

Institute of Petroleum Refining and Petrochemistry

REFINERY PROCESS AUDIT

2020

Process audit objective

Improvement of the current manufacturing process by conducting a process audit, which is an optimal solution for reducing enterprise expenses and increasing its profit without a major process overhaul

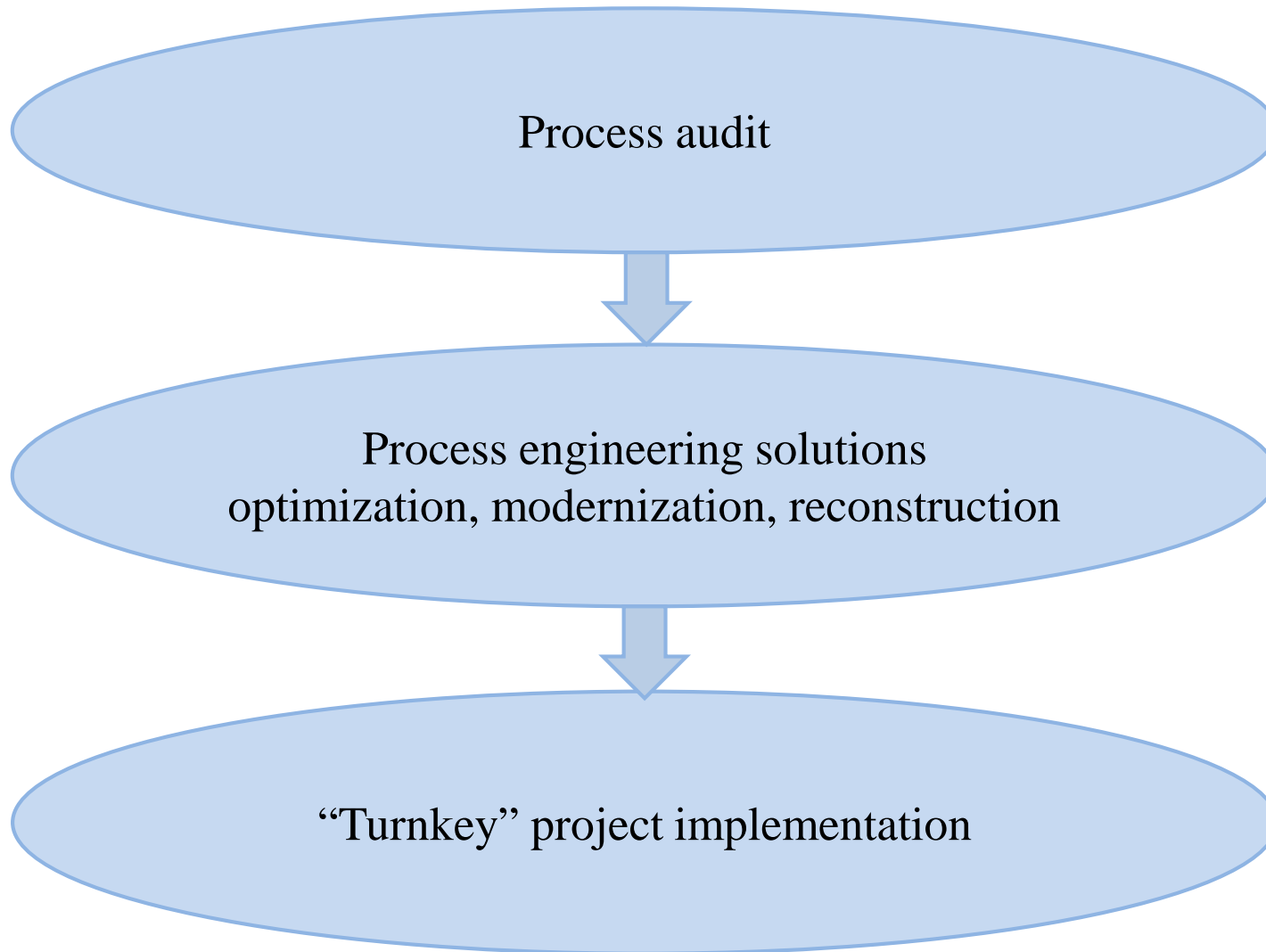
A process audit includes:

- a qualified analysis and check of the operating mode of individual assemblies and processes
- processes computational modeling
- material and energy balance optimization
- process and economical effect calculation

Reasons for the process audit:

- improved production efficiency
- “bottle necks” detection
- low efficiency
- energy cost optimization
- violations of applicable industrial safety rules
- increase in target product yield
- non-compliance with the target product quality values
- failure to reach the set process parameters by a new unit

Increasing current production efficiency



Process audit stages

1. Obtaining project technical documentation
2. Expert examination of the facility to determine its current condition
3. Processing of the obtained information by subject matter experts
4. Determining optimal solutions for improving the facility operation
5. Study of suggested solutions feasibility
6. Selection of appropriate process engineering solutions by the Client
7. Project implementation

Expert examination of the facility to determine its current condition

- in terms of selected technology efficiency
- in terms of provided functionality compliance with the released production qualitative and quantitative parameters
- in terms of project solution quality
- in terms of the equipment used
- in terms of efficiency of agents, catalysts, additives
- in terms of energy efficiency
- in terms of instrumentation and control

Implemented projects

Tar deasphalting unit (300 thous. tons/year)

Joint-Stock Oil Company Bashneft- Ufaneftekhim, PJSC



Process audit result

- Productivity is higher by 45 %
- Target product yield is higher by 3-4 %
- Specific power consumption is 40 % lower (incl. 5,7-fold reduction of steam consumption)
- Reduction of hydrogen sulfide contents in the circulating solvent from 2 % to 0,01 %
- Reduction of plant's steel intensity by up to 10 %
- Replacement of reciprocal compressors with ejector-type compressors



Bitumen unit

Gazpromneft – Moscow Oil Refinery, JSC

- Productivity increased from 750 thous. tons/year to 1.7 mln. tons/year
- Polluting agents emission related to tar production reduced by 75 %
- Industrial emissions impact upon atmospheric air reduced by 4 %



AT-2 unit reconstruction for visbreaking process purposes (800 thous. tons/year)

LUKOIL-Ukhtaneftepererabotka, LLC

Advantages:

- Reduction of capital costs by 30-40 %
- Advanced oil refinery
- Improved product turnover
- Finding a tar recycling solution without the need to build a new unit



Lukoil-Volgogradneftepererabotka, OJSC



Process audit result

- Productivity increased from 80 thous. tons/year to 280 mln. tons/year
- Two-fold reduction of process integration costs
- Power consumption reduced by more than 1.5 times



Treatment facilities (3.5 thous. m³/h)

Reconstruction of biological treatment facilities (BTF) at Joint-Stock Oil Company Bashneft- Ufaneftekhim, PJSC



- Productivity increased from 2000 m³/hour to 3500 m³/hour
- Treated water maximum return to production is up to 100 %
- Modern solutions for salt removal and selective heavy metal removal reaching normative values of maximum permissible concentration
- Reaching normative values for maximum permissible concentration of the fish farm without an additional treatment unit
- Oil products concentration in water released into the river decreased from 0.15 mg/l (exceeding the maximum permissible concentration) to 0.05 mg/l (below maximum permissible concentration limit)