

Introduction to Gear Vibration Tester

made by Signallink Co., Ltd.

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Signallink Co., Ltd.

Overview

What is vibration?

Vibration is a dynamic phenomenon observed as a to-and-fro motion about an equilibrium position. Vibration is caused by the transfer or storage of energy within structures, resulting from the action of one or more forces. Vibration is often a by-product of an otherwise useful operation and is very difficult to avoid.

Vibrations can be observed in the time domain, i.e. the change in the amplitude of the vibration with time ("time history"). Vibration time histories can fall into one of several classes as defined by their mathematical form or by the statistical properties of the motions they contain. Vibrations can also be looked at in the frequency domain where the vibration is described by its frequency spectrum. The two domains are related mathematically via the Fourier Transform.

Unlike other vibration transducers, piezoelectric accelerometers are used to measure all types of vibrations regardless of the nature of the vibration in the time domain or the frequency domain, as long as the accelerometer has the correct frequency and dynamic ranges. Because of the wide frequency and dynamic ranges of piezoelectric accelerometers it is always possible to find a particular type for any vibration measurement. It is only the analysis techniques which must be changed according to the type of vibration

Gear Vibration Tester

In general, a gear final inspection system has measured the geometry parameters of a gear, like OBD, tooth runout, inner diameter, upper endface runout, lower endface runout, taper runout, etc. Geometry dimension is important but a gear operates in assembled states. So dynamic rotating test is more important than geometry dimension measurement.

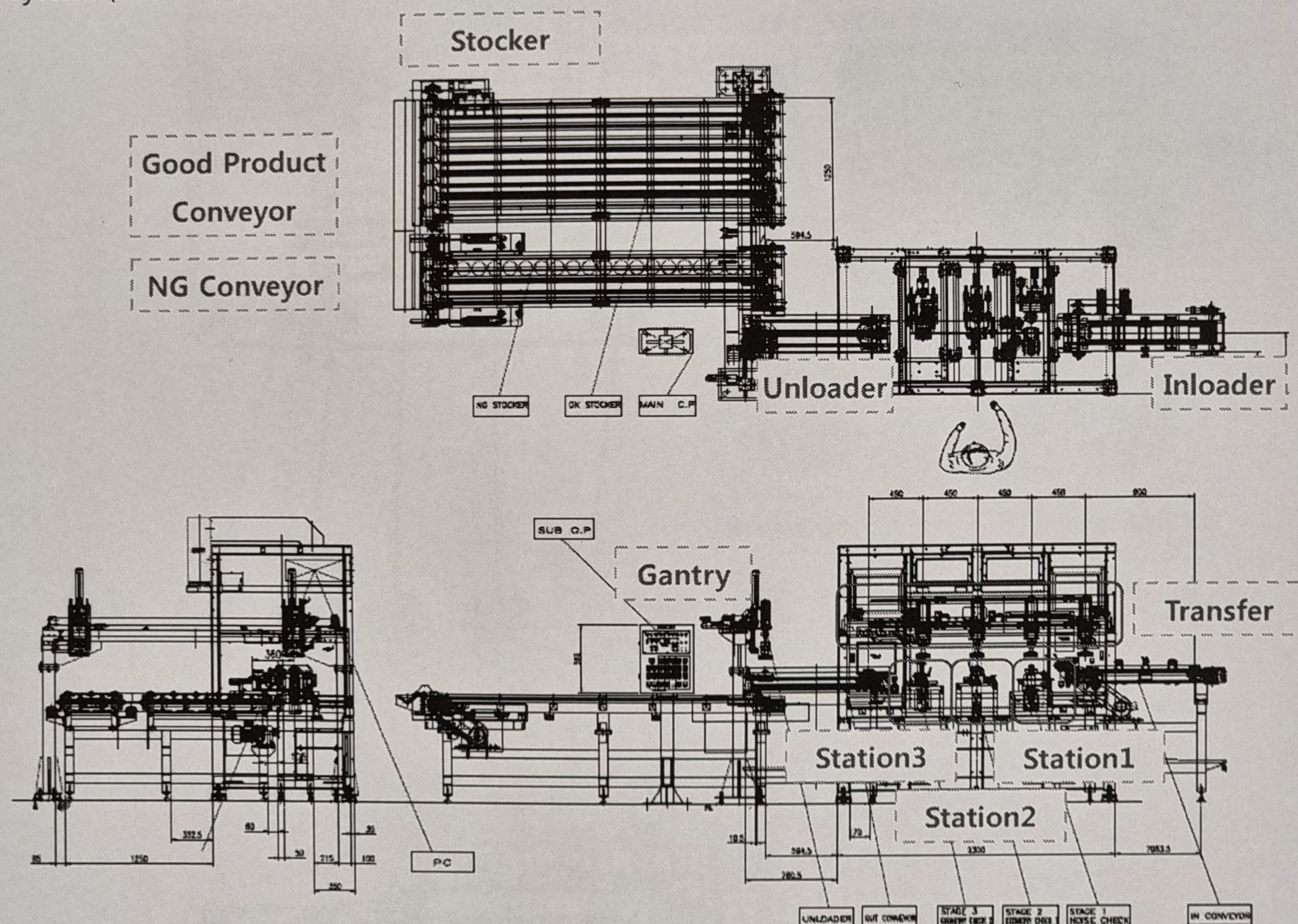
The Signallink's Gear Vibration Tester can measure geometry dimensions as well as gear dynamic parameters. Dynamic parameter means the acceleration occurred for it is operating. Structural acceleration causes mechanical noise.

The measured acceleration signal is analyzed using a various frequency analysis algorithm. The algorithms include rms, peak, crest factor in time domain and overall value, gear mesh order and its harmonic components. Crest factor is effective for detecting gear's nick. The GVT can mark a position which has nick in vibration measurement station. It consists of 3 stations which are noise testing station, geometry-1 (OBD, runout, inner diameter) and geometry-2 station (upper, lower, taper runout) measurement system.

