scratches quickly-filling technology, 5. nano anti-friction and in-situ dynamic self-repair technology, 6. ion compound infiltration technology, 7. Non-electric welding technology, 8. structure patch repair technology, 9. wear-resisting repair technology, 10. leak sealing technology, 11. Body-fitted sealing technology, 12. electronic equipment fast-cleaning technology, 13. Fast-cutting technology, 14. robot remanufacturing technology and so on.

D Maintenance effect evaluation theory

Thinking of characters of engineering equipment lash-up maintenance, relatively suitable maintenance effect evaluation methods include comprehensive evaluation method, modeling and simulation method and so on.

1) Comprehensive evaluation method

Comprehensive evaluation method is a method combining qualitative and quantitative evaluation and used when evaluator do not understand some factors of lash-up maintenance, including analytic hierarchy process (AHP), fuzzy comprehensive evaluation, gray system amplitude analysis and DEA evaluation.

2) Modeling and simulation method

Lash-up maintenance effect evaluation based on modeling and simulation method can make use of simulation and modeling technology to establish systematical lash-up maintenance simulation model and carry on simulation experiment to obtain system data, then work out effect evaluation indexes through statistics and handling. Main methods include computer simulation method, system dynamics method, BCPNN method and other methods based on simulation tools.

E Maintenance support informationization technology

Aiming at the requirements of support accuracy, intensity and high efficiency of engineering equipment lash-up maintenance, the research must mainly be on crucial technology of equipment maintenance support information system, advanced communication and data transmission to develop informationization support and optimization technology based on network and computer.

F Lash-up maintenance training technology

Because of limited fund and manpower reduction, modular, simulating and simulation machine technology has become a development tendency of engineering equipment lash-up maintenance training technology. This improving technology must result in advanced lash-up maintenance training capabilities.

1) Simulator technology

Simulator technology can partly solve some problems in equipment lash-up maintenance training. Some engineering equipment component simulators can be established, even complicated full-function simulator can be established, which is operated like a real component, can be disassembled and also targeted.

2) Virtual reality technology

The established computer simulation environment through virtual reality technology contains interactive virtual objects, which enlarges human's cognitive range to analyze equipment's structure, working principle in virtual environment, even carry out lash-up maintenance directly. This can reduce training cost as well as have good training effect.

3) Embedded simulation technology

Embedded lash-up maintenance simulation of engineering equipment defines that in the precondition of not changing inner system structure of engineering equipment, embed the equipment having lash-up maintenance training simulation function into the whole engineering equipment system and make it as part of the system to carry on the training of engineering equipment and personnel.

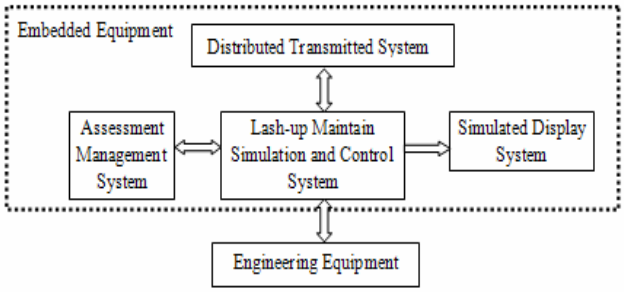

Fig. 3 Framework of Engineering Equipment Embedded Lash-up Maintenance Simulation System

III. Conclusion

In the future a large amount of technology-intensive and high-informationized engineering equipment will be put into use, which brings forward new requirements for engineering equipment technical support. This urgently requires to complete engineering equipment lash-up maintenance technical support system, and improve the research of lash-up maintenance technology and lash-up maintenance material to develop lash-up maintenance technology in the direction of being speedy, automating and intelligentized.

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