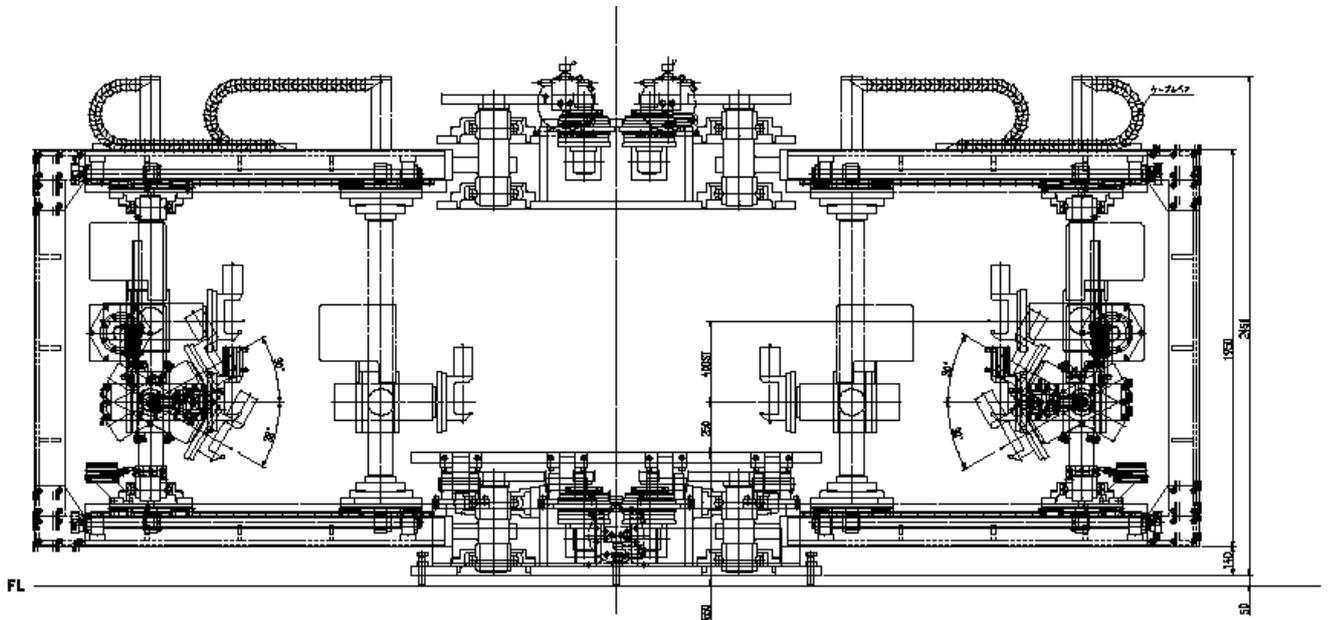


Messrs.: _____

The brief guide to CNC Stretch Bender



Opton Co.,Ltd.