The components of gear vibration tester (GVT)

System Overview

The Gear Vibration Tester consists of 3 test station (noise, geometry-1, geometry-2), moving system (inloader, transfer, unloader) and stocker (option).

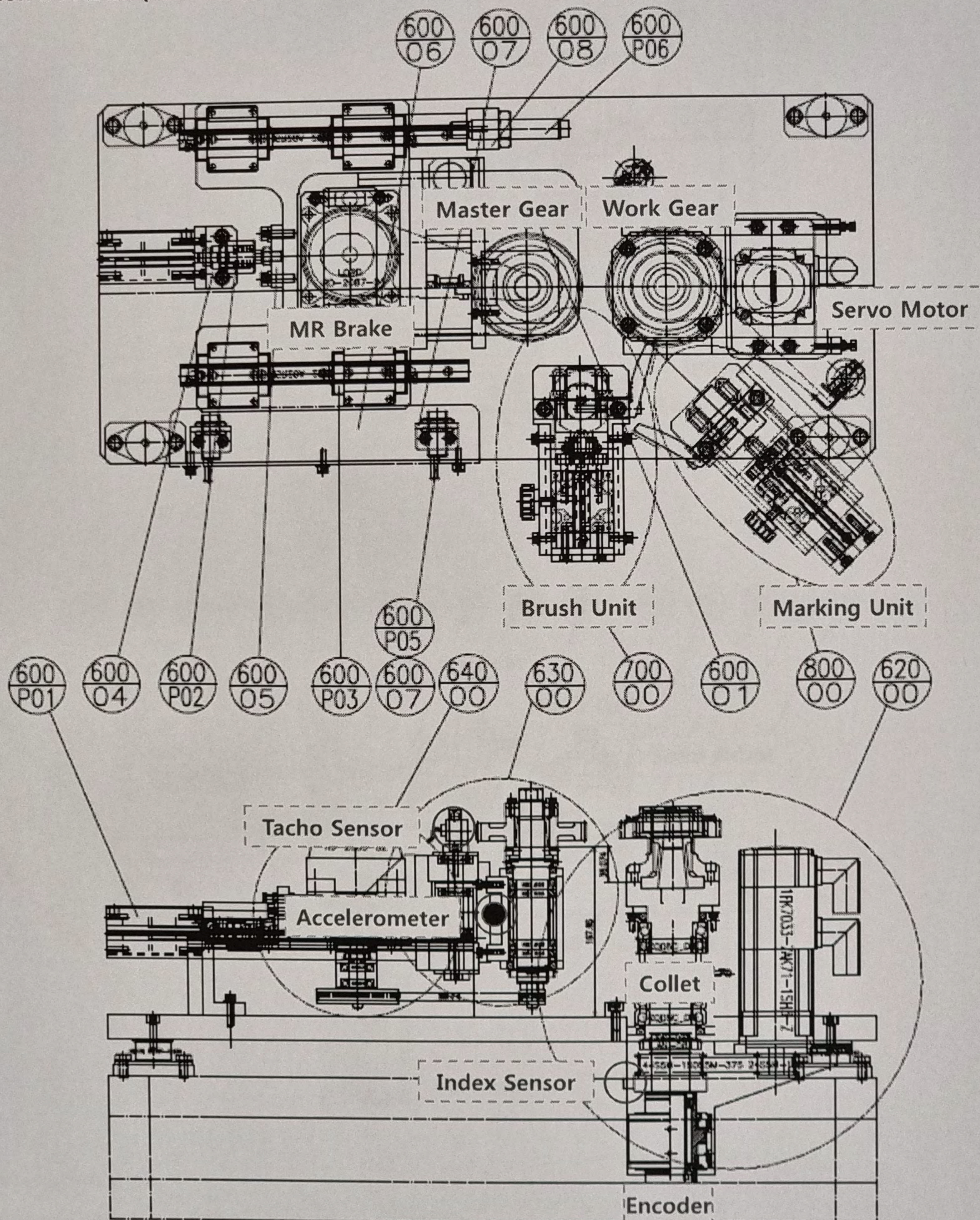


Measurement Items

Station	Items
Station 1	Time Domain – Rms, Peak, Crest Factor (Gear Nick) Freq Domain – Gear Mesh Order and its harmonic up to 5th Others – Master Gear Nick, Rpm Error
Station 2	OBD, Runout, Inner Diameter
Station 3	Upper, Lower, Taper Runout

