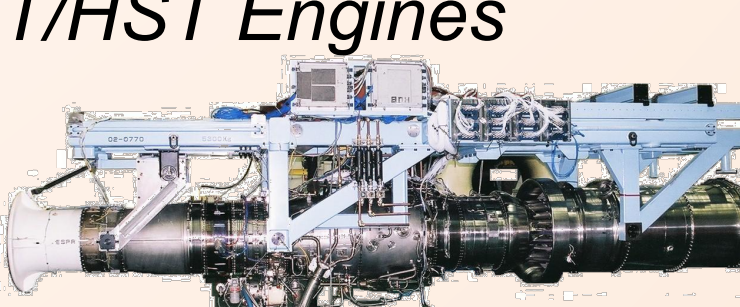


Photo from Proc. 2nd ESPR Symposium

VTOL Research by NAL

1962

1974



Research for High Power/Weight Ratio Turbojet (JR100, 200, 220)



Maritime Patrol Aircraft P-1 Powered by F7-10



Photo from ALTA website

High Bypass Turbofan

Afterburning Low Bypass Turbofan

F3-30AB,-400, XF5-1, XF9-1



Photo from ALTA website

X-2, Advanced Technology Demonstrator - Experimental Powered by XF5-1

Intermediate Trainer T-4 Powered by F3-30



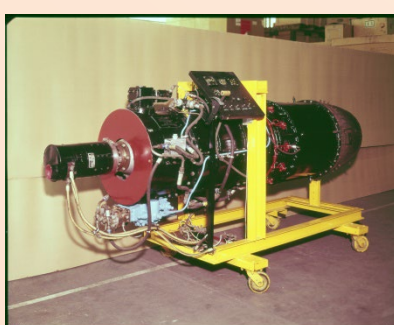
Photo from ALTA website

Photo from JASDF website

Turbojet

J3-3,-7,-8

Low Bypass Turbofan



1945 Japan's 1st Turbojet "Ne-20"

Post War 1st Turbojet J3



R&D by MOD

Post World War II Moratorium Aircraft research was prohibited in Japan