Ver.2.1

<Stretch Bender ex-Opton>

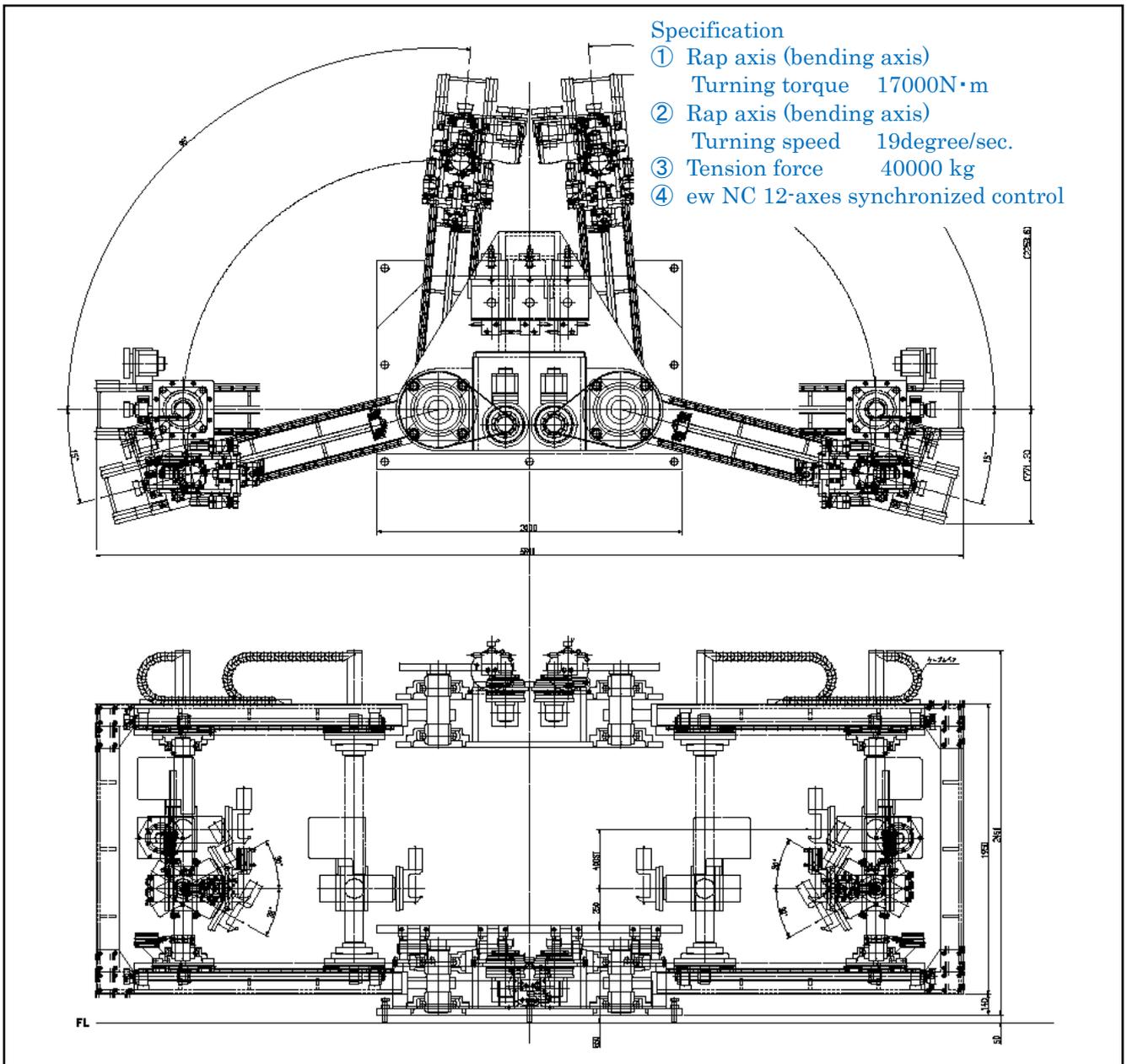
Opton stretching bender performs bending as a work piece is kept stretched to both ends with synchronized numerically control being implemented for a work piece tension and chuck arm position switching to meet both demand of trial or mass production.

These functions lead to accuracy-oriented machining by minimizing the quality instability that may be caused by variation of material and/or ambient temperature. Some machine model, where two-side supported tension chuck is mounted, can minimize a work piece from inclined position thus enables speedy yet accuracy production.

The series includes three sizes for capacities Large, Middle and Small-sized with optional devices or work loading and other peripheral hardwares.

The stretching bender of old version currently at service in user factory can be renewed to the latest N/C machine by fitting the 「DDV hydraulic Servo pump」 as hydraulic control and 「TIF NC」 as the controlling software both from Opton's latest original technologies.

【1】: Opton Stretching Bender in total view (Middle-sized machine)



