

## Development of Remotely Monitoring and Control System for Siemens 840D sl NC Machine Tool Using Snap 7 Codes

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**Abstract**—Based on the understanding of the communication methods and the structure and architecture of databases/data blocks of numeric control (NC) system, an open source communication suite designed specifically for Siemens NC system, Snap 7, is used to realize data acquisition from Siemens 8400 sl NC system of which the communication interfaces are industrial Ethernet. Furthermore, monitoring system for display and analyses of the production processing state is developed and its reliability is evaluated.

**Keywords**—monitoring; remote control; snap 7; 840D sl; NC system

## 1. INTRODUCTION

To meet the competitive priorities like low cost, good quality, short delivery times, high flexibility, and good service [1], modern manufacturing needs rich information on various factors/parameters related to production like those for product design, materials, and particularly production processing. Modern technologies like NC system and information and communication technology (ICT) make it possible to generate/store/transfer data (information) relevant to the situation and conditions during the manufacturing, e.g., the manufacturing parameters, the state of the machine tools and measurement probes and so on [1-4]. Data (information) can be further analyzed to optimize the manufacturing processes, provide basic information for manufacturing execution system (MES), and set the basis for product life management [1,5]. Clearly, realization of the real time monitoring and control system for manufacturing processes becomes very important today. Mainstream NC systems like those of Siemens and Fanuc are not open systems and data acquisition can be made through their own specifically defined interfaces among the system modules or by the exchange between the machine data blocks (MDB) [6]. This situation not only limits the advanced system development based on current mainstream NC systems, but also hinders the interoperability since usually more than one NC systems may be used in manufacturing plants. Therefore, the methods for data acquisition other than those provided by the specific NC system itself are preferable for the development of distributed NC system (DNC) which nowadays constitutes the base for smart manufacturing. In this study, aiming at the realization of monitoring system, we choose a

widely adopted NC system in manufacturing industry, SINUMERIK 840D sl, to explore the methods to extract useful data like those concerning the state of manufacturing, the motor and so on.

## II. SINUMERIK 840D SL NC SYSTEM AND THE MODULES

SINUMERIK 840D sl NC system is capable of high-performance milling and turning and opens up a nearly inexhaustible technology range: from grinding to modern manufacturing technology like the laser machining [6-7]. This system boasts of high flexibility in terms of new manufacturing technology fields. In addition, the SINUMERIK 840D sl also provides excellent modularity of the operator components and has such unique open system architecture that the CNC with this NC system can be optimally adjusted to the machine technology [7]. And the SINUMERIK 840D sl supports various communication protocols and is commutative at all levels. 840D sl mainly consists of human machine interface (HMI), PC unit (PCU), numeric control unit (NCU), drive and motors [7]. The communication architecture is shown as Figure 1.

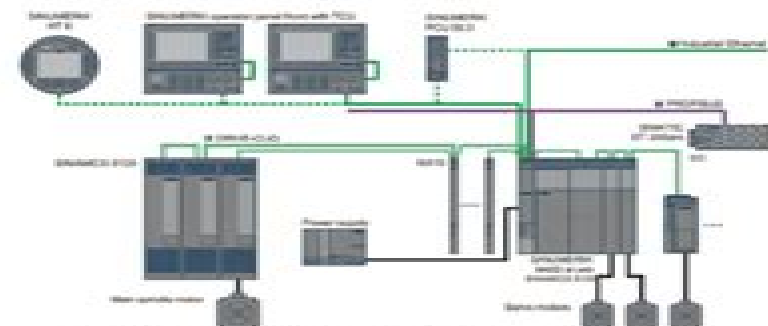


FIGURE 1. COMMUNICATION ARCHITECTURE OF ROAD 51

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