Project schedule

Hydrogen Cyanide and AMS Plant Replacement

Group 06

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Deliverables

A new chemical plant that manufactures hydrogen cyanide and ammonia sulphate with higher sustainability will be ready to run in the selected site by the work done.

Task description

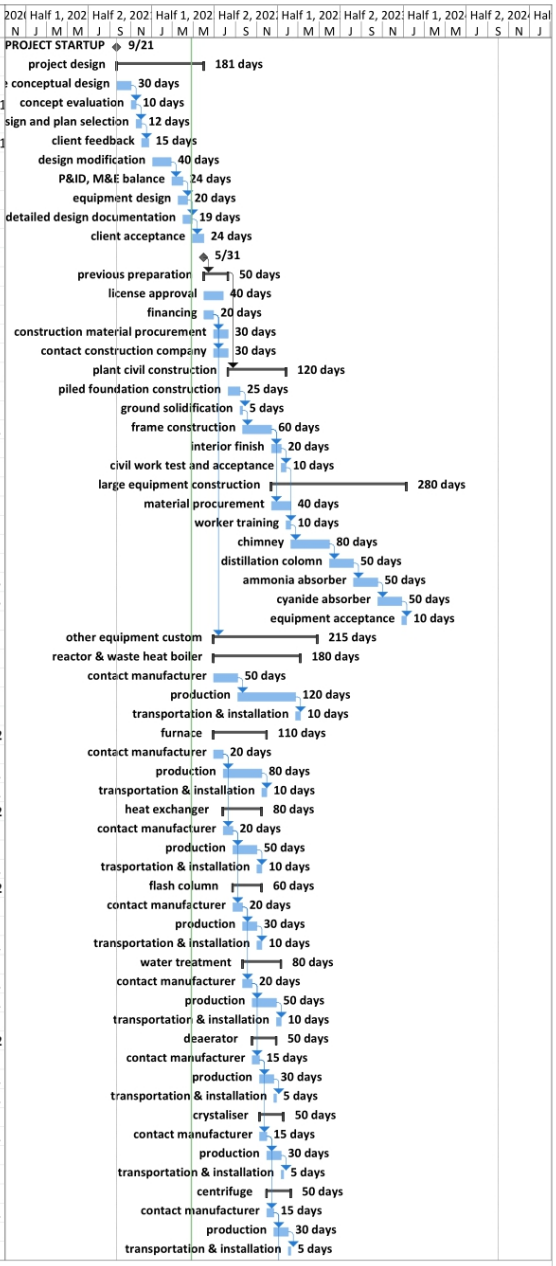
To achieve the client's requirement, the whole project was divided into three stages. The first stage was project design. At that stage, the entrusted group began with proposing three conceptual designs with different production process. Then, based on client's feedback and comprehensive assessment, one of the concepts was modified and proceeded to detailed design. The relative work included P&ID, material balance, equipment design, plant layout and reports (functional design specification, safety, economic analysis, environmental impact and sustainability assessment, design proposal) were finished subsequently. If the project is successfully approved by the client, the next stage, construction work, can be started as planned. Construction stage will be divided into six parts, including previous preparation, plant civil construction, large equipment construction, other equipment custom, pipeline, control system. Considering their dependencies, some of them will be conducted in succession, but some will be conducted simultaneously to shorten the duration. To follow local labour law, weekends are not included in the duration. The construction work is expected to be completed on May 14th, 2024. The final stage is mainly for commissioning and employee training. Additionally, recruitment work will be started in the mid of the project.

Project duration

The project was initiated on September 21st, 2021 and is expected to be accomplished on October 1st, 2024.