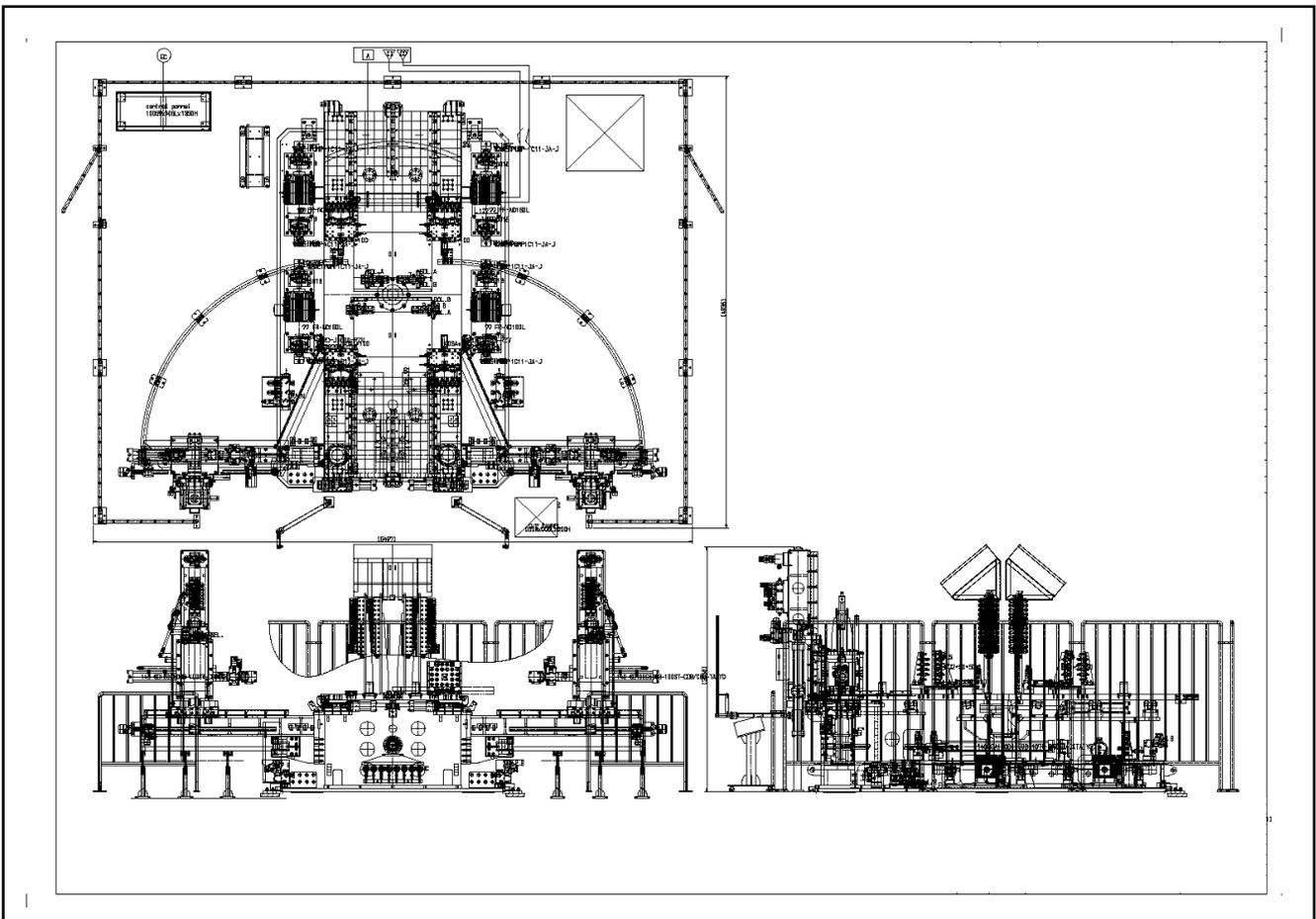
【2】: The features ;

- ① Thanks to the rigid mechanical design with the rap-axis being retained at two points, quality-oriented production is always expected.
- ② Thanks to fully 12-axial synchronized N/C being implemented, the machine can stay stable in accuracy-oriented operation that will be resulted in the production for quality parts
- ③ Alternative modes of control, or one by standard thrust-force and by positioning as the other, can be selected for operating the tension axis. This will allow quality-stable machining of work pieces that are unstable in material quality.
- ④ Once the machining data can be created with all positioning data memorized based on the tension-axis by thrust-mode control, bending can be performed on the position-controlled axis behavior. This production mode suites to the production with the materials of dispersed quality.
- ⑤ The positioning accuracy is available for the figure of less than ± 0.1 mm, leading to very stable machining at the end.
As another feature for machining of high-stability, the thrust force applied to the tension-axis can be made for the figure less than $\pm 2\%$.