Mainly 3 Measurement System

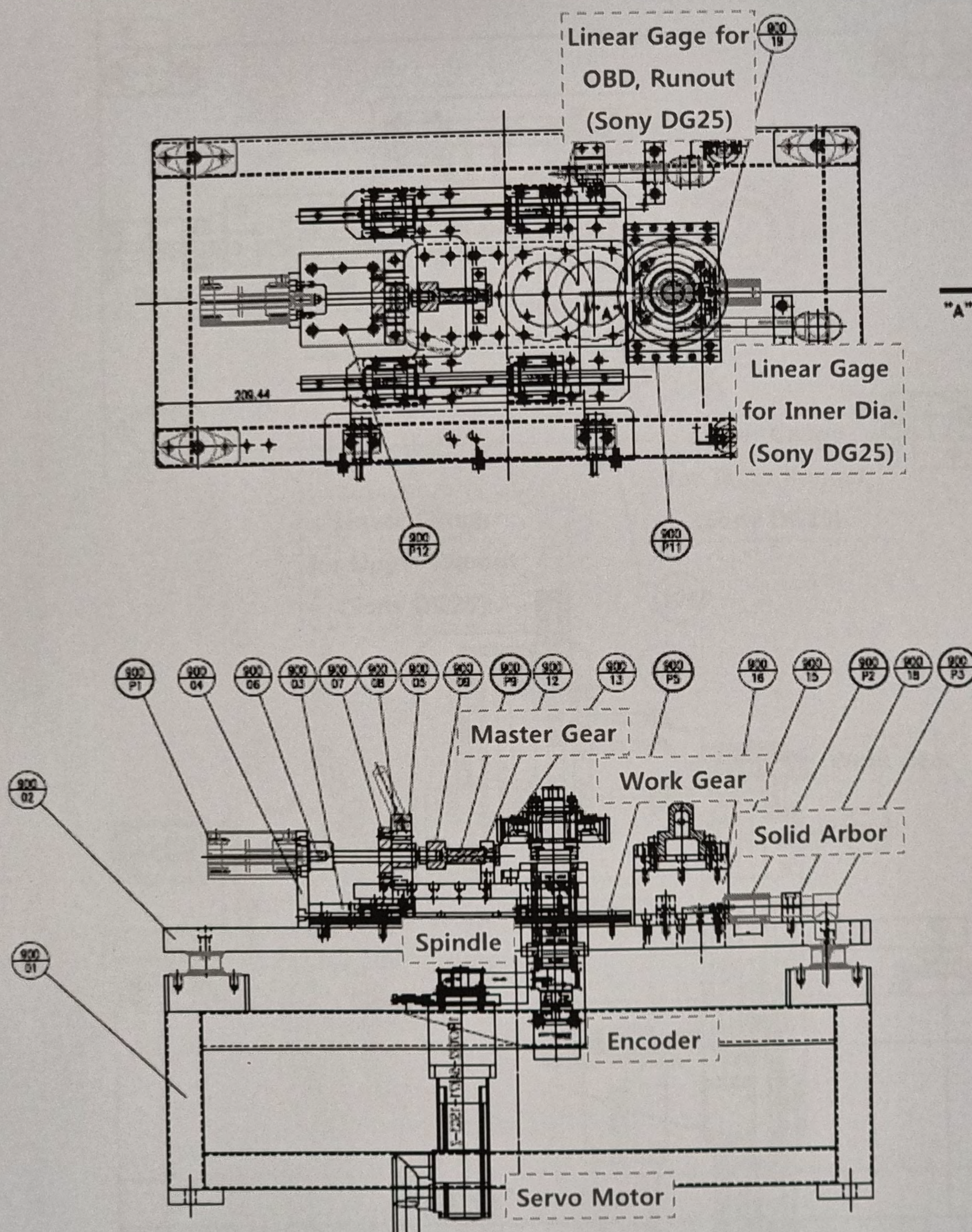
Station 1 : Noise (vibration)



◆ Inspection Point

- Spindle (master gear axis, collet) Runout
- Sensor(accelerometer) Calibration (once per 6 months)
- Servo Motor Timing Belt's Tension and MR Brake Ribstar Belt's Tension

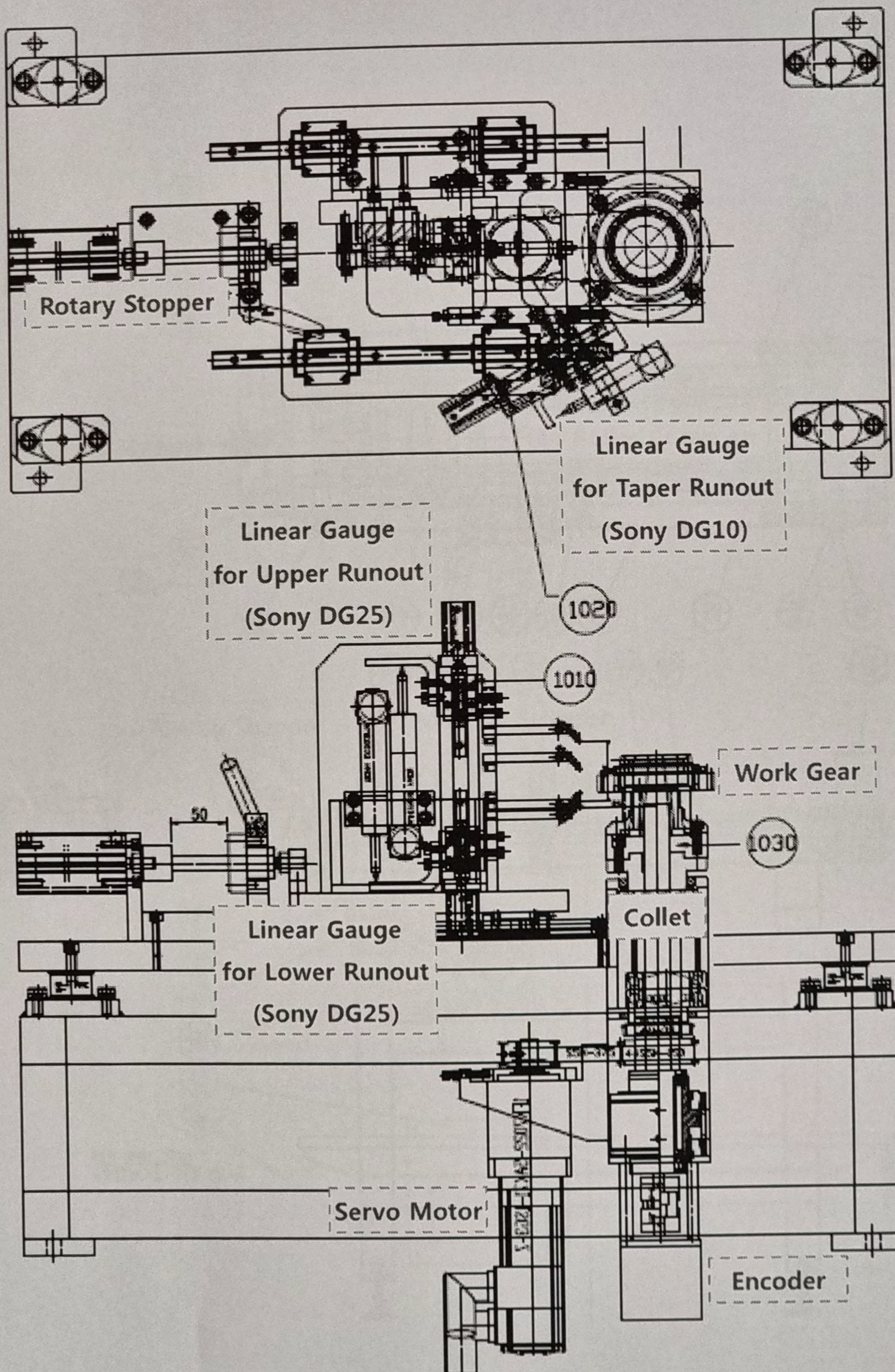
Station 2 : Geometry-1



◆ Inspection Point

- Solid Arbor's wear (check once per 3 months)
- Master Gear Spindle Runout
- Timing Belt's Tension

