
Techno-Economics

Steam Tracing & Auto-Trace (Electric Tracing).

Case Studies 1 to 5

Pipe Tracing

Case Studies 6 & 7

Tank Tracing

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Techno-Economics

Steam Tracing or Auto-Trace (Electric Tracing).

Study Considers:

- Total Installed Cost.
- Total Energy Cost.

(NOT Included are: the Cost towards Maintenance & Replacement; and, Economic Evaluation.)

Installation Cost Economics

- Pipe Tracing

- Steam Tracing Cost are Comparable to Auto-Trace Cost.
- Steam Tracing Cost in some cases are more than the cost of Auto-Trace.
HOW HIGH? and WHY!

Installation Cost Economics - Pipe Tracing

CASE	NB	FLUID	deg.C	RS./MT/OF TRACED PIPE	
				STEAM	AUTO-TRACE
1	80	LSHS	85	2322	2162
2	50	LSHS	85	2437	2512
3	250	LSHS	85	3265	2130
4	250	ASPHALT	120	4285	2123
5	80	LSHS	70	2955	2183

Cost are Exclusive of Thermal Insulation, and Boiler.

Installation Cost Economics - Pipe Tracing

Steam Tracing Cost is High due to System
Cost of:

1. Steam Supply Manifold.
2. Steam Trap Assembly.
3. Steam Distribution System.
4. Condensate Return System.

Installation Cost Economics - Pipe Tracing

Steam Tracing Cost Increases with Design Conditions related to:

1. High Pour Point.
2. Many Elevation (Riser) Points.
3. Steam Supply & Condensate Layout.
4. Increase in Fluid Pipe Sizes.

Installation Cost -Pipe Tracing

Case 1 (Yard Pipe)

Cost Rs. Lakh

	<u>Steam</u>	<u>Auto-Trace</u>
1. Tracer- Pipe/Strip	3.0	19.4
2. Supply Manifold	1.5	
3. Steam Trap Assem.	5.6	
4. Distribution Steam/Electric	6.3	1.4
5. Condensate Return	6.8	
6. Control & Monitor.		<u>0.8</u>
Total	<u>23.2</u>	21.6

Energy Cost Economics - Pipe Tracing

- Energy Cost of Steam Tracing is SIX Times more than Auto-Trace.
- Steam Tracing System consumes on an average 25 Times more Energy than Auto-Trace Electric Tracing System.

HOW MUCH? and WHY!

Energy Cost Economics - Pipe Tracing

				RS./YR./MT/OF TRACED PIPE	
CASE	NB	FLUID	deg.C	STEAM	AUTO-TRACE
1	80	LSHS	85	2839	437
2	50	LSHS	85	2148	453
3	250	LSHS	85	2977	480
4	250	ASPHALT	120	4752	779
5	80	LSHS	70	1505	251

Electric Cost considers continuous operation at max. differential; except in Case 5, where annual mean average differential is considered.

Energy Cost Economics - Pipe Tracing

Steam Tracing Energy Cost is High due to:

1. High Tracer Output (Flow / No-Flow)
2. Steam Trap Energy.
3. Radiation Loss.
4. Steam Leaks.

Energy Cost - Pipe Tracing

Case 1 (Yard Pipe)

Cost Rs. Lakh

	<u>Steam</u>	<u>Auto-Trace</u>
1. Tracer- Pipe/Strip	19.3	4.4
2. Steam Trap Energy	4.0	
3. Radiation Loss	4.2	
4. Steam Leaks	<u>8.1</u>	<u>4.4</u>
	35.5	
<u>Less: Condensate Recovery</u>	<u>7.1</u>	<u>4.4</u>
Total	28.4	4.4

Energy Cost Economics - Pipe Tracing

- Steam Tracing Energy Cost per year is equal to 100% of the System Installation Cost.
- Auto-Trace Energy Cost per year is equal to 25% of the System Installation Cost.

When Steam Tracing is NOT Preferred?