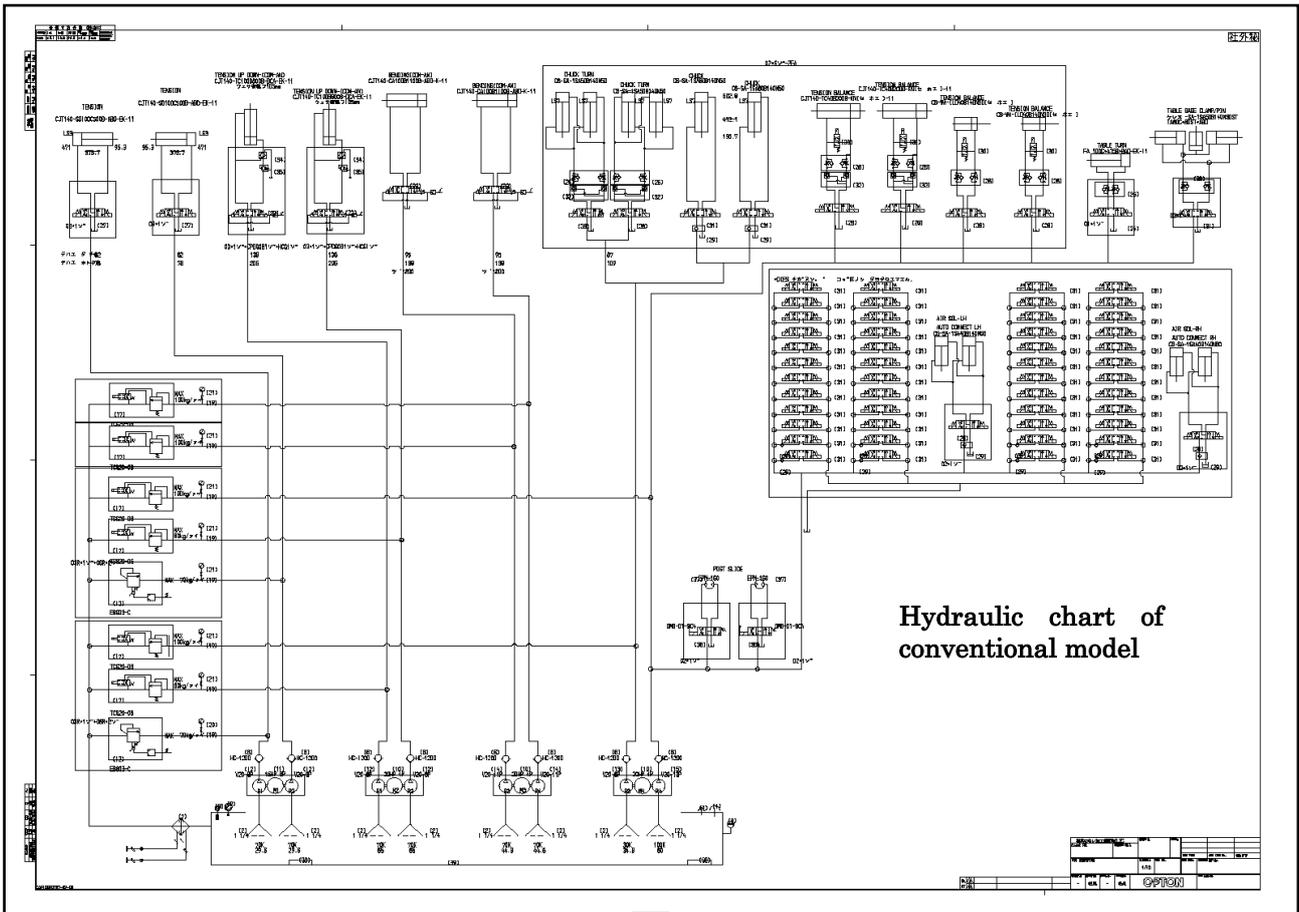
【3】:Renewal of the old Stretching Bender currently at service

The stretching bender of old version currently at service in user factory can be renewed to the latest N/C machine by fitting the 「DDV hydraulic Servo pump」 as hydraulic control and 「TIF NC」 as the controlling software (2000-over software parts included) both from Opton's latest original technologies.