Station 3 : Geometry-2

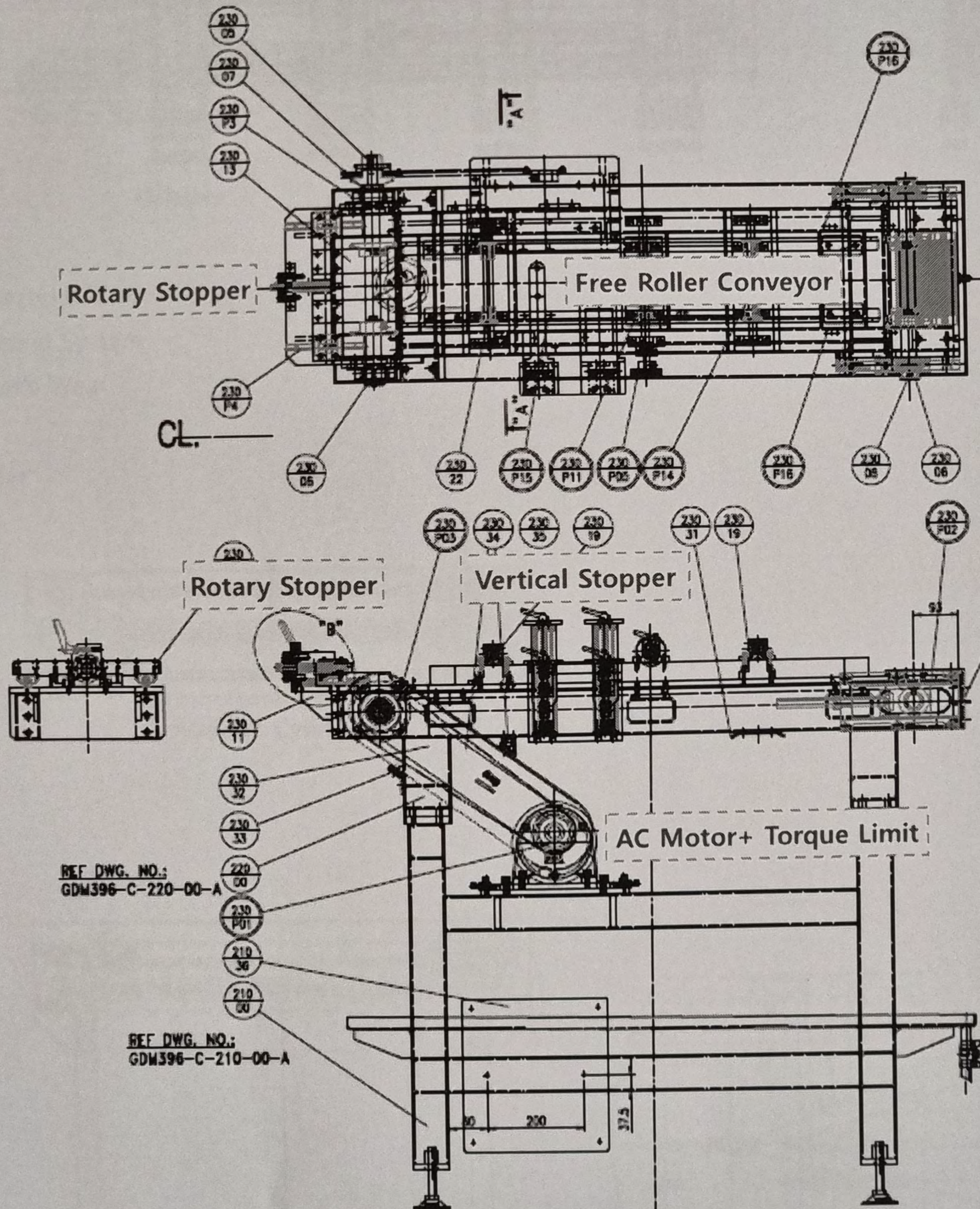


◆ Inspection Point

- Collet Runout
- Finger's deformation and Contactor's Wear
- Timing Belt's Tension

