Abstract: In the past, model-based development focused mainly on functional and structural aspects of the system to be developed. Recently, several approaches to include timing aspects have been suggested. However, these approaches focus predominantly on later development phases. Models specifying the requirements with respect to timing without focusing on a specific solution are missing. For example, few models allow the specification of the allowed jitter of a system. In this paper, we identify requirements that are necessary to express the desired timing behavior of hard and soft real-time systems by analyzing different application domains. Based on these results, we evaluate existing approaches with respect to their suitability to model timing requirements and present an suitable approach. Finally, this paper describes the application of the suggested approach in the context of an example from the automation domain.