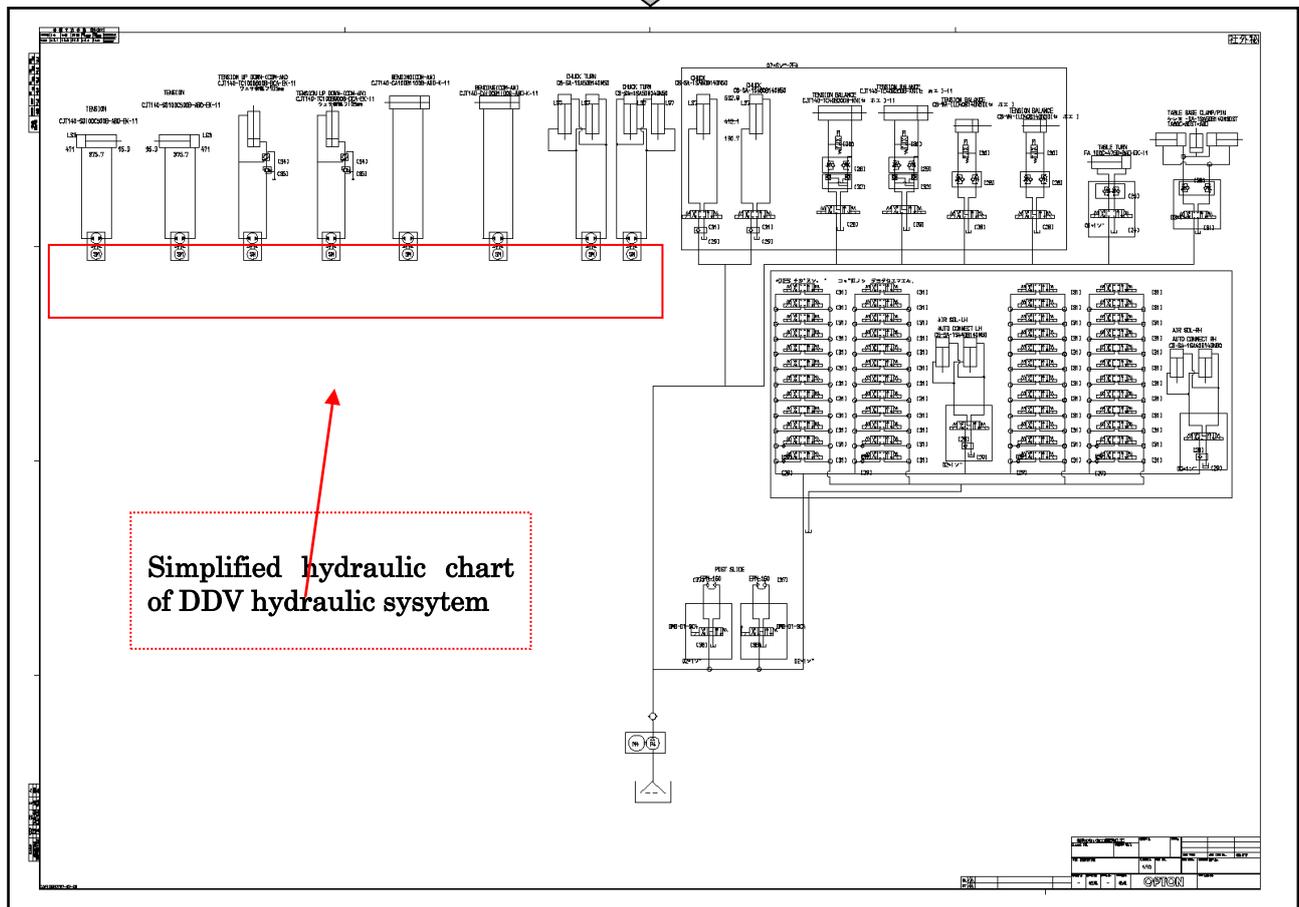
① Old type Stretching Bender (Reference only)



② Comparison of hydraulic schematics charts of DDV hydraulic servo system and conventional one