Moving System

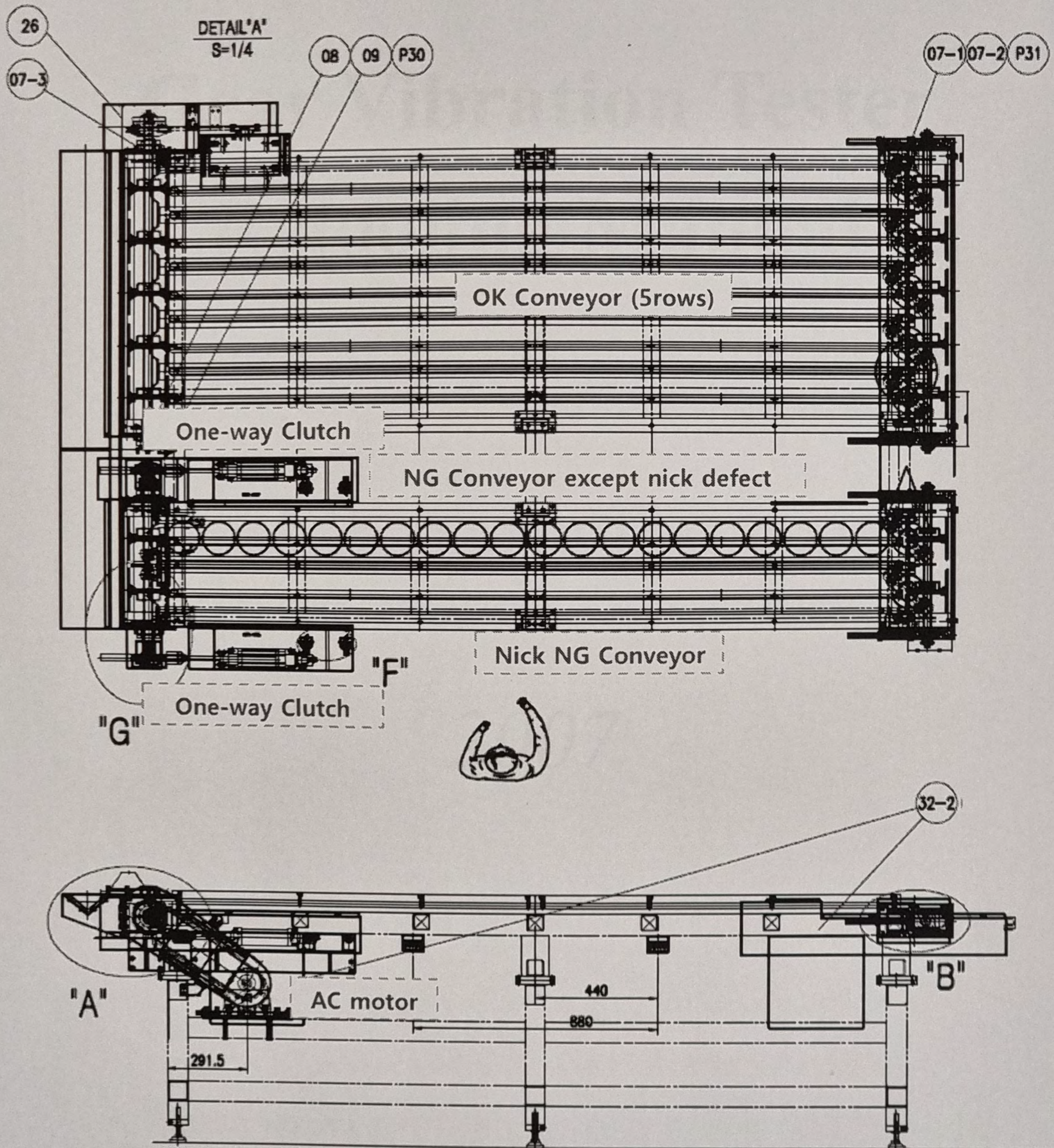
Inloader



◆ Inspection Point

- Free Roller Conveyor's wear and fracture
- Conveyor Chain's tension

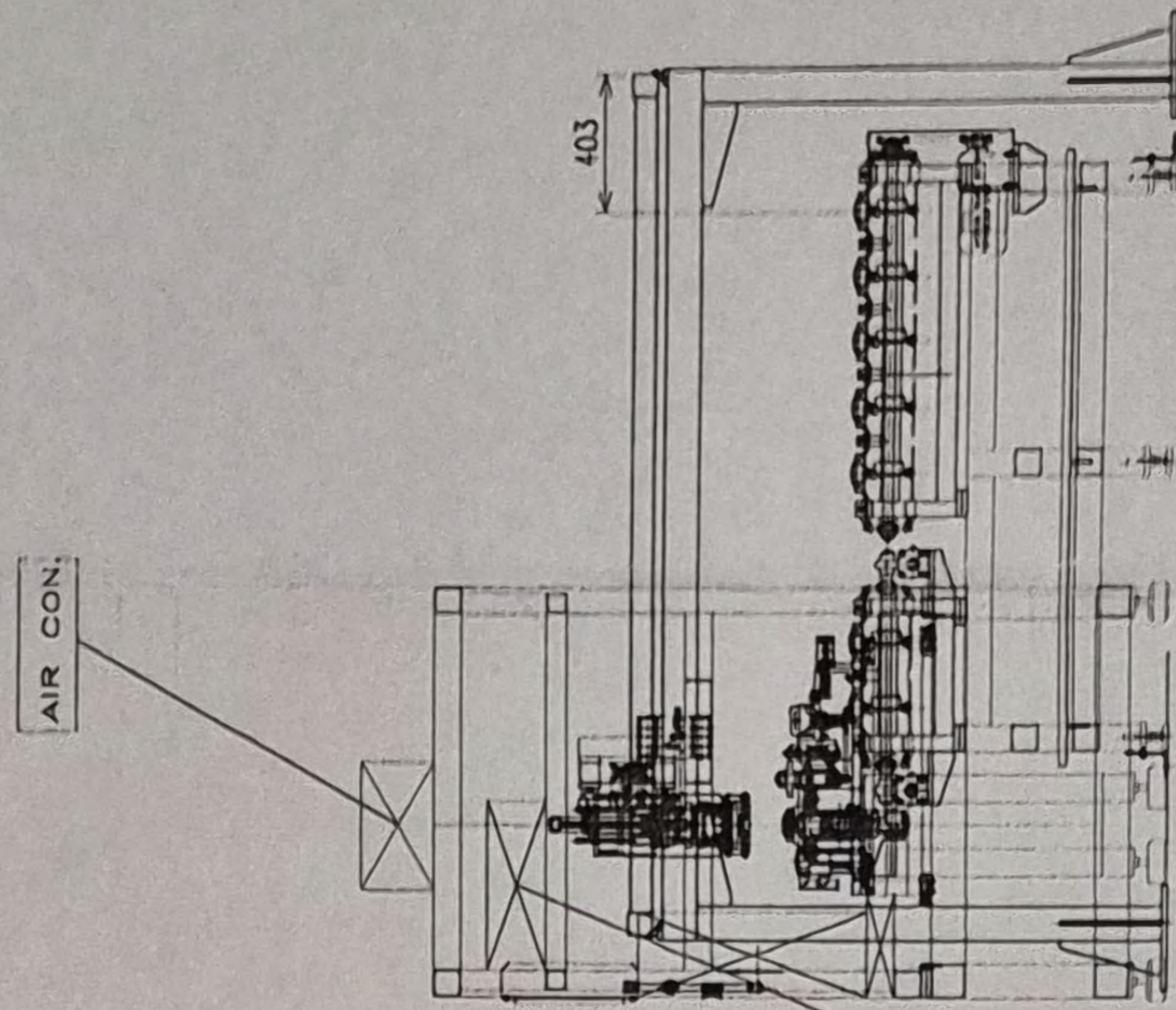
