A System Design and Application of Matching Qualification and Quantity of Purchasing Materials in Steel Enterprises

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Abstract. This paper designs and implements a system based on .net programming technology to match the qualification and quantity of purchased goods in steel enterprises. The system consists of five modules: measurement module, sampling module, inspection and verification module, logistics matching module and data storage. The metering module is used for measuring the gross weight and tare weight of the vehicles entering the factory, and obtaining the weight data of the incoming materials; the function of the sampling module is mainly to sample the materials transported by the incoming vehicles, and send them to the sample after sample preparation. The test module is mainly used for testing and analyzing the sample of the incoming materials, and obtaining the physical and chemical test results of the materials; the logistics matching module matches the weight data of the purchased materials into the factory and the test data, thereby matching the quality of the materials. Combined with quantity; data storage, a large amount of data for storage analysis and matching for quality and quantity matching. The design can cancel the manually entered paper account, use the computer system for data integration, and the staff can more easily and quickly complete the collection and transmission of various data of the entry materials, shortening the work of matching the quality and quantity of the incoming materials. Time, greatly improving work efficiency, reducing work intensity, reducing the chance of human error, making production activities more smoothly.

Introduction

When purchasing materials into the factory, the iron and steel enterprises must first measure the gross weight of each vehicle by the metrology department. After the gross weight of the vehicle is measured, it needs to be sampled at the sampling station of the inspection department, and then discharged to the stockyard. After the unloading, then measure the tare weight of the vehicle and complete the logistics flow of the whole material into the factory. For iron and steel enterprises, a large part of the imported materials are used for raw materials for iron making, mainly coal, coke and ore. The most important data for the incoming materials is the weight[1]. The gross weight of the incoming vehicles and the tare weight are only the original weight of the incoming materials. There is a certain amount of water in coal, coke and ore. The weight of water in the material needs to be deducted from the original weight. This requires matching the original weight with the results of the inspection analysis to obtain the weight of the water contained in the material. At present, the quality matching of materials entering the factory in the iron and steel enterprises is mainly based on the measurement data provided by the measurement department every day. The logistics department selects the data of the same supplier of the same material every day from the data provided by the measurement department, and obtains the same day. A total amount of materials entering the plant, and then the laboratory will inform the logistics department of the inspection results of various materials sampled at the factory, and the logistics department will obtain the final matching relationship between quality and quantity. These tasks are carried out by the staff of each department in the EXCEL spreadsheet and then sent to other departments by mail. The main disadvantages of this method are: (1) the entire flow efficiency of the data will be very low, often taking a few days to get results; (2) data in various transfer summary operations are prone to human error, affecting the

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correctness of the data; (3) data sources involve multiple departments and easy to produce. The problem of inconsistent data leads to the inconsistency between departments; (4) The degree of sharing of business information is weak, since most procurement operations and negotiations with suppliers are completed by telephone, there is no necessary written records, procurement information and supplier information. Basically, each business person has his own control and the information is not shared. The impact is that the traceability of the business is weak. Once the problem occurs, it is difficult to investigate. At the same time, the execution of the procurement task depends to a large extent on people, and the change of the position of the staff has a great impact on the business.