Hydraulic chart of conventional model



③ About Technologies of Opton original DDV Hydraulic Servo Pump and 「TIF」 N/C

【1】Opton 「DDV Hydraulic Servo Pump」--Its features--

1) High and stable accuracy at durable service

The product is built in hybrid structure that is composed of non-leakage and fixed-displacement piston of reversible type, AC-servo motor. Velocity, direction and thrust forth of the cylinder motion are controlled by the turning speed, direction and the torque of the AC servo motor. Thanks to the piston pump at the end of AC motor that works as the reducer of hydraulic pressure, hydraulic performance can be directly mirrored by the one of AC servo motor. This

2) Large energy-saving

The conventional hydraulic servo valve system causes high heat generation when hydraulic media runs through narrow path of throttle valve. 50+% of the input electricity is only consumed as heating, thus leading the effective work of electricity down to less than 50%. With the DDV installed, the Opton bender has marked the energy consumption less than 1/3 of the conventional case.

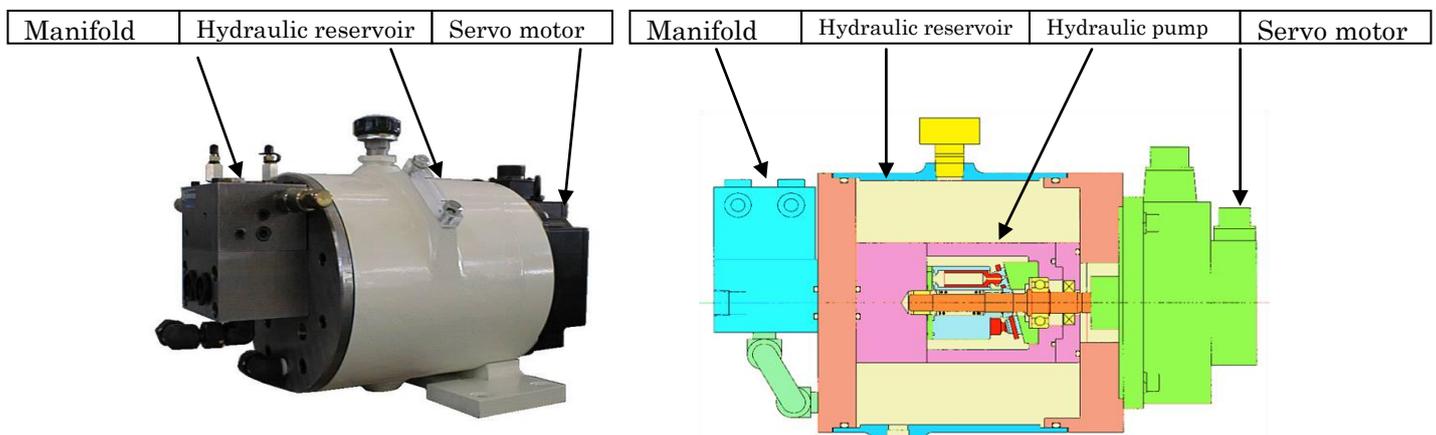
Large noise generation is another problem that is caused by large-sized tank, complicated distribution channeling and resonant-casing vibration of the actuating pump.

Because of no throttle valve installed and the cylinder pump activating only in time needed, Opton DDV system works at the input electricity efficiency of 95+% or with less than 5% loss for heating energy, thus leading to the noise generation around 1/10 of those of conventional systems..

3) No large-sized hydraulic tank needed as that of conventional type.

Large-sized hydraulic tank and coolant facility are the “must” to control the temperature and quality degradation of the media for conventional hydraulic systems. Opton’s non-leak type DDV pump causes only minimized level of heat generation and subsequent lower degradation of hydraulic media, no large-sized hydraulic tank. Because 1/10 or less of the hydraulic media only needed which is enough for cooling by air.