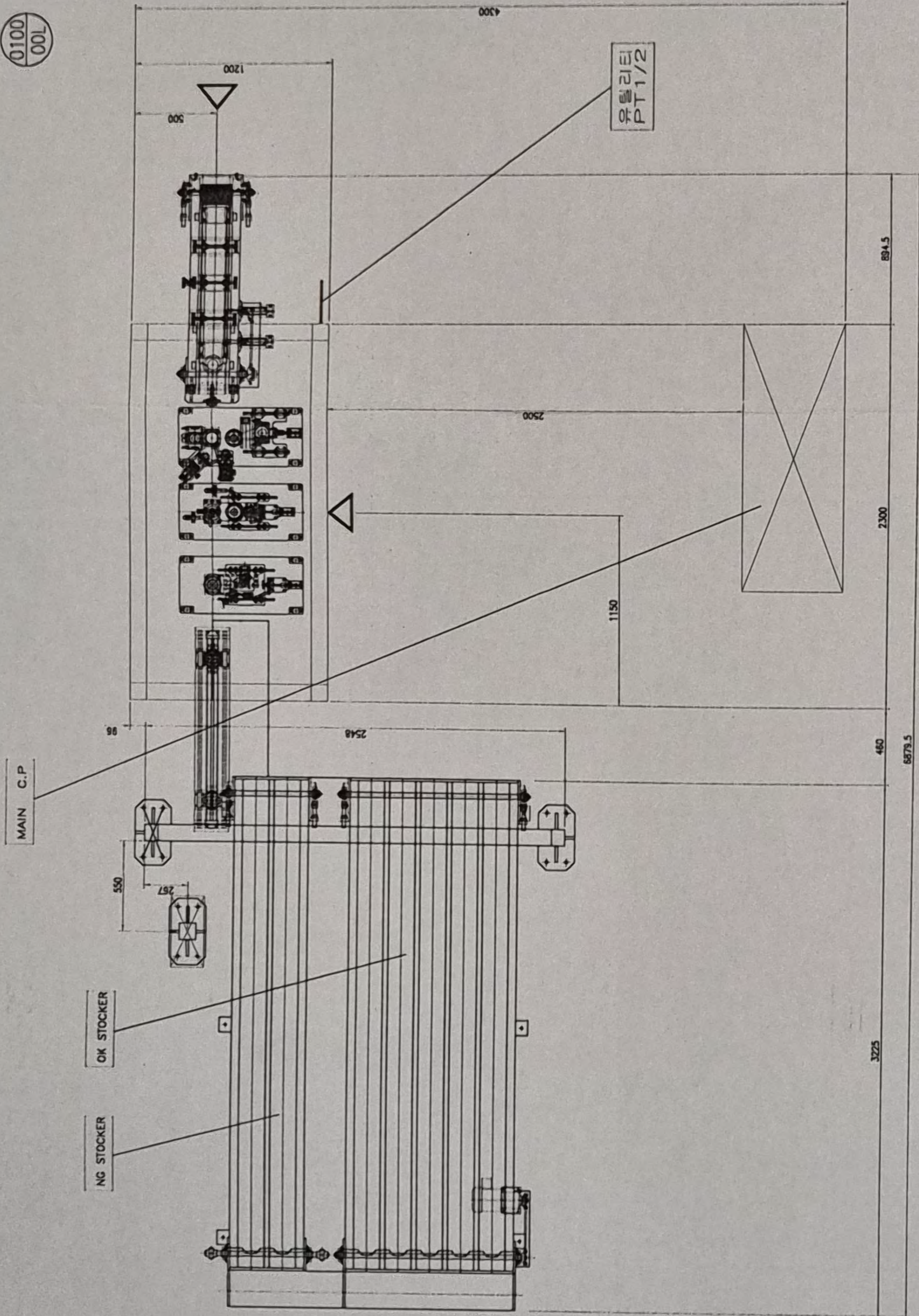
Stocker (*option)



▽ (W, W)

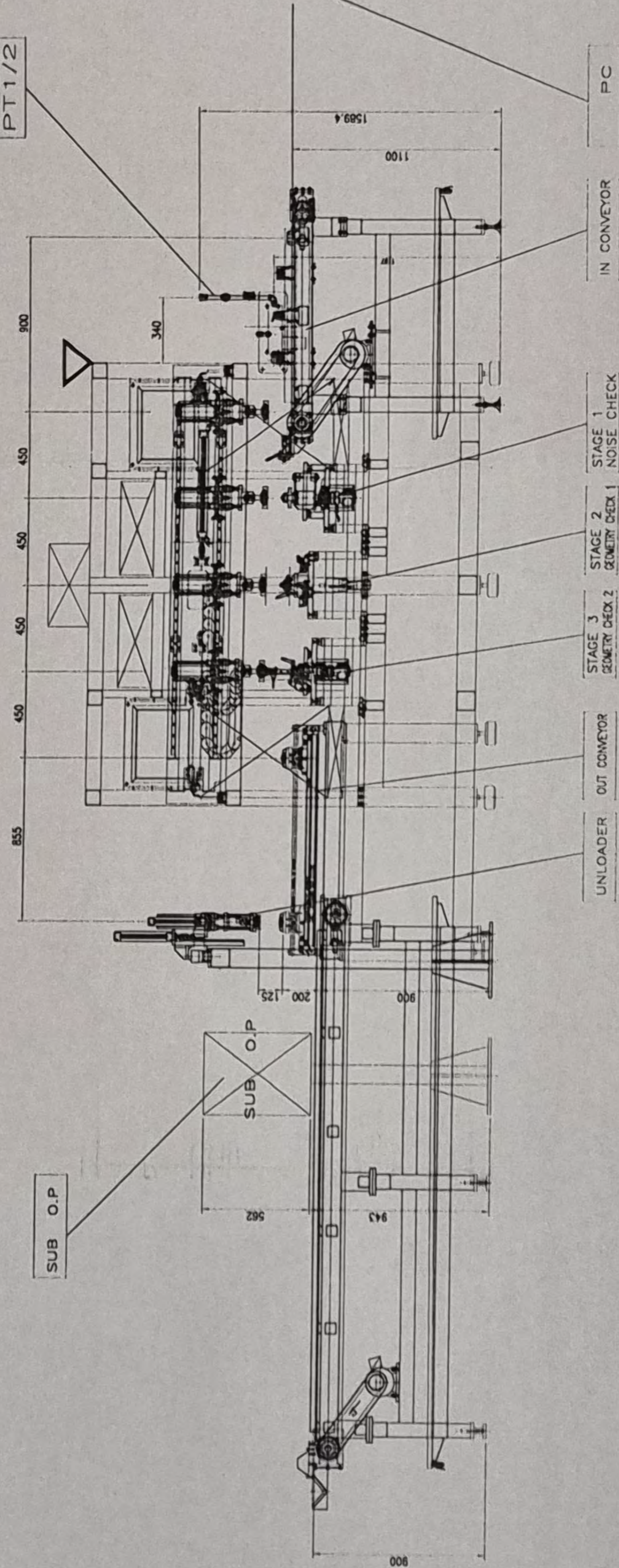
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OK STOCKER

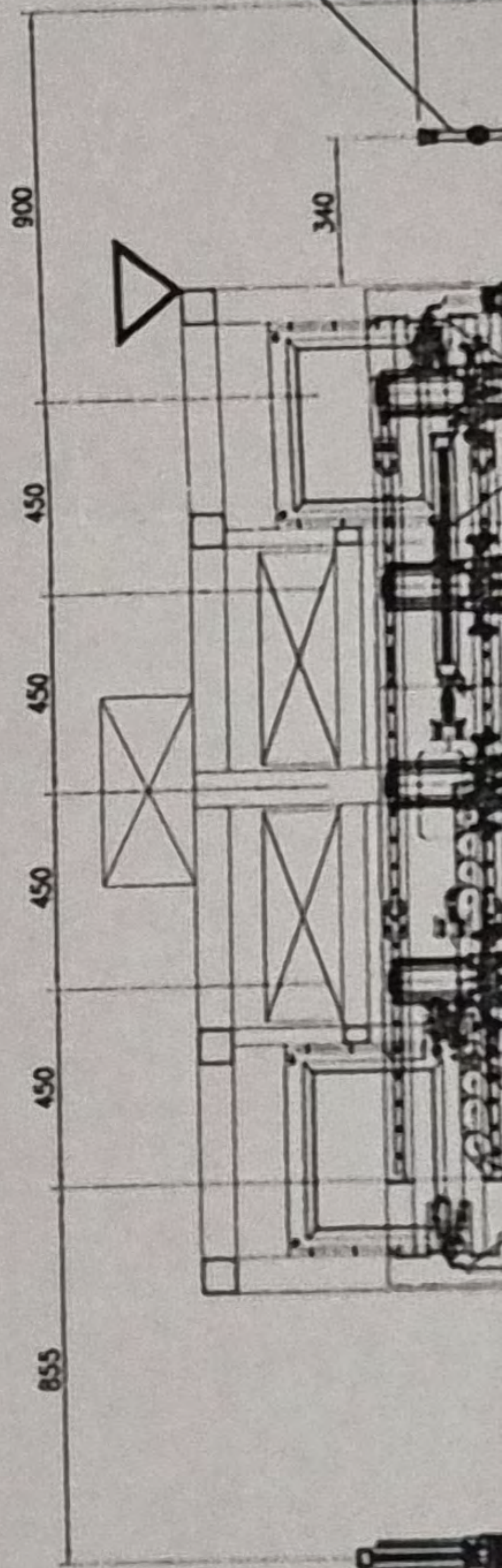
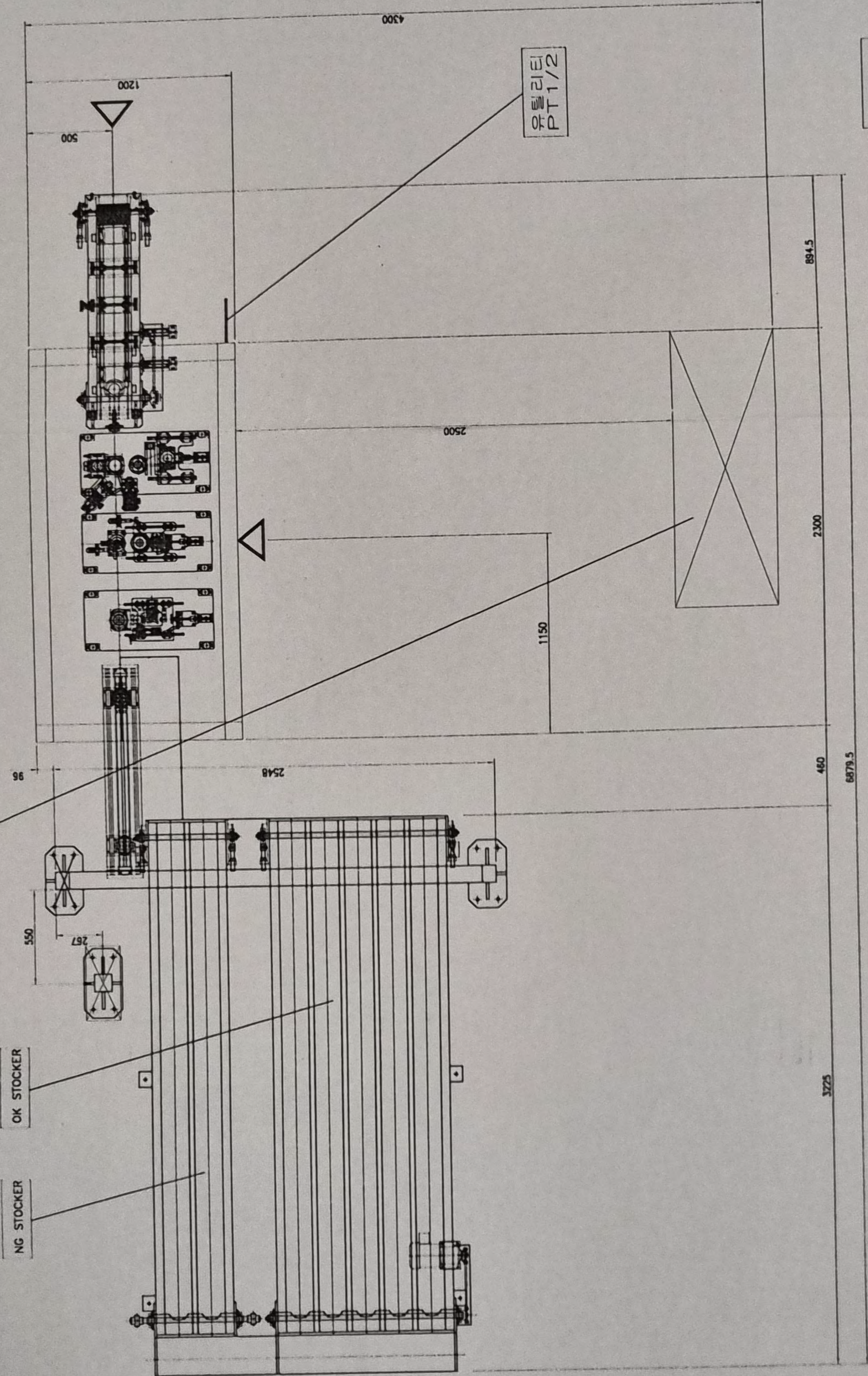
NG STOCKER

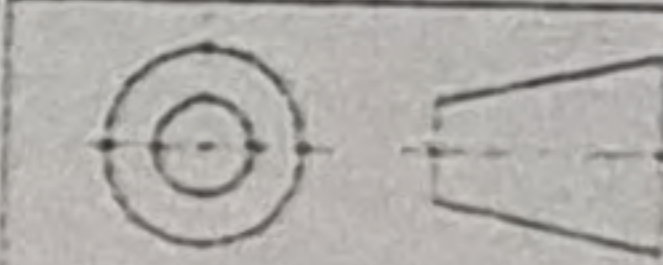
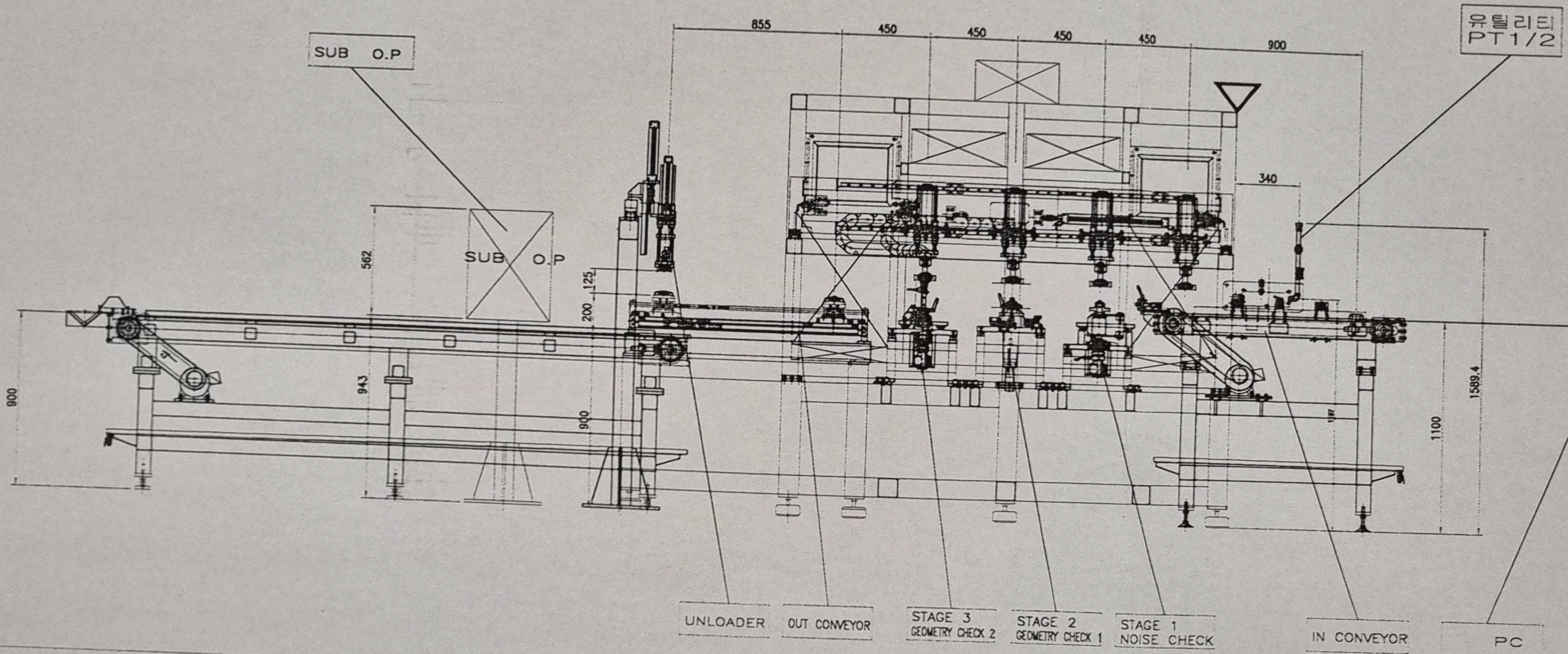
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IN CONVEYOR

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