1. Dirty, Noisy, Leaks . . .
2. NOT Easy to Modify, Repair, Maintain.
3. Time Loss in Design & Engineer.
4. Time Loss to Install & Commission.
5. When additional Boiler Capacity needed.

When Steam Tracing is Preferred?

1. To remove Line Plugs departmentally.

2. By Perception:

- Steam is Plenty, Cheap, Free.
- Very Low Installation Cost.
- Steam being a cheaper Energy, therefore cheaper in operating Energy Cost.

Why Steam Tracing Should NOT be the Choice?

1. Very Expensive in Operating Energy Cost.
2. Expensive to Repair, Replace & Maintain.
3. Expensive to Install.
4. Pollutes Environment.
5. Leaks: damage Insulation; Corrodes Pipe.
6. Frequent Plant Pipe Plugging.
7. Fluid Spoilage: Hot Spot; Colour Stains; Carbonization

Why Auto-Trace is Preferred?

1. Neat & Clean
2. Safe & Reliable Electrical System.
3. Energy Efficient.
4. Easy & Quick to Design and Install.
5. No Maintenance.
6. 40 years LIFE tested. 15 years Proven.

When Auto-Trace is NOT preferred?

1. Plant Plugs due to: Bare Valves, Flanges & Instruments.
2. Wet Insulation.
3. Tracer subjected to Over Temperature Exposure.
4. Accidental Power Switch-Off.

Installation Cost Economics - Tank Tracing

Steam Tracing is 3 to 4 Times Expensive
when compared to Auto-Trace.

HOW MUCH? and WHY!

Installation Cost Economics - Tank Tracing

CASE	deg.C	FLUID	D x H	RS./SQ.MT/	OF SURFACE
				STEAM	AUTO-TRACE
6	70	LSHS	30 x 20	2624	779
7	70	LSHS	11 x 12	2611	680

Cost are Exclusive of Thermal Insulation, and Boiler.

Installed Cost -Tank Tracing

Case 6

Cost Rs. Lakh

	<u>Steam</u>	<u>Auto-Trace</u>
1. Tracer- Coil / Strip	21.0	51.1
2. Inlet & Temp. Regulator.	35.8	
3. Steam Trap Assembly.	12.7	
4. Pressure Reduction Station	5.4	
5. Distribution Steam/Electric	72.2	2.7
6. Condensate Return	<u>42.1</u>	<u>2.4</u>
Total	189.2	56.2

Energy Cost Economics - Tank Tracing

CASE	deg.C	FLUID	D x H	RS./YR./SQ.MT OF SURFACE	
				STEAM	AUTO-TRACE
6	70	LSHS	30 x 20	2489	461
7	70	LSHS	11 x 12	776	254

Energy Cost - Tank Tracing

Case 6

Cost Rs. Lakh

Steam Auto-Trace

1. Tracer- Coil / Strip	50.6	33.2
2. Steam Trap Energy	5.6	
3. Radiation Loss	101.5	
4. Steam Leaks	61.5	
5. Control Error	<u>5.1</u>	<u>33.2</u>
	224.4	
Less: Condensate Recovery	<u>44.9</u>	<u>33.2</u>
Total	179.5	33.2

When Steam Coil Heating is Preferred?

1. Thermal Insulation is NOT used.
2. Quick Heatup from Cold is needed.
3. Perception
 - Steam in Plenty, Cheap or Free.
 - Cheap to Install.

When Steam Coil Tracing is NOT Preferred?

1. Coil Installation in an Operating Tank.
2. Steam is not Available.
3. Industry Experience:
 - 'Boil Over' accidents.
 - Steam Coil Leaks into Fluid.
 - Fluid Leak into Condensate System.

Why Steam Coil Tank Tracing is NOT Preferred?

1. Expensive on Energy.
2. Expensive to Install.
3. Expensive to Repair & Replace.
4. Over heats and Spoils the Fluid.
5. Contaminates Boiler Feed Water.