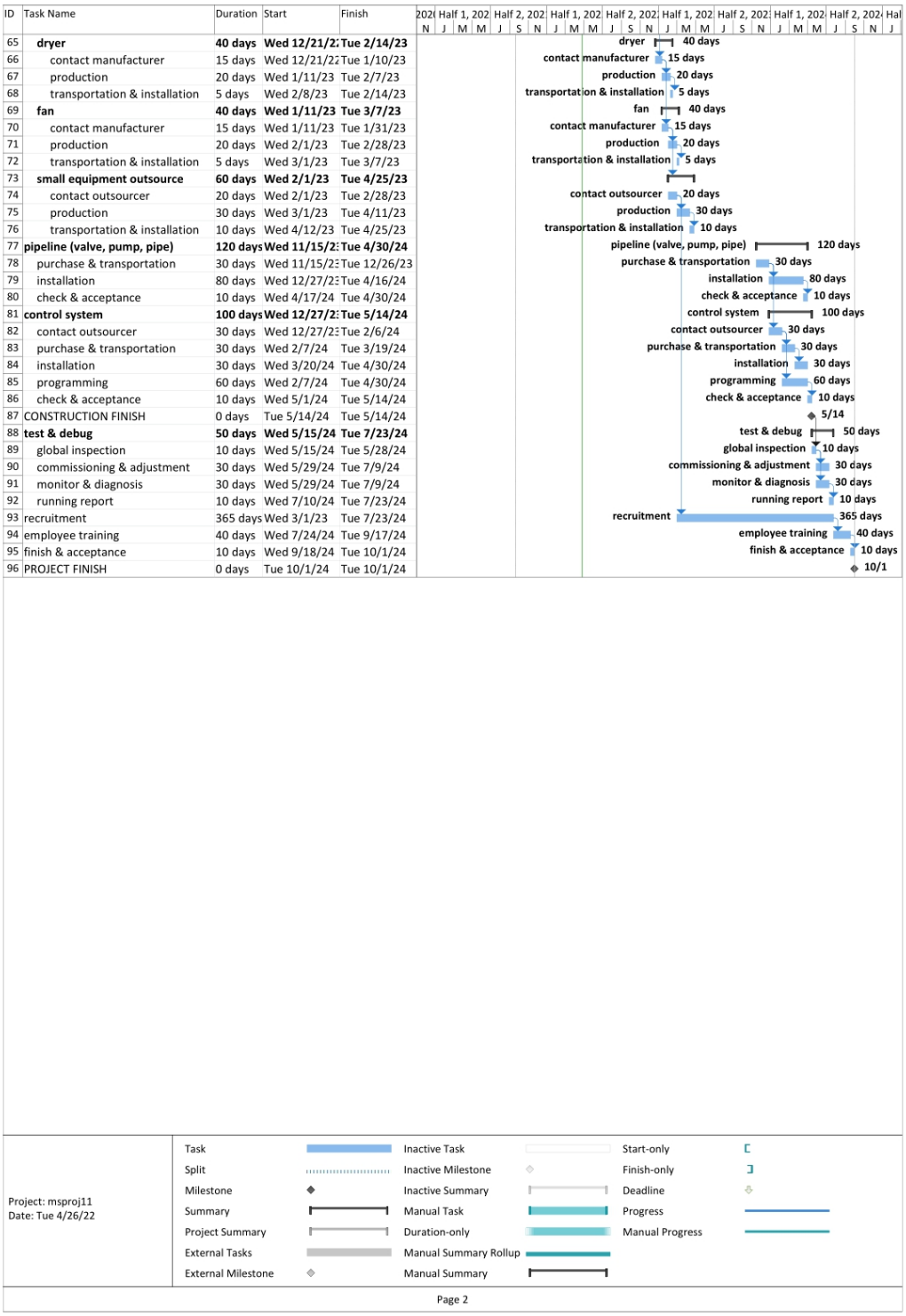
Gantt chart

ID	Task Name	Duration	Start	Finish
1	PROJECT STARTUP	0 days	Tue 9/21/21	Tue 9/21/21
2	**project design**	**181 days**	**Tue 9/21/21**	**Tue 5/31/22**
3	three conceptual design	30 days	Tue 9/21/21	Mon 11/1/21
4	concept evaluation	10 days	Tue 11/2/21	Mon 11/15/21
5	design and plan selection	12 days	Tue 11/16/21	Wed 12/1/21
6	client feedback	15 days	Thu 12/2/21	Wed 12/22/21
7	design modification	40 days	Mon 1/3/22	Fri 2/25/22
8	P&ID, M&E balance	24 days	Mon 2/28/22	Thu 3/31/22
9	equipment design	20 days	Fri 3/18/22	Thu 4/14/22
10	detailed design documentation	19 days	Fri 4/1/22	Wed 4/27/22
11	client acceptance	24 days	Thu 4/28/22	Tue 5/31/22
12	DESIGN FINISH	0 days	Tue 5/31/22	Tue 5/31/22
13	**previous preparation**	**50 days**	**Wed 6/1/22**	**Tue 8/9/22**
14	license approval	40 days	Wed 6/1/22	Tue 7/26/22
15	financing	20 days	Wed 6/1/22	Tue 6/28/22
16	construction material procuremer	30 days	Wed 6/29/22	Tue 8/9/22
17	contact construction company	30 days	Wed 6/29/22	Tue 8/9/22
18	**plant civil construction**	**120 days**	**Wed 8/10/22**	**Tue 1/24/23**
19	piled foundation construction	25 days	Wed 8/10/22	Tue 9/13/22
20	ground solidification	5 days	Wed 9/14/22	Tue 9/20/22
21	frame construction	60 days	Wed 9/21/22	Tue 12/13/22
22	interior finish	20 days	Wed 12/14/22	Tue 1/10/23
23	civil work test and acceptance	10 days	Wed 1/11/23	Tue 1/24/23
24	**large equipment construction**	**280 days**	**Wed 12/14/2**	**Tue 1/9/24**
25	material procurement	40 days	Wed 12/14/22	Tue 2/7/23
26	worker training	10 days	Wed 1/25/23	Tue 2/7/23
27	chimney	80 days	Wed 2/8/23	Tue 5/30/23
28	distillation colomn	50 days	Wed 5/31/23	Tue 8/8/23
29	ammonia absorber	50 days	Wed 8/9/23	Tue 10/17/23
30	cyanide absorber	50 days	Wed 10/18/23	Tue 12/26/23
31	equipment acceptance	10 days	Wed 12/27/23	Tue 1/9/24
32	**other equipment custom**	**215 days**	**Wed 6/29/22**	**Tue 4/25/23**
33	**reactor & waste heat boiler**	**180 days**	**Wed 6/29/22**	**Tue 3/7/23**
34	contact manufacturer	50 days	Wed 6/29/22	Tue 9/6/22
35	production	120 days	Wed 9/7/22	Tue 2/21/23
36	transportation & installation	10 days	Wed 2/22/23	Tue 3/7/23
37	**furnace**	**110 days**	**Wed 6/29/22**	**Tue 11/29/22**
38	contact manufacturer	20 days	Wed 6/29/22	Tue 7/26/22
39	production	80 days	Wed 7/27/22	Tue 11/15/22
40	transportation & installation	10 days	Wed 11/16/22	Tue 11/29/22
41	**heat exchanger**	**80 days**	**Wed 7/27/22**	**Tue 11/15/22**
42	contact manufacturer	20 days	Wed 7/27/22	Tue 8/23/22
43	production	50 days	Wed 8/24/22	Tue 11/1/22
44	trasportation & installation	10 days	Wed 11/2/22	Tue 11/15/22
45	**flash column**	**60 days**	**Wed 8/24/22**	**Tue 11/15/22**
46	contact manufacturer	20 days	Wed 8/24/22	Tue 9/20/22
47	production	30 days	Wed 9/21/22	Tue 11/1/22
48	transportation & installation	10 days	Wed 11/2/22	Tue 11/15/22
49	**water treatment**	**80 days**	**Wed 9/21/22**	**Tue 1/10/23**
50	contact manufacturer	20 days	Wed 9/21/22	Tue 10/18/22
51	production	50 days	Wed 10/19/22	Tue 12/27/22
52	transportation & installation	10 days	Wed 12/28/22	Tue 1/10/23
53	**deaerator**	**50 days**	**Wed 10/19/2**	**Tue 12/27/22**
54	contact manufacturer	15 days	Wed 10/19/22	Tue 11/8/22
55	production	30 days	Wed 11/9/22	Tue 12/20/22
56	transportation & installation	5 days	Wed 12/21/22	Tue 12/27/22
57	**crystaliser**	**50 days**	**Wed 11/9/22**	**Tue 1/17/23**
58	contact manufacturer	15 days	Wed 11/9/22	Tue 11/29/22
59	production	30 days	Wed 11/30/22	Tue 1/10/23
60	transportation & installation	5 days	Wed 1/11/23	Tue 1/17/23
61	**centrifuge**	**50 days**	**Wed 11/30/2**	**Tue 2/7/23**
62	contact manufacturer	15 days	Wed 11/30/22	Tue 12/20/22
63	production	30 days	Wed 12/21/22	Tue 1/31/23
64	transportation & installation	5 days	Wed 2/1/23	Tue 2/7/23



Project: msproj11
Date: Tue 4/26/22

Task	Inactive Task	Start-only	
Split	Inactive Milestone	Finish-only	
Milestone	Inactive Summary	Deadline	
Summary	Manual Task	Progress	
Project Summary	Duration-only	Manual Progress	
External Tasks	Manual Summary Rollup		
External Milestone	Manual Summary		



ID	Task Name	Duration	Start	Finish
65	**dryer**	**40 days**	**Wed 12/21/22**	**Tue 2/14/23**
66	contact manufacturer	15 days	Wed 12/21/22	Tue 1/10/23
67	production	20 days	Wed 1/11/23	Tue 2/7/23
68	transportation & installation	5 days	Wed 2/8/23	Tue 2/14/23
69	**fan**	**40 days**	**Wed 1/11/23**	**Tue 3/7/23**
70	contact manufacturer	15 days	Wed 1/11/23	Tue 1/31/23
71	production	20 days	Wed 2/1/23	Tue 2/28/23
72	transportation & installation	5 days	Wed 3/1/23	Tue 3/7/23
73	**small equipment outsource**	**60 days**	**Wed 2/1/23**	**Tue 4/25/23**
74	contact outsourcer	20 days	Wed 2/1/23	Tue 2/28/23
75	production	30 days	Wed 3/1/23	Tue 4/11/23
76	transportation & installation	10 days	Wed 4/12/23	Tue 4/25/23
77	**pipeline (valve, pump, pipe)**	**120 days**	**Wed 11/15/23**	**Tue 4/30/24**
78	purchase & transportation	30 days	Wed 11/15/23	Tue 12/26/23
79	installation	80 days	Wed 12/27/23	Tue 4/16/24
80	check & acceptance	10 days	Wed 4/17/24	Tue 4/30/24
81	**control system**	**100 days**	**Wed 12/27/23**	**Tue 5/14/24**
82	contact outsourcer	30 days	Wed 12/27/23	Tue 2/6/24
83	purchase & transportation	30 days	Wed 2/7/24	Tue 3/19/24
84	installation	30 days	Wed 3/20/24	Tue 4/30/24
85	programming	60 days	Wed 2/7/24	Tue 4/30/24
86	check & acceptance	10 days	Wed 5/1/24	Tue 5/14/24
87	CONSTRUCTION FINISH	0 days	Tue 5/14/24	Tue 5/14/24
88	**test & debug**	**50 days**	**Wed 5/15/24**	**Tue 7/23/24**
89	global inspection	10 days	Wed 5/15/24	Tue 5/28/24
90	commissioning & adjustment	30 days	Wed 5/29/24	Tue 7/9/24
91	monitor & diagnosis	30 days	Wed 5/29/24	Tue 7/9/24
92	running report	10 days	Wed 7/10/24	Tue 7/23/24
93	recruitment	365 days	Wed 3/1/23	Tue 7/23/24
94	employee training	40 days	Wed 7/24/24	Tue 9/17/24
95	finish & acceptance	10 days	Wed 9/18/24	Tue 10/1/24
96	PROJECT FINISH	0 days	Tue 10/1/24	Tue 10/1/24

The Gantt chart was created by Microsoft Project. This Gantt chart adopted standard calendar and automatically skipped the weekends. Each black frame represented a certain part of work. Additionally, arrows between two tasks represented their dependencies.

Schedule description

Since the project design stage has taken place already, no explanation for the arrangement of it will be made.

For the previous preparation, a few licenses need to be obtained from the British government. Normally 20 workdays are needed for license approval based on the efficiency of British government. Thus, 40 days will be sufficient for licenses. Financing means raising money, which is very important for a project. Civil work will be delivered to professional construction companies, it will take about 30 days to find and communicate with those companies. Meanwhile, Construction material procurement will be conducted.

For plant civil construction, expected duration is supposed to be 120 days, but it should be confirmed by the outsourcer. The original foundation of the site is soft, so about 30 days will be needed for the piled foundation construction and ground solidification. The civil construction of this plant is mainly bearing structure, which will not consume too more time. Interior finish means detailed construction inside the frame. Test and acceptance work may not take 10 days, it can be regard as flex time for this part.

For large equipment which will directly constructed on the spot, the duration is supposed to be 280 workdays. The material procurement will be started when civil frame construction is finished, because material storage space will be available at that moment. Because the civil workers may not have experience in chemical equipment construction, a 10-day training will be arranged for them. Taking high labour fee in UK into consideration, equipment constructions will not be conducted simultaneously. The construction duration of each equipment is estimated by its dimension and construction difficulty. The 10-day acceptance can not only be used for checking but also flex time.

For some important equipment that needs to be customized by professional manufacturer, the work will be started after financing. It will take about 50 workdays to find and communicate with reactor manufacturer. Normally, the customization of reactor will take about half year, so 120 workdays are reasonable. The furnace customization work will be initiated in parallel with reactor. A dedicated team will be responsible for all outsourcer contacting work. Taking labour cost into consideration, the contacting work for other equipment except reactor will be conducted successively. For example, the contacting work of heat exchanger will be started when the contacting work of furnace is finished. And no conflict in the production, transportation and installation work between each equipment, so their durations are independently considered.

The contacting, production, transportation and installation work for each equipment is considered based on its dimension and production difficulty. The small equipment outsource part is for those tanks and mixers, and they may not take such a 60-day long duration. This 60-day duration can be regarded as flex time.

For pipeline part, the duration is supposed to be 120 days. The pipe (include pipe, valve, pump) installation work will be started when onsite construction work is finished. And the material procurement will be started 30 workdays before installation. The duration for installation is estimated based on total pipe length. The check &

acceptance time can also be regarded as flex time.

For control system, the duration is supposed to be 100 days. The dedicated team will start finding and contacting professional outsourcer after pipe material procurement. Then, the procurement and programming work will be initiated simultaneously. The actual time duration should be confirmed with the outsourcer.

Once control system is done, the construction stage is finished. Then, it comes to test & debug part. Firstly, a global inspection is needed before commissioning. The duration for global inspection is set as 10 workdays, but it is very flexible. Secondly, a 30-workday commissioning will be conducted. Meanwhile, the team will continuously monitor the running condition, and complete a running report after commissioning. After that, the final version of P&ID and relative document should be fixed.

The recruitment will be initiated in the mid of project and stopped when testing & debug part is done. To ensure safe and effective operating of the plant, a two-month training will be arranged for all employees.

The whole project is expected to be accomplished on October 1st , 2024. The client's predetermined time to start the plant is year 2025. Therefore, at least three extra months can be regarded as flex time.