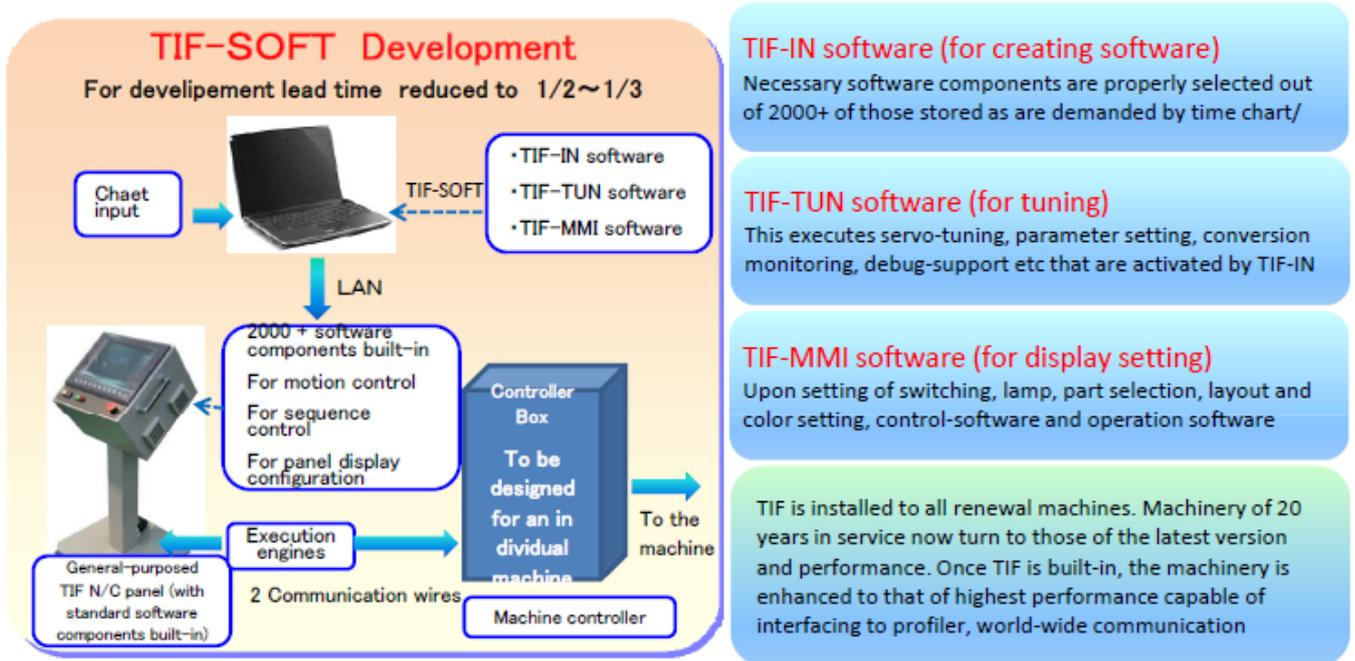
4) DDV hydraulic servo pump in external & internal views



【2】The features of Opton original 「TIF」 N/C technology (patented)

- 1) The TIF N/C is Opton’s latest and original technological product already employed in its wide N/C machinery including pipe benders, 3D surface profiler, Hydroforming machine and many renewed machines.
- 2) The 2000-over PLC/CNC software parts are stored in the panel computer. These empowers to create automatically the software for operation control of the machine automatically upon input of the time- and flow-chart for machine operation. These software parts work to control over functional parts of no-fuse breaker, magnet switches, power-pack and relays for DD hydraulic servo pumps, but not of the sequencer hardwares.
- 3) Debugging for function change can be easily done at the production floor, bringing quick machine start up.

The principle idea of TIF NC/PLC



1. This controller is employed to all Benders, 3D Profilers, Hydro-formers ex-Opton as original features.
2. This controller is employed to all Benders, 3D Profilers, Hydro-formers ex-Opton for renewal application. The machine of 20-years in service is graded up to the machine of latest operability and performance. The renewed feature will include capacity as the latest machine for interfacing with Opton surface-profiler and global communication network for another 10 years service life.

In starting feasibility study

For starting a study on the stretch bender, followings are offered:
Please pick up any one below that most suites your initial interest.

1. Opton staff visit to an inquirer is offered to make detailed presentation with DVD on a PC.
2. Opton staff is pleased to make a visit to an inquirer for the best proposal upon Opton's receipt of inquirer's product information covering the title, OD, thickness, material, Q'ty of production, repetitiveness of production etc.

Opton stays always ready to meet anyone above