Overall design

In view of this, in order to overcome the problem mentioned above of insufficient timeliness, accuracy and traceability of data information flow in the process of matching the quality and quantity of purchased materials into the factory, a system[2] and method that match qualification for purchasing and entering the factory for steel enterprises is provided. The method integrates the measurement data, the sampling station sampling data, and the inspection result data by a computer system to correlate the weight of the same material of the same supplier with the inspection result every day, thereby realizing the matching of the quality and quantity of the purchased materials. And upload the data to the enterprise's ERP system[3]. When the materials enter the factory, the metrology department first measures[12] the gross weight of the incoming trains, records the number of the train, the name of the supplier, the name of the incoming materials, the gross weight, the gross weight measurement time, etc., and then the vehicle can sample at the sampling station. At the time of sampling, the sampling station performs sampling and batch operations according to the principle of the same supplier of the same supplier on the same day, and the materials are combined into one batch and a unique sampling code is prepared for each batch. After the sampling is completed, the material can be unloaded at the stockyard, and then the factory metering is performed to record the data such as the tare and time when leaving the factory. The operator of the logistics department only needs to select the information of the incoming materials of a vehicle in the system[4]. The system can calculate the weight of the materials that the same materials enter the factory every day according to the tare measurement time of the vehicle.The tare measurement time is calculated on the total weight of the material entering the factory on the same day, and finally the test result information is obtained in the test data according to the sampling code of the vehicle, thereby matching the quality and quantity of the incoming materials in the day. The whole process does not need to send emails and ledgers to exchange data with each department. It only needs simple selection to complete the operation, avoiding the mistakes that may be generated by manual entry. The data greatly reduced flow in the system is faster and the final result is obtained. Unified data between departments to avoid inconsistencies in data across departments.The main functions of the material storage management assistant system: First, build a material storage management assistant system in the internal network, establish a host server, realize data redundancy, and ensure data security; second, use modern information technology and material storage management to combine The material management and control is closed, and the material storage management auxiliary system is reserved[5]. It is expected that it will be convenient to digitize the materials and improve the accuracy of digital management. The third is to introduce calculations. It also uses the analysis method to establish files for equipment ontology problems and quality events in line faults, conduct quality sampling during material reception, improve the quality of human resources, and satisfy the company's “source traceability, process controllable and accurate”. Docking, improved the level of material management, and improved the application value of the material storage management assistance system.

The purchase[6] of the incoming material transportation vehicle is measured by the factory measurement module to obtain the data related with weight; the sampling module performs the sampling operation to obtain the sampling code of the material; the physical property and chemical composition of the incoming materials are inspected by the inspection and testing module. The test result is obtained; the logistics matching module matches the measured quantity data with the test data to obtain the final result[7]; the state setting module sets the state of the whole process (gross

weight measurement, sampling, unloading, tare measurement, etc.). The authority control module controls the authority that each department can view and manipulate data, and the data storage module stores data. This paper designs a system that matches the qualifications and quantities of the purchased materials. The system structure is shown in Fig. 1:

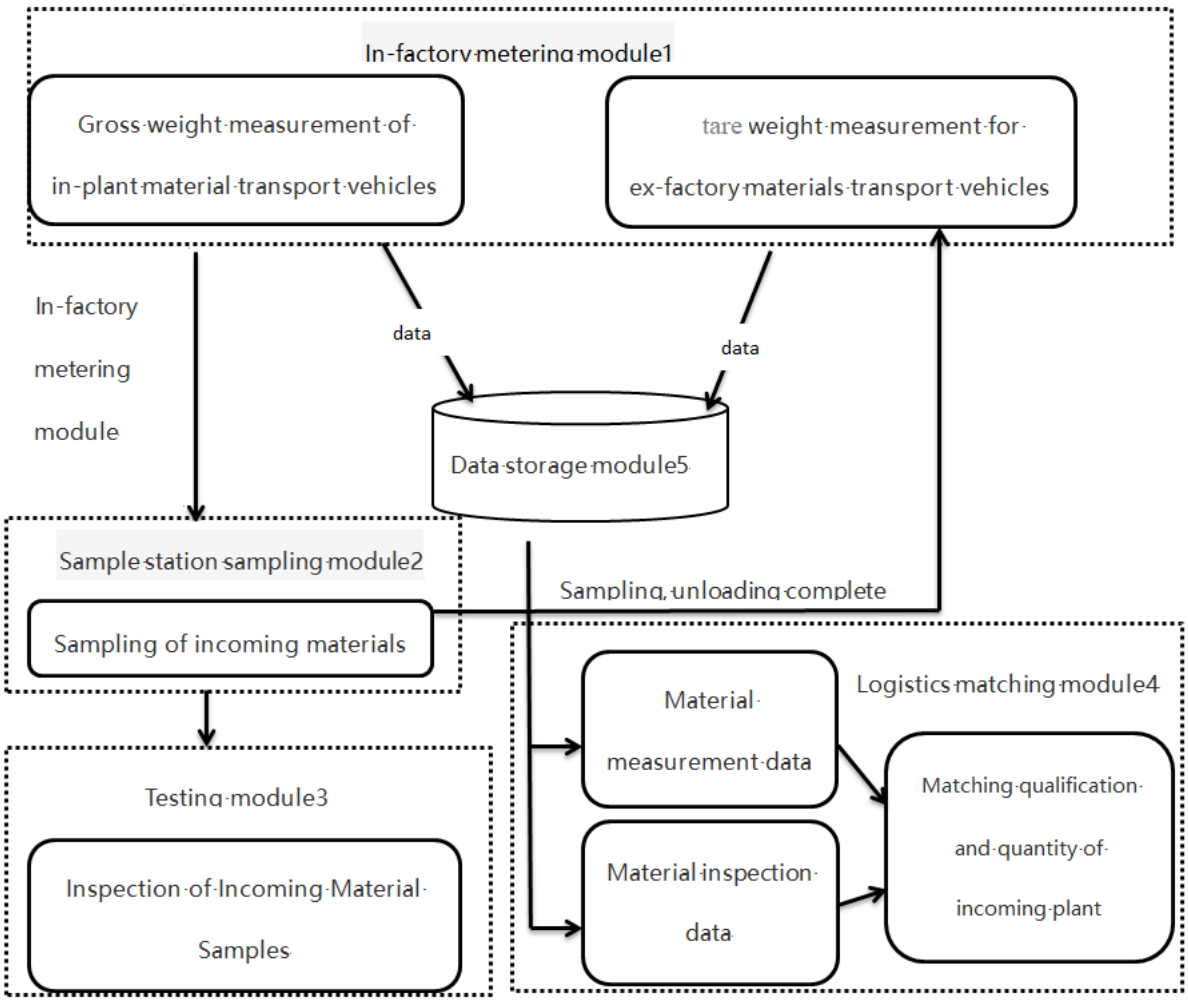


Figure 1. System structure

Matching method of qualification and quantity of entry materials:

1) When the incoming materials entering the factory, the gross weight of the transport vehicle is first measured and the vehicle number, supplier name, incoming material name, gross weight and gross weight measurement time of the vehicle are obtained ;

2) The sampling station performs sampling operations on the materials transported into the factory;

3) Unloading the goods at the material yard, and then transporting the vehicle to the factory for tare measurement, and obtaining the tare and tare time of the factory;

4) The logistics department calculates the weight data of the materials entering the factory every day according to the tare weight of the vehicle, and then carries out the batch of materials for the same day according to the principle of the same material of the same supplier, and then the materials of each batch and the same day. The results of this kind of material test are matched.

The system and method described in this paper are applied to the matching of the quality and quantity of the purchased materials, so that the weight of the incoming materials and the test results can be accurately matched. The staff of each department can complete the data of the quality and quantity of the incoming materials through the system[8]. Transmission, unified data, eliminating the cumbersome data check and transfer work, only need simple operation to match the weight and quality of various materials in each day, and provide accurate data support for subsequent

procurement and settlement work. It is convenient for the staff to do the settlement work.

The beneficial effect of the system is that the manually entered paper accounts are cancelled, and the computer system is used for data integration. The staff can more easily and quickly complete the collection and transmission of various data of the entry materials, and shorten the qualification of the incoming materials. The matching work time greatly improves the work efficiency[9], reduces the work intensity, reduces the error rate of human operation, and makes the production activities more smoothly.

Implementation

The following is how to match the weight and quality of the original fuel purchased into the plant one day as an example to introduce the material quality matching process in the system. The final measurement results of the metering system are shown in Fig. 2. The test results are shown in Fig. 3. The matching results of mass and quantity are shown in Fig. 4:

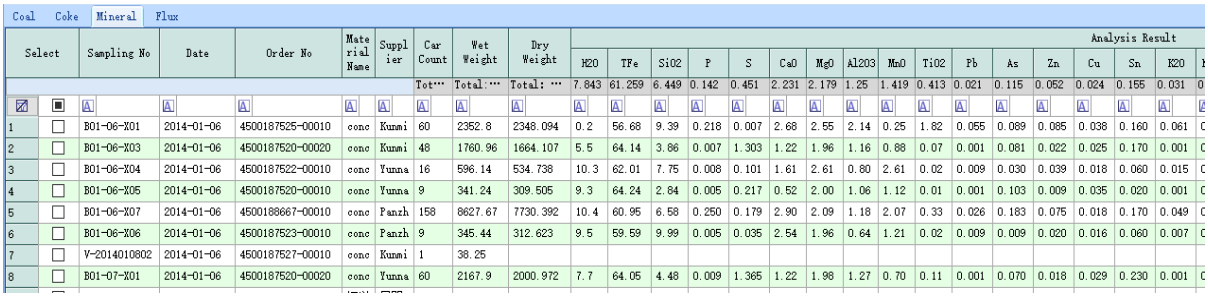
Weight Data Query

	Card No	Car No	Material Name	Weight Data		
				Gross Weight	Tare Weight	Net Weight
1		云F60451	Iron concentrate(Gudong)	88.02	25.31	62.71
2	0003393	云A95035	Iron concentrate(Gudong)	26.52	14.31	12.21
3	0000755	云AB1762	Iron concentrate(Wuji)	28.54	19.15	9.39
4	0003418	云F55239	Iron concentrate(Wuji)	99.64	22.36	77.28
5	0000886	云A96951	Iron concentrate(Gudong)	96.04	20.4	75.64
6	0000348	云AC6525	Iron concentrate(Zhenxing)	108.52	21.24	87.28
7	0002567	云AE2126	Iron concentrate(Gudong)	47.44	13.14	34.3
8	0003312	云AC6529	Iron concentrate(Wuji)	58.69	19.9	38.79
9	0002473	云D79547	Iron concentrate(Zhenxing)	51.16	19.02	32.14
Total:363				24768.81Ton	6577.87Ton	18190.94Ton

Figure 2. Data measuring

	Sampleing No	Sample Preparation No	H2O	TFE	SIO2	CAO	MGO	AL2O3	MNO	P	S	TIO2	PB	ASN	ZN	CU	SN	K2O	NA2O
1	B12-27-X06	B12-27-H11	9.00	63.92	3.70	1.09	2.37	1.00	0.85	0.005	0.145	0.01	0.001	0.073	0.015	0.038	0.060	0.001	0.00
2	B12-27-X04	B12-27-H15	9.20	63.95	4.18	1.38	2.12	1.13	0.97	0.007	1.020	0.08	0.001	0.091	0.014	0.026	0.160	0.001	0.00
3	B12-27-X02	B12-27-H13	9.90	63.76	2.97	0.57	3.28	1.06	1.17	0.004	0.211	0.01	0.001	0.109	0.010	0.030	0.030	0.001	0.00
4	B12-27-X03	B12-27-H12	11.10	62.59	7.66	1.51	2.13	0.61	1.99	0.005	0.076	0.02	0.011	0.013	0.030	0.015	0.050	0.008	0.00
5	B12-27-X05	B12-27-H17	9.30	60.51	8.96	2.27	1.86	0.52	0.96	0.004	0.057	0.01	0.008	0.008	0.015	0.018	0.050	0.010	0.00
6	B12-27-X01	B12-27-H10	0.50	56.10	8.99	2.64	3.04	1.97	0.23	0.119	0.024	2.74	0.112	0.059	0.107	0.029	0.161	0.087	0.00
7	B12-28-X08	B12-28-H29	10.90	53.68	11.40	4.14	1.70	1.87	0.15	0.286	0.177	0.13	0.001	0.021	0.023	0.027	0.530	0.051	0.00
8	B12-29-X08	B12-29-H30	17.00	54.07	10.05	4.50	1.73	1.80	0.01	0.327	0.158	0.11	0.003	0.005	0.028	0.001	0.500	0.061	0.00
9	B12-28-X07	B12-28-H22	12.40	45.25	14.78	0.67	0.53	1.26	11.69	1.036	0.010	0.15	0.008	0.052	0.038	0.026	0.310	0.009	0.00
10	B12-29-X07	B12-29-H34	12.10	44.67	15.07	0.63	0.49	1.40	11.15	1.016	0.009	0.16	0.008	0.052	0.037	0.018	0.330	0.007	0.00
11	B12-28-X02	B12-28-H23	9.00	62.50	4.04	0.77	3.40	1.00	0.90	0.008	0.133	0.01	0.002	0.084	0.011	0.024	0.050	0.001	0.00
12	B12-29-X02	B12-29-H33	9.00	63.37	3.39	0.98	2.62	1.02	0.92	0.006	0.135	0.01	0.003	0.101	0.015	0.025	0.030	0.001	0.00
13	B12-28-X01	B12-28-H21	9.10	63.66	4.19	1.44	2.16	1.14	0.96	0.012	1.058	0.08	0.001	0.097	0.015	0.024	0.170	0.001	0.00
14	B12-29-X01	B12-29-H31	8.60	63.37	4.60	1.56	2.16	1.20	0.96	0.011	1.359	0.09	0.001	0.112	0.018	0.023	0.230	0.001	0.00
15	B12-28-X05	B12-28-H26	9.90	63.95	2.86	0.57	2.67	1.07	1.05	0.004	0.116	0.01	0.001	0.087	0.008	0.027	0.020	0.001	0.00
16	B12-29-X03	B12-29-H36	7.70	63.56	2.94	0.95	2.64	1.07	1.02	0.008	0.330	0.02	0.002	0.089	0.009	0.026	0.040	0.001	0.00
17	B12-28-X04	B12-28-H28	11.20	62.40	7.72	1.55	2.34	0.63	1.91	0.008	0.075	0.02	0.011	0.013	0.033	0.013	0.060	0.008	0.00
18	B12-29-X05	B12-29-H37	10.70	62.88	7.16	1.37	2.75	0.70	1.87	0.010	0.078	0.04	0.011	0.021	0.040	0.013	0.070	0.009	0.00
19	B12-28-X06	B12-28-H25	9.70	60.65	9.04	2.44	1.88	0.57	1.19	0.007	0.040	0.01	0.009	0.009	0.018	0.013	0.060	0.010	0.00
20	B12-29-X06	B12-29-H39	9.10	59.69	9.47	2.71	2.01	0.60	1.53	0.005	0.046	0.01	0.009	0.012	0.021	0.013	0.060	0.010	0.00

Figure 3. Data examination



Coal Coke Mineral Flux

Select	Sampling No	Date	Order No	Material Name	Supplier	Car Count	Wet Weight	Dry Weight	Analysis Result																
									H2O	TFe	SiO2	P	S	CaO	MgO	Al2O3	MnO	TiO2	Pb	As	Zn	Cu	Sn	K2O	
						Tot···	Total:···	Total: ···	7.843	61.259	6.449	0.142	0.451	2.231	2.179	1.25	1.419	0.413	0.021	0.115	0.052	0.024	0.155	0.031	0
1	B01-06-X01	2014-01-06	4500187525-00010	conc	Kunmi	60	2352.8	2348.094	0.2	56.68	9.39	0.218	0.007	2.68	2.55	2.14	0.25	1.82	0.055	0.089	0.085	0.038	0.160	0.061	0
2	B01-06-X03	2014-01-06	4500187520-00020	conc	Kunmi	48	1760.96	1664.107	5.5	64.14	3.86	0.007	1.303	1.22	1.96	1.16	0.88	0.07	0.001	0.081	0.022	0.025	0.170	0.001	0
3	B01-06-X04	2014-01-06	4500187522-00010	conc	Yunna	16	596.14	534.738	10.3	62.01	7.75	0.008	0.101	1.61	2.61	0.80	2.61	0.02	0.009	0.030	0.039	0.018	0.060	0.015	0
4	B01-06-X05	2014-01-06	4500187520-00010	conc	Yunna	9	341.24	309.505	9.3	64.24	2.84	0.005	0.217	0.52	2.00	1.06	1.12	0.01	0.001	0.103	0.009	0.035	0.020	0.001	0
5	B01-06-X07	2014-01-06	4500188667-00010	conc	Fanzh	158	8627.67	7730.392	10.4	60.95	6.58	0.250	0.179	2.90	2.09	1.18	2.07	0.33	0.026	0.183	0.075	0.018	0.170	0.049	0
6	B01-06-X06	2014-01-06	4500187523-00010	conc	Fanzh	9	345.44	312.623	9.5	59.59	9.99	0.005	0.035	2.54	1.96	0.64	1.21	0.02	0.009	0.009	0.020	0.016	0.060	0.007	0
7	V-2014010802	2014-01-06	4500187527-00010	conc	Kunmi	1	38.25																		
8	B01-07-X01	2014-01-06	4500187520-00020	conc	Yunna	60	2167.9	2000.972	7.7	64.05	4.48	0.009	1.365	1.22	1.98	1.27	0.70	0.11	0.001	0.070	0.018	0.029	0.230	0.001	0

Figure 4. Data matching of quality and quantity

101. Weighing the weight of the vehicle coming in and out the factory, the gross fuel transportation vehicle is measured when the vehicle enters the factory, and the tare weight is measured when the unloading is delivered, and finally the net weight data of the material transported by the vehicle is obtained: as shown in Fig. 2, the data The list is the license plate number, transportation material name, gross weight, tare weight, net weight and other data of each vehicle of the original fuel transportation vehicle;

102. After the material transportation vehicle enters the factory, it is necessary to go to the sampling station to sample the vehicle by sampling module in the system, and sample the batch of the same material supplied by the unified supplier every day to form a sample inspection lot and number it as “B01-01-X01”, sent to the inspection department for sample inspection;

103. After the inspection department performs the sample preparation, the sample and the like according to the sample number of step 102, the inspection result of the inspection batch is obtained: as shown in Fig. 3, the data list is the inspection result data of each inspection batch;

104. The system automatically matches the trains and the inspection results corresponding to each batch according to the result data of step 101 and step 103, and obtains matching result data required by the purchasing department, so that the purchasing department performs the purchase settlement: as shown in Fig. 4, The data list is the number of batches, wet weight, moisture, dry weight, and key component content obtained after each batch quality and quantity match.

Conclusion

The design of the system[11] has the following advantages and effects: it is suitable for the matching of the qualifications and quantity of the purchases of steel enterprises, and the staff of each department use the computer system to record and obtain data, no longer use the traditional paper ledger and spreadsheet; timeliness of data transmission is strengthened, and the staff of each department do not need to exchange data by means of sending mail; the work of data entry and transfer of staff in various departments is eliminated, the probability of human error is reduced; the integration of data is realized by using computer system. And matching greatly improves work efficiency. Strengthen the supervision system and internal control system of materials and standardize the process. The implementation of price comparison by enterprises can not only make the competition in the material market more active, but also increase the cost performance of materials, and further expand the sources of materials for enterprises. Through the development and application of the management system, we can keep abreast of the inertia of the material inventory of the unit, and carry out the dynamic management of the scientific system from the planning, warehousing, delivery, settlement and various economic assessment data to effectively improve the material management. The business of the joint department handles the work efficiency collaboratively; it can realize effective communication between the internal interest rate and external information, so that the enterprise can obtain market information in a timely manner. The scientific and effective application of the material management system in enterprise economic management can promote the normal management of the enterprise economy, promote the best results of the enterprise material management work, and improve the enterprise material management level and maximize the enterprise. The economic benefits have laid a solid foundation. Purchasing work is the guarantee for

the smooth production and operation of each enterprise. Especially in the iron and steel enterprises, it is necessary not only to purchase high-quality and low-cost raw materials, but also to purchase the energy materials at reasonable prices required by the enterprise, so that the steel enterprises can be reduced. Production costs are in an invincible position in the fierce market competition. In the production and operation of iron and steel enterprises, we must strengthen the procurement management of enterprises, improve the attention of enterprise managers on procurement management, formulate reasonable rules and regulations, standardize the procurement process of enterprises, strictly control[10] the quality of procurement materials and raw materials, and cultivate strong sense of responsibility. The comprehensive quality of the procurement staff can ensure the smooth procurement of the enterprise, thereby ensuring the smooth production of steel enterprises, reducing production costs, achieving more profit, and enabling steel companies to survive and develop in such a highly competitive